

1 December 2022

Professor Matthew Tonts  
Chair, Environmental Protection Authority  
Prime House  
8 Davidson Terrace  
JOONDALUP WA 6027

ATTN: Dr Shaun Meredith, Executive Director, EPA Services (DWER)  
by email: [Shaun.Meredith@dwer.wa.gov.au](mailto:Shaun.Meredith@dwer.wa.gov.au)

and

Dr Robert Hughes, Director, EPA Services (DWER)  
by email: [Robert.Hughes@dwer.wa.gov.au](mailto:Robert.Hughes@dwer.wa.gov.au)

Dear Professor Tonts,

**PARKER RANGE IRON ORE HAUL ROAD (EPA ASSESSMENT NO. 2297): REVISED RESPONSE TO SUBMISSIONS SECTION 40(6)(b).**

I refer to Mineral Resources' Parker Range Iron Ore Haul Road (the Revised Proposal) and the Environmental Review Document released for a 2-week public comment between 8 August 2022 to 21 August 2022. I also refer to the submissions received on the Environmental Review Document, comprising submissions from several Government agencies and 1 public submission, and Mineral Resources' Response to Submissions report (Revision 0) submitted to the Environmental Protection Authority (EPA) in accordance with Section 40(6)(b) of the State *Environmental Protection Act 1986* (WA) on 26 October 2022.

Mineral Resources' *revised* Response to Submissions report (Revision 1) is appended to this letter. As requested, the revised Response to Submissions report consolidates the additional information provided by Mineral Resources since the initial revision, and the additional information requested by EPA in its letter dated 30 November 2022. .

Mineral Resources considers the submissions do not substantially alter the information or assessment outcomes as presented within Mineral Resources' Environmental Review Document. Mineral Resources therefore respectfully requests the Environmental Protection Authority (EPA) to accept this response to submissions and proceed to complete the environmental assessment process.

As noted within the responses, Mineral Resources has provided additional information to clarify the assessment, and where appropriate, has accepted the submissions and agreed to modify the management of the Revised Proposal (in order to enable the EPA's assessment processes to proceed).

I look forward to receiving confirmation from EPA of acceptance of Mineral Resources response to submissions, and confirmation that the Revised Proposal will be put to the EPA Board for consideration at the next available meeting (December 2022).

The effort made by the Government agencies to consider the Environmental Review Document is acknowledged and greatly appreciated by Mineral Resources. As part of Mineral Resources' ongoing consultation process with key stakeholders, Mineral Resources will provide a copy of this letter and response to the representatives of each of the Government agencies to ensure they remain informed of our views and response to their submissions for this Proposal.

A number of matters raised in the submissions will require the EPA to consider the environmental conditions to be applied to control the environmental effects of the Revised Proposal. As outlined in my recent correspondence dated 12 October 2022, Mineral Resources anticipates a separate Statement of approval can be issued for the Revised Proposal (consistent with Section 40AA(6)(a)) with implementation conditions to include a requirement for the implementation of:

- (a) Significant Flora Construction Management Plan
- (b) Significant Fauna Management Plan and
- (c) Fauna Offset Strategy.

The Significant Flora Construction Management Plan, Significant Fauna Management Plan and the Fauna Offset Strategy referred to above were submitted with the Environmental Review Document for the Haul Road. Implementation of the above plans/strategy will ensure the potential environmental effects of the Haul Road are appropriately managed, monitored and offset to meet the EPA's objectives for the environmental factors of 'Flora and Vegetation' and 'Terrestrial Fauna'.

Mineral Resources would welcome discussion with the EPA Chair on the responses to submissions, or of Mineral Resources' proposed environmental management approach, if needed.

I look forward to your acceptance of Mineral Resources' Response to Submissions, and I appreciate the continued efforts of personnel within EPA Services as we move towards the completion of the environmental assessment process.

Please do not hesitate to contact me if you have any queries.

Yours faithfully



Les Purves  
General Manager – Environment, Approvals, Land Access

**Attachments:**

1. Mineral Resources Limited (2022) *Parker Range Iron Ore Project Haul Road: Response to Submissions Section 40(6)(b)*. Report prepared by Hawkins S of Globe Environments Australia Pty Ltd for JBS&G on behalf of Mineral Resources Limited. Revision 1. December 2022.

**Copy to:**

1. Mr Sam Liberidis, Assessment Officer, Department of Climate Change, Energy, the Environment and Water
2. Ms Leanne Zheng, Senior Environmental Officer, Department of Water and Environmental Regulation
3. Ms Michelle Corbellini, Manager Environmental Management Branch, Department of Biodiversity, Conservation and Attractions
4. Ms Karen Caple, Executive Director, Department of Mines, Industry Regulation and Safety
5. Ms Tanya Butler, Director Heritage Operations, Department of Planning, Lands and Heritage
6. Mr Peter Woronzow, Commissioner, Main Roads Western Australia
7. Mr Nic Warren, Chief Executive Officer, Shire of Yilgarn

# Parker Range Iron Ore Project Haul Road


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## RESPONSE TO SUBMISSIONS

*Environmental Protection Act 1986 (WA)*  
Section 40(6)(b)



CONTACT INFORMATION	
Proponent:	Polaris Metals Pty Ltd
Address:	20 Walters Drive, Osborne Park WA 6017
Postal Address:	Locked Bag 13, Osborne Park WA 6017
Corporate Contact:	Les Purves, General Manager - Environment, Approvals, Land Access
Phone:	(08) 9329 3407 / 0437 595 684
Email:	les.purves@mrl.com.au

DECLARATION	
I declare that I am authorised to submit this Response to Submissions document on behalf of Polaris Metals Pty Ltd, a wholly-owned subsidiary of Mineral Resources Limited:	
Name: Les Purves	Signature: 
Role: General Manager – Environment, Approvals, Land Access	

DOCUMENT CONTROL					
REV	DATE	PREPARED BY	REVIEWED BY	APPROVED BY	DOCUMENT PURPOSE
A	13.10.2022	S Hawkins (Globe Environments for JBS&G)	N Smith (Mineral Resources)	-	Draft Response to Submissions
B	20.10.2022	S Hawkins (Globe Environments for JBS&G)	N Smith, B Holloway, A Parker, L Purves (Mineral Resources)	-	Draft Response to Submissions
0	26.10.2022	S Hawkins (Globe Environments for JBS&G)	N Smith (Mineral Resources)	L Purves (Mineral Resources)	Response to Submissions
1	01.12.2022	S Hawkins (Globe Environments for JBS&G)	N Smith (Mineral Resources)	Les Purves (Mineral Resources) Signature: 	Revised Response to Submissions

**Citation**

This report should be cited as:

Mineral Resources Limited (2022) *Parker Range Iron Ore Project Haul Road: Response to Submissions Section 40(6)(b)*. Report prepared by Hawkins S of Globe Environments Australia Pty Ltd for JBS&G Australia on behalf of Mineral Resources Limited. Revision 1. December 2022.

**Acknowledgement**

This report includes recent contributions provided by Mineral Resources’ supporting consultants. The assistance and contributions of Mineral Resources’ supporting consultants is acknowledged and appreciated.

**Limitations**

This report has been prepared by Globe Environments Australia Pty Ltd on behalf of JBS&G (JBS&G Australia Pty Ltd) for the exclusive use of the Client, Mineral Resources Limited, for the sole purpose stated in the report title. Globe Environments has prepared this report in a manner consistent with the normal level of care and expertise exercised by members of the environmental services profession. In preparing this report, Globe Environments has relied on information provided by the Client, as well as other publicly available contextual information, all of which is presumed accurate and complete on receipt. Globe Environments makes no warranty and accepts no liability for the use of this report by persons other than the Client or for use of this report in excess of its stated purpose.

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## EXECUTIVE SUMMARY

The Parker Range Iron Ore Project (the Approved Proposal) is located approximately 15 km south-east of Marvel Loch, within the Shire of Yilgarn, in the Eastern Wheatbelt Region of Western Australia. The Approved Proposal consists of a mine and haul road spur, with the mine forecast to operate for a period of up to 10 years with an ore production throughput of approximately 4 million tonnes per annum. Development of the Approved Proposal commenced in July 2020. Polaris Metals Pty Ltd (Polaris Metals), a wholly-owned subsidiary of Mineral Resources Limited (Mineral Resources), is the Proponent for the Approved Proposal.

In order to support the continued growth and optimisation of Mineral Resources' broader Yilgarn Operations, the Approved Proposal is now proposed to be developed as a connected satellite operation to Minerals Resources' Koolyanobbing Operations, located approximately 90 km north of the Approved Proposal. Mineral Resources propose to revise the Approved Proposal to include the development of a Haul Road (the Revised Proposal) of approximately 52 km length to connect the Approved Proposal with the Koolyanobbing Operations (Figure 1).

The Development Envelope and the Indicative Footprint for the Haul Road has been designed to avoid and minimise potential impacts to the recorded environmental values, in particular, breeding habitat of the Malleefowl *Leipoa ocellata* (EPBC-V, BC-V), breeding habitat for Chuditch *Dasyurus geoffroi* (EPBC-V, BC-V), and a colony of the sugar ant *Camponotus* sp. nr. *terebrans* which may potentially provide habitat for the Arid Bronze Azure Butterfly *Ogyris subterrestris petrina* (EPBC-CE, BC-CE).

The Revised Proposal (Haul Road) was referred for environmental assessment under the State *Environmental Protection Act 1986* (WA) in May 2021, with the State Environmental Protection Authority (EPA) determining the Revised Proposal would be subject to an environmental assessment at the level of 'Referral Information' to consider the EPA's environmental factors of 'Flora and Vegetation' and 'Terrestrial Fauna'.

Concurrently, the Revised Proposal was also referred for environmental assessment in June 2021 under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (C'th), with the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) determining the Revised Proposal would be subject to an environmental assessment as an 'Accredited Assessment' (to be coordinated by the EPA) to consider the impact to the listed 'Threatened' fauna Malleefowl, Chuditch and the Arid Bronze Azure Butterfly as 'Matters of National Environmental Significance'.

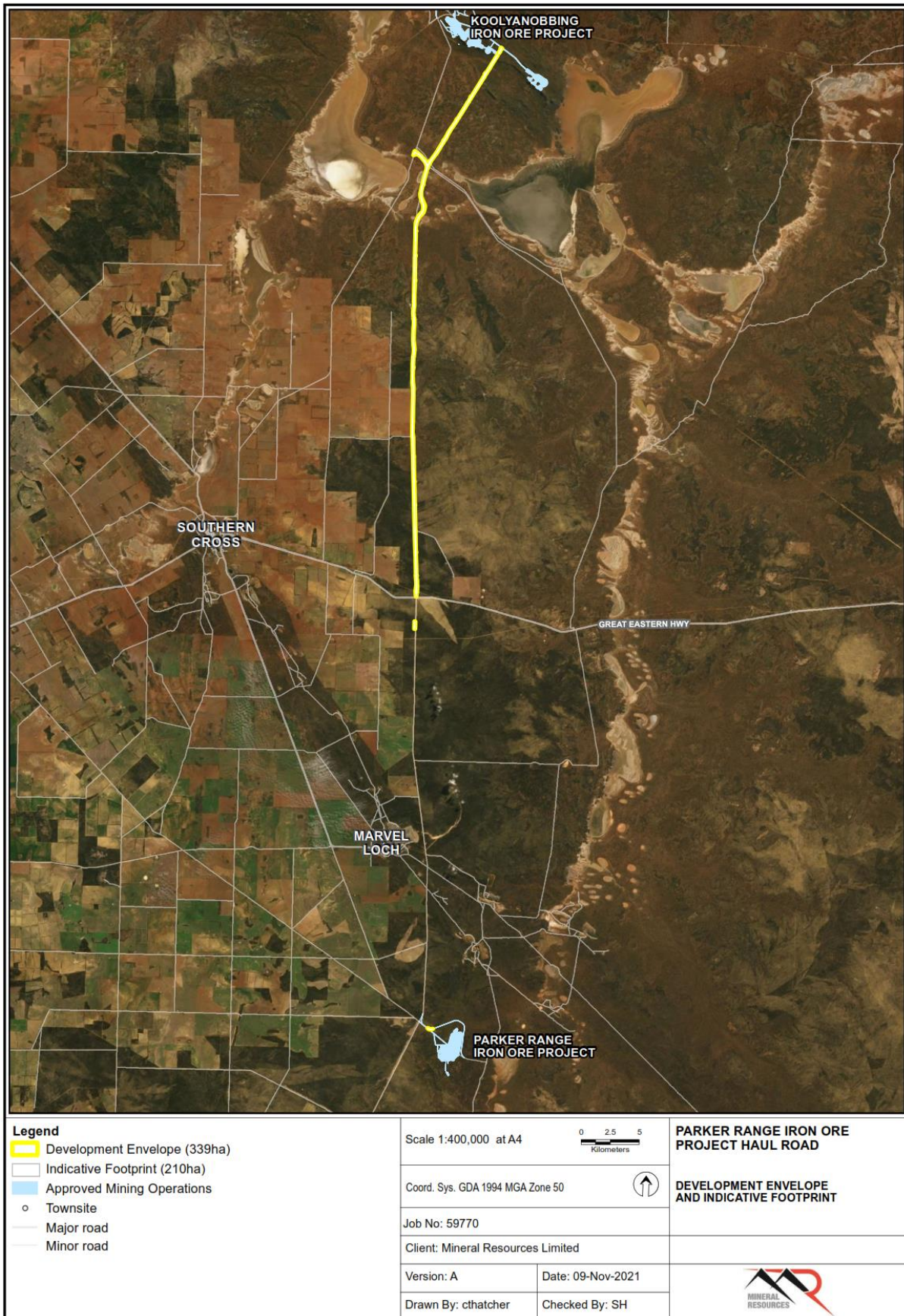
An Environmental Review Document was prepared by Mineral Resources to assess the environmental effects of the Revised Proposal, meeting the assessment requirements of both EPA and DCCEEW through the Accredited Assessment process. The Environmental Review Document incorporated the results of the baseline environmental surveys and included a number of management plans/strategies to outline how Mineral Resources proposes to avoid, manage and offset the environmental effects to the identified environmental values.

Mineral Resources' Environmental Review Document was released for a 2-week public comment period during August 2022, with submissions received from a number of Government agencies as well as 1 public submission. As part of the environmental assessment process, in accordance with Section 40(6)(b) of the *State Environmental Protection Act 1986* (WA), the EPA requires Mineral Resources to review and respond to the submissions received. This Report forms Mineral Resources' response to submissions in accordance with Section 40(6)(b) of the Act, with the submissions received and Mineral Resources' response outlined within Table 1 to Table 8 (below).

Mineral Resources considers the submissions received do not substantially alter the information or assessment outcomes as presented within the Environmental Review Document. As noted within the responses, Mineral Resources has provided additional information to clarify the assessment, and where appropriate, has accepted the submissions and agreed to adjust the proposed management of the Revised Proposal.

Based on the mitigation and management measures outlined within the Environmental Review Document, the Revised Proposal is considered to meet the EPA's objectives for the preliminary key environmental factors of 'Flora and Vegetation' and 'Terrestrial Fauna', and to meet the DCCEEW's objectives for listed 'Threatened' fauna as 'Matters of National Environmental Significance'. With the application of environmental management plans, the Revised Proposal will avoid or minimise impacts on the identified environmental values; such that the Revised Proposal can be implemented without significant impact to the health, diversity or productivity of the environment. The potential for significant residual impact to the fauna habitat for Malleefowl and Chuditch can be appropriately mitigated through the application of an environmental offset.

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File Name: \\008pmpr004v001.jbgaust\JBS Perth\Projects\1\Open\Mineral Resources\59770 Parker Range Haul Road\GIS\Maps\R10\_Rev\_A\59770\_03\_IndicativeFootprint.mxd  
 Image Reference: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

**FIGURE 1: PROPOSAL LOCATION - REGIONAL**

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TABLE 1 – THE PROPOSAL (GENERAL)

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
PUBLIC SUBMISSION		
1	<p>Concern raised that the proposal would be located adjacent to the Emu Fence Road and may lead to an increase in road accidents, particularly at night.</p>	<p><b>Response:</b></p> <p>Mineral Resources notes the concern raised in the public submission of the need to maintain public safety. Mineral Resources have worked closely with multiple Government agencies (Main Roads, Shire of Yilgarn and the Department of Primary Industry and Regional Development (DPIRD)) to ensure the proposed Haul Road is designed, constructed and operated to meet all required safety standards. Public safety has been a primary consideration in the design of the proposed Haul Road, and public safety will continue to be a primary consideration during its operation.</p> <p>To provide an overview, the proposed Haul Road is approximately 52 km in length, extending from the Great Eastern Highway northwards to Mineral Resources' Koolyanobbing Range mine operations. The Haul Road includes a section which will replace the existing Emu Fence Road on which <i>both</i> mining vehicles and public vehicles will operate, and a new section to be restricted to Mineral Resources' mining vehicles only (nil public access / risk).</p> <p>To minimise the environmental disturbance footprint, the initial approximately 14 km length of the Haul Road extending from the Great Eastern Highway (south) to Wheatley Road (north) will <i>replace</i> the current Emu Fence Road and will remain a shared public road; consistent with the agreement with the Shire of Yilgarn. This section of Emu Fence Road will be upgraded to a Main Roads RAV Network 10 standard dual carriageway, comprising a 3.5m lane width and 1.5m shoulder width. The replacement of this section of Emu Fence Road will provide an overall improvement in the current road design and condition; such that it will provide an overall improvement for public safety in the long-term.</p> <p>Mineral Resources acknowledges this initial 14 km section of the proposed Haul Road (i.e. the replaced Emu Fence Road) will have interaction between public vehicles and Mineral Resources' mining vehicles. The interaction of vehicles has been considered in the engineering design to ensure the traffic direction/flow is clear (i.e. roads appear and function in the manner which drivers expect them to). This engineering design is reinforced through road markings (where required) as well as traffic signage at locations where the traffic conditions change (e.g. a change in speed limit, approach of intersections, change from public road to 'private' road). The combination of engineering design, road markings and traffic signage will ensure that the public is informed of traffic direction and access; such that a potential risk of road accidents will be low during both daytime and night operations.</p> <p>It should be noted that as a result of the relatively high traffic volume on Great Eastern Highway (compared to other nearby roads), it is the intersection of the proposed Haul Road with the Great Eastern Highway which is considered to present the greatest potential interaction between private vehicles and Mineral Resources' mining vehicles. This intersection will be designed with engineering and traffic input (and approval) from Main Roads to comply with all regulatory standards; with public safety again being the primary consideration in the engineering design of this intersection. Similar to the above, the combination of engineering design, road markings and traffic signage will ensure that the public is informed of traffic direction and access to ensure public safety is maintained.</p> <p>Although publicly available maps indicate the public Emu Fence Road continues north of Wheatley Road to Lake Seabrook Road, this area north of Wheatley Road is not a public road, but rather, is a 'track'. What may appear to be a continuation of the Emu Fence Road is an access track operated by the Department of Primary Industries and Regional Development (DPIRD) within the State Barrier Fence Crown Reserve to allow for DPIRD personnel to inspect and maintain the State Barrier Fence. This track is a 'private' track with its use restricted to DPIRD-authorized vehicles only; with nil public access permitted. Mineral Resources and DPIRD have established an agreement to allow Mineral Resources to construct and operate the Haul Road within the State Barrier Fence Crown Reserve between Wheatley Road (south) to Lake Seabrook Road (north) (approximately 25 km length). In this area, the Haul Road will be constructed and operated <i>adjacent</i> to the DPIRD access track for the State Barrier Fence, with this section of the Haul Road restricted to Mineral Resources'-authorized vehicles only (nil public use). The existing access track for the State Barrier Fence will be retained by DPIRD to allow for DPIRD to continue to inspect and maintain the fence, without interaction with Mineral Resources' mining vehicles. As the public Emu Fence Road ends at Wheatley Road, the Haul Road does not present any risk of interaction with public vehicles north of Wheatley Road. The exclusion of public vehicles on this section of the Haul Road will ensure that there is no potential risk to public safety.</p> <p>From Lake Seabrook Road (south) to the Koolyanobbing Range mine operations (north) (approximately 13 km length) the Haul Road will also be restricted to Mineral Resources'-authorized vehicles only. Accordingly, the exclusion of public vehicles on this section of the proposed Haul Road will ensure that there is no potential risk to public safety.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources notes the concern raised in the public submission of the need to maintain public safety. Safety has been a primary consideration in the design of the proposed Haul Road, with safety to continue to be a primary consideration during operation of the Haul Road.</p> <p>No changes to the Revised Proposal are considered necessary in response to this submission item.</p>

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NO	SUBMISSION	MINERAL RESOURCES RESPONSE
EPA SERVICES (DEPARTMENT OF WATER AND ENVIRONMENTAL REGULATION, DWER)		
2	<p>The Environmental Review Document (ERD) describes a development envelope and indicative footprint. Consistent with EPA Guidance (2021) on How to identify the Content of a Proposal Instruction and template, while the development envelope approach provides some flexibility for the location of the proposal footprint, the potential impacts of all flexibility options will usually need to be assessed by the EPA.</p> <p>The quantification of Significant Residual Impacts for the proposal should be revised based on the whole development envelope and not just the indicative footprint. Alternatively, Mineral Resources Ltd (MRL) can choose to confirm the disturbance footprint for the proposal.</p>	<p><b>Response:</b></p> <p>The Environmental Review Document identifies the Revised Proposal comprises an Indicative Footprint of 210 ha within a broader Development Envelope of 339 ha. The Indicative Footprint of 210 ha comprises 173 ha of native vegetation (to be cleared) and 37 ha of existing cleared/disturbed land. The 173 ha value is a restriction (limit) for the Revised Proposal.</p> <p>The approach of using a larger Development Envelope within which there is a smaller Indicative Footprint and/or prescribed disturbance value is an accepted practice consistent with the EPA (2021) guidance document <i>How to Identify the Content of a Proposal: Instruction and Template</i>. The advantage of this approach is that it will provide for some degree of flexibility during implementation of the Revised Proposal (but subject to the spatial limitations of the Development Envelope and the area limitation of the native vegetation clearing). This flexibility also minimises the potential additional environmental assessment (through Section 45C of the State <i>Environmental Protection Act 1986</i> (WA) and Section 156A of the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (C'th) for any minor adjustments, compared to a fixed disturbance footprint option.</p> <p>Mineral Resources acknowledges the EPA will need to consider the potential environmental effects of the Revised Proposal taking into account the spatial extents of both the Indicative Footprint and the larger Development Envelope. In addition, the EPA should have regard to the 173 ha limit on native vegetation clearing which is to be applied as a restriction to the Revised Proposal (i.e. the EPA assessment should not contemplate clearing of native vegetation up to the full extent of the 339 ha Development Envelope or the 210 ha Indicative Footprint). To enable the EPA to assess the Revised Proposal in this manner, the Environmental Review Document identifies the flora and vegetation values and the terrestrial fauna values for both the Indicative Footprint and the Development Envelope throughout the document (i.e. the impact values presented in tables identify the values for both the Indicative Footprint and the Development Envelope).</p> <p>The Residual Impact Significance Model, outlined within Section 10 <i>Environmental Offsets</i> of the Environmental Review Document, identifies the 173 ha value of native vegetation clearing as the basis for the value calculations. It is not considered appropriate to quantify the significant residual impacts based on the whole Development Envelope (339 ha) as suggested by the submission, noting (as above) the native vegetation clearing will be limited to a total of 173 ha. Accordingly, Mineral Resources considers the Environmental Review Document correctly and appropriately considers the quantification of significant residual impacts using the 173 ha value limit for native vegetation clearing.</p> <p>Based on the above, Mineral Resources does not see benefit in adjusting the approach of the Development Envelope and Indicative Footprint by moving to a fixed disturbance footprint option. Mineral Resources acknowledges the EPA will consider the potential environmental effects of the Revised Proposal taking into account the spatial extents of the Indicative Footprint, the Development Envelope and the native vegetation clearing limit.</p> <p><b>Proposed Outcome:</b></p> <p>The Environmental Review Document identifies an Indicative Footprint and a Development Envelope within which up to 173 ha of native vegetation is proposed to be cleared; consistent with the EPA (2021) guidance document <i>How to Identify the Content of a Proposal: Instruction and Template</i>. Mineral Resources notes that EPA will need to consider the potential environmental effects of the Revised Proposal taking into account the spatial extents of the Indicative Footprint, the Development Envelope and the native vegetation clearing limit, with the information presented within the Environmental Review Document appropriate to enable EPA to complete its assessment in this manner.</p>
MAIN ROADS WESTERN AUSTRALIA		
3	<p>The proposed haul road to connect the Parker Range mine with its Koolyanobbing Operations intersects with the Great Eastern Highway at Emu Fence Road. The Great Eastern Highway is under the responsibility of Main Roads. Once the proposed haul road is operational, there will be a significant increase in the number of trucks crossing Great Eastern Highway.</p> <p>Consultation with Main Roads on the Great Eastern Highway - Emu Fence Road crossing as detailed in the Environmental Review Document (ERD) has been limited to date. It is noted that Mineral Resources Ltd (MRL) has been in consultation with Main Roads regarding the current temporary haulage arrangement on Great Eastern Highway between Emu Fence Road and Mt Walton Road.</p> <p>To ensure the public safety of Great Eastern Highway road users, it is strongly recommended that MRL work with Main Roads to understand road crossing upgrade requirements and to seek relevant environmental approvals associated with the crossing.</p> <p>Furthermore, when the haul road is no longer required for operations due to closure of the mine, it will either be handed over to Main Roads or Council, or it will be decommissioned and rehabilitated. It is recommended MRL liaise with Main Roads regarding this arrangement prior to the road no longer being required.</p>	<p><b>Response:</b></p> <p>Mineral Resources acknowledges Main Roads Western Australia (Main Roads) as a key stakeholder for the proposal, in particular, for the intersection of the Haul Road with Main Roads' Great Eastern Highway public road. The Revised Proposal will result in haulage vehicles crossing the Great Eastern Highway. Mineral Resources agrees with Main Roads that public safety of road users on the Great Eastern Highway is a primary consideration in the design of the proposed Haul Road, and with public safety will continue to be a primary consideration during its operation.</p> <p>Mineral Resources has met with representatives for Main Roads on multiple occasions, the most recent being in September 2022 to specifically discuss the intersection design, project duration and the proposed ore haulage activities. Mineral Resources will continue to engage with Main Roads on the intersection design and construction to allow haulage vehicles to safely cross the Great Eastern Highway, and to ensure all concerns are addressed and appropriate controls implemented to manage any identified risks.</p> <p>Earlier consultation with Main Roads representatives identified that environmental approvals for the intersection with Great Eastern Highway within the Main Roads -controlled road reserve will occur through Main Road's Native Vegetation Clearing Permit (Statewide Clearing Permit) under the <i>Environmental Protection Act 1986</i> (WA). This process will ensure that the intersection will be designed and constructed consistent with all Main Roads' requirements and standards. Noting this separate assessment and approval process, accordingly, the area of the Revised Proposal excludes the area of the Main Roads -controlled road reserve.</p> <p>Mineral Resources acknowledges that in addition to the design, construction and operation of the intersection with the Great Eastern Highway, the interests of Main Roads extend to the long-term removal/retention of the intersection following the use of the Haul Road by Mineral Resources. Mineral Resources will</p>

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NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p>ensure that Main Roads is identified within the Mining Proposal and Mine Closure Plan as a key stakeholder in relation to the removal/retention of the intersection with the Great Eastern Highway.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources acknowledges Main Roads as a key stakeholder for the Revised Proposal, and will continue to engage with Main Roads on the intersection design and construction so as to allow haulage vehicles to safely cross the Great Eastern Highway.</p> <p>Mineral Resources will ensure that Main Roads is identified within the Mining Proposal and Mine Closure Plan as a key stakeholder in relation to the removal/retention of the intersection of the Haul Road with the Great Eastern Highway public road.</p>
<b>DEPARTMENT OF MINES, INDUSTRY REGULATION AND SAFETY (DMIRS)</b>		
4	<p>DMIRS notes that the proposed post-mining land use for the haul road is not yet confirmed and that the current preference is for long-term utilisation of the infrastructure by stakeholders. In the early stages of a mining project, it may be acceptable for provisional or proposed post-mining land uses to be identified, provided that there has been adequate engagement with the key stakeholders.</p> <p>This should also involve a clear process and timeline to further identify the agreed post-mining land use.</p> <p>Should the agreed post-mining land use result in the closure and rehabilitation of the haul road, specific closure strategies for the reinstatement and continuation of natural surface water flows are to be included in the mine closure plan.</p> <p>Alternatively, should the haul road remain vested with other stakeholders, the required maintenance and upkeep of drainage infrastructure must be communicated to and agreed with those stakeholders. This should be demonstrated in the stakeholder consultation of the relevant mine closure plan.</p>	<p><b>Response:</b></p> <p>The Environmental Review Document (at multiple locations) identifies that following Mineral Resources' use of the Haul Road, it is proposed the road infrastructure will be removed and the area rehabilitated to enable the long-term restoration of environmental values (native vegetation and fauna habitat). Removal of the Haul Road infrastructure and rehabilitation of the area is the default post-mining land use (PMLU) outcome proposed by Mineral Resources. Mineral Resources is in the process of amending the Mining Proposal and Mine Closure Plan for the Parker Range Iron Ore Project (the mine) to incorporate the proposed Haul Road. The amended Mining Proposal and Mine Closure Plan are scheduled for submission to DMIRS in Q4 2022 for assessment and approval under the State <i>Mining Act 1978 (WA)</i>. The Mining Proposal and Mine Closure Plan will detail the rehabilitation activities associated with the Haul Road (as the default PMLU), including the reinstatement and continuation of natural surface water drainage flows.</p> <p>As a potential alternative (but not the default PMLU), the Environmental Review Document also identifies that <i>if</i> an ongoing beneficial social or economic use of the road infrastructure is identified then the Haul Road (or part of) may be retained for ongoing use to provide a long-term economic and/or social advantage, with management of the Haul Road (or part of) transferred to a relevant Government authority or other appropriate body. Currently, an ongoing beneficial social or economic use of the road infrastructure has not been identified, however, such opportunity for an ongoing beneficial use may be identified in the future. In the event that an ongoing beneficial social or economic use of the road infrastructure is identified, then detailed consultation with all key stakeholders will be necessary (at that time) to identify and resolve all matters related to the proposed use, maintenance (including surface water drainage), transfer of the infrastructure, relevant timelines and the establishment of any required agreements. The Mining Proposal and Mine Closure Plan will outline the requirement for detailed consultation with all key stakeholders in the event that an ongoing beneficial use of the road infrastructure is identified.</p> <p>For the section of the proposed Haul Road between the Great Eastern Highway and Wheatley Road, this section will replace this section of the public Emu Fence Road, and accordingly, this section of the Haul Road will be retained as a public road. The Road Use Agreement established with the Shire of Yilgarn requires Mineral Resources to maintain this section of the Emu Fence Road in its original condition or to an alternate agreed condition until such time as the road is handed back to the Shire of Yilgarn. The retention of this section of the proposed Haul Road (the replaced Emu Fence Road) will be outlined within the Mining Proposal and Mine Closure Plan.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources will ensure the Mining Proposal and Mine Closure Plan to be submitted for assessment and approval under the State <i>Mining Act 1978 (WA)</i> addresses:</p> <ul style="list-style-type: none"> <li>(a) Rehabilitation activities associated with the Haul Road, including the reinstatement and continuation of natural surface water drainage flows.</li> <li>(b) Retention of the section of the Haul Road between the Great Eastern Highway and Wheatley Road, to be part of the public road Emu Fence Road.</li> </ul> <p>The requirement for detailed consultation with all key stakeholders in the event that an ongoing beneficial use of the road infrastructure is identified (to identify and resolve all matters related to the proposed use, maintenance (including surface water drainage), transfer of the infrastructure, relevant timelines and the establishment of any required agreements).</p>
5	<p>It is not clear whether the small alignment variation for the Parker Range Road is on appropriate Mining Act tenure.</p>	<p><b>Response:</b></p> <p>The Environmental Review Document identifies the Revised Proposal includes a small alignment variation for the Parker Range Road (a public road managed by the Shire of Yilgarn) proposed to assist in the bypassing of low-volume public traffic around the Parker Range mining operations, with this area occurring within Unallocated Crown Land (refer p27). As this small alignment variation is for a public road (i.e. not to be used for mining purposes) it does not require tenure under the State <i>Mining Act 1978 (WA)</i>, and accordingly, will not be included within the Mining Proposal or the Mine Closure Plan to be submitted to DMIRS. This small alignment variation for the public Parker Range Road has been included as part of the Revised Proposal under the State <i>Environmental Protection Act 1986 (WA)</i> assessment process to provide a mechanism for the assessment and approval of the native vegetation clearing / fauna habitat clearing (including consideration of cumulative impacts); consistent with the approach previously undertaken for the environmental assessment of the Parker Range Road Bypass as a component of the Parker Range mining operations.</p>

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p><b>Proposed Outcome:</b></p> <p>The small alignment variation for the public Parker Range Road has been included as part of the Revised Proposal under the State <i>Environmental Protection Act 1986</i> (WA) assessment process to provide a mechanism for the assessment and approval of the native vegetation clearing / fauna habitat clearing. The small alignment variation occurs within Unallocated Crown Land. As this small alignment variation is for a public road (i.e. not to be used for mining purposes) it does not require tenure under the State <i>Mining Act 1978</i> (WA), and accordingly, will not be included within the Mining Proposal or the Mine Closure Plan to be submitted to DMIRS.</p>
6	<p>DMIRS will conduct an analysis of the Project via assessment of a mining proposal and mine closure plan required to be submitted for operational approval in accordance with Section 82A(2)(b) of the Mining Act 1978. The assessment will focus on aspects of the project not directly managed under other applicable legislation and will result in agreed outcomes that will ensure the project will meet the DMIRS Objectives Policy for Mining.</p>	<p><b>Response:</b></p> <p>Mineral Resources acknowledges and accepts the DMIRS submission that the Revised Proposal will be assessed through a Mining Proposal and Mine Closure Plan as required under the State <i>Mining Act 1978</i> (WA) to ensure the DMIRS (2020) document <i>Environmental Objectives Policy for Mining</i> is met.</p> <p>Mineral Resources is in the process of amending the Mining Proposal and Mine Closure Plan for the Parker Range mining operations (the Approved Proposal) to incorporate the proposed Haul Road. The amended Mining Proposal and Mine Closure Plan are scheduled for submission to DMIRS in Q4 2022 for assessment and approval by DMIRS under the State <i>Mining Act 1978</i> (WA).</p> <p><b>Proposed Outcome:</b></p> <p>The submission from DMIRS is acknowledged and accepted.</p>
SHIRE OF YILGARN		
7	<p>The Shire of Yilgarn opposes the exclusive use by the proponent and contractors of the proposed road north of the Great Eastern Highway. The Shire seeks provision that the road would be made available, on fair commercial terms, to third party commercial users.</p>	<p><b>Response:</b></p> <p>The proposed Haul Road will <i>replace</i> part of the public Emu Fence Road between the Great Eastern Highway and Wheatley Road. The replaced section will be upgraded to a Main Roads' RAV Network 10 standard dual carriageway, comprising a 3.5m lane width and 1.5m shoulder width, with the replacement section to provide an overall improvement in the current road design and condition to provide an overall improvement for public safety in the long-term. This section between the Great Eastern Highway and Wheatley Road will remain a public road accessible to all road users (not for exclusive use by Mineral Resources).</p> <p>The proposed Haul Road section north of Wheatley Road to the Koolyanobbing Range mine operations will be a new road, and with existing cleared areas used to the extent possible to minimise the additional native vegetation clearing required. Whilst this section will be constructed and operated for the purpose of Mineral Resources' ore haulage (with nil public access), Mineral Resources would welcome discussions with third-parties for this section to be available for use on fair commercial terms (taking into account the life-cycle costs for construction, maintenance and removal/rehabilitation). It is noted that any third-party use would additionally require agreement with DPIRD as the landowner for the State Barrier Fence Crown Reserve, and further agreement/approval with DMIRS <i>may</i> be necessary if the proposed third-party use was not for operations under the <i>Mining Act 1978</i> (WA) (as the Haul Road will be authorised under the State <i>Mining Act 1978</i> (WA) for mining purposes only, not applicable to general non-mining uses). Mineral Resources' position of welcoming potential third party use is consistent with the view expressed within the Environmental Review Document which notes the potential for ongoing beneficial social or economic use of the road infrastructure beyond the timeframe required by Mineral Resources. Mineral Resources would be most appreciative of the Shire of Yilgarn in providing commercial connection to any potential third-party users for the proposed Haul Road to enable third-party use discussions to occur.</p> <p><b>Proposed Outcome:</b></p> <p>The proposed Haul Road between the Great Eastern Highway and Wheatley Road will <i>replace</i> part of the public road Emu Fence Road, with this section to remain available for public use.</p> <p>The proposed Haul Road between the Wheatley Road and the Koolyanobbing Range mine operations will be for use by Mineral Resources' mining vehicles (nil public use), however, Mineral Resources welcomes discussion with potential third-party users for use of this section on fair commercial terms, and subject to agreement with other Government agencies (as required). Mineral Resources would be most appreciative of the Shire of Yilgarn in providing commercial connection to any potential third-party users for the proposed Haul Road to enable third-party use discussions to occur.</p>

**TABLE 2 – FLORA AND VEGETATION**

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
EPA SERVICES (DEPARTMENT OF WATER AND ENVIRONMENTAL REGULATION, DWER)		
1	<p>The post-mining land use of the haul road is not confirmed and there is the possibility that the haul road will be decommissioned and rehabilitated at the end of mining. The ERD states that the likelihood of successful rehabilitation is high considering previous rehabilitation experience in the area. The Significant Flora Construction Management Plan is intended for construction purposes and does not address post-construction land use, rehabilitation actions or rehabilitation monitoring. There is a lack of clarity on what rehabilitation actions would be implemented, should the haul road not be retained as a road.</p> <p>Further information should be provided outlining the proposed rehabilitation actions in the event that post-mining land use of the haul road is not agreed upon.</p>	<p><b>Response:</b></p> <p>The Environmental Review Document identifies that following Mineral Resources' use of the Haul Road, it is proposed the road infrastructure will be removed and the area rehabilitated to enable the long-term restoration of environmental values (native vegetation and fauna habitat). Removal of the Haul Road infrastructure and rehabilitation of the land area is the default post-mining land use (PMLU) outcome proposed by Mineral Resources.</p> <p>The <i>Mining Act 1978 (WA)</i> is the primary legislation which controls mine closure, including rehabilitation activities. Mineral Resources is in the process of amending its Mine Closure Plan for the Parker Range Iron Ore Project (the mining area) to incorporate the proposed Haul Road. The Mine Closure Plan will detail the rehabilitation activities for the Haul Road. The amended Mine Closure Plan is scheduled for submission to DMIRS in Q4 2022 for assessment and approval under the State <i>Mining Act 1978 (WA)</i>.</p> <p>The DWER submission is correct that the submitted Significant Flora Construction Management Plan is intended only for construction of the Haul Road. Whilst noting this, the Environmental Review Document and the Significant Flora Construction Management Plan identify that vegetation and topsoil/subsoil cleared during construction of the Haul Road will be separately stockpiled and managed to enable its re-use during the post-mining rehabilitation of the Haul Road.</p> <p>The Mine Closure Plan (referred to above) is considered the appropriate mechanism by which to outline and control the post-mining rehabilitation works for the Haul Road. The Mine Closure Plan will outline that the Haul Road will be removed at the completion of its operational life and the area rehabilitated with native vegetation. The rehabilitation works will seek to restore the native vegetation values (and fauna habitat). The rehabilitation works will be undertaken in accordance with standard rehabilitation practices (e.g. site preparation, respreading of retained topsoil/subsoil and vegetation, seeding (if required)). The detail of the actions for rehabilitation will be outlined within the Mine Closure Plan.</p> <p>The Environmental Review Document identifies that the <i>"likelihood of successful rehabilitation is high considering Mineral Resources' previous rehabilitation experience in the local area"</i>. This statement is supported by the outcomes of Mineral Resources' rehabilitation works at the Koolyanobbing Range mine operations (located at the northern end of the Revised Proposal) as outlined within the recent rehabilitation monitoring prepared by Ecotec (2022). In summary of the monitoring results, Ecotec (2022) states that:</p> <p><i>"Analysis of the data collected during the 2021 monitoring has generally demonstrated very good progress toward achievement of closure criteria across the project. At Koolyanobbing, each of the sites monitored in 2021 on A1 and B-C waste dumps demonstrated achievement (of the) closure criteria. The 2021 monitored sites on K waste Dump demonstrated partial achievement of closure criteria."</i></p> <p>A number of representative photographs of the rehabilitation at the Koolyanobbing Range mine operations from the Ecotec (2022) monitoring report are provided below. Mineral Resources would be happy to provide a copy of the Ecotec (2022) monitoring report if required.</p> <div> </div> <p>Monitoring Site K09 South End (Source: Ecotec 2022)</p>

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NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		 <p>Monitoring Site A101 West End (Source: Ecotec 2022)</p> <p><b>Proposed Outcome:</b></p> <p>The <i>Mining Act 1978 (WA)</i> is the primary legislation which controls mine closure, including rehabilitation activities. Mineral Resources is in the process of amending its Mine Closure Plan as required under the <i>Mining Act 1978 (WA)</i>, and this document will detail the rehabilitation activities for the Haul Road.</p> <p>Evidence supporting Mineral Resources' previous rehabilitation success for the Koolyanobbing Range mine operations is provided above, and a copy of the Ecotec (2022) monitoring report can be provided if required.</p>
2	<p>The proposed haul road will have a small direct impact to the Koolyanobbing Ranges Priority Ecological Community (PEC) (5 hectares). However, discussion of indirect impacts does not consider the additional bisection of the range as a holistic impact on both the Koolyanobbing Range and Koolyanobbing PEC.</p> <p>Justification for the portion of the proposal that bisects the Koolyanobbing Range in a section of the undisturbed Range should be provided.</p>	<p><b>Response:</b></p> <p>The Environmental Review Document identifies the Development Envelope for the Revised Proposal coincides with 8 ha of the Koolyanobbing Ranges PEC, within which the Indicative Footprint coincides with 5 ha. The effect of the Revised Proposal to the Koolyanobbing Ranges PEC at &lt; 0.1 % (5 ha) of its mapped area of approximately 6,700 ha is not considered to be significant on its own, or in a cumulative sense in context with the existing mining operations (~2 %, ~100 ha). It should be noted that the DBCA's mapping for the Koolyanobbing Ranges PEC is very broad; encompassing both the restricted ironstone range as well as capturing the surrounding woodland habitats that are not restricted (refer to Figure 10 within the Environmental Review Document).</p> <p>The Revised Proposal crosses through part of the southern the Koolyanobbing Range at a point of low relief of similar elevation as the surrounding flat plains. The effect of this is that the Haul Road does not impact the ironstone range or the flora/vegetation values that are restricted to the ironstone range, as identified by Figure 8A within the Environmental Review Document. The vegetation types coinciding with the Haul Road are broadly distributed, occurring both within and outside the mapped area of the Koolyanobbing Ranges PEC.</p> <p>The Koolyanobbing Ranges extend a length of approximately 30 km (north-west to south-east) and are generally described as comprising the northern Koolyanobbing Range and the southern Koolyanobbing Range. The Koolyanobbing Ranges are separated by Lake Deborah, resulting in a naturally bisection of several hundred metres between the northern Koolyanobbing Range and the southern Koolyanobbing Range. In addition to this natural bisection, multiple crossings of the southern Koolyanobbing Ranges exist in the form of roads/tracks for mining/exploration/pastoral activities, the Koolyanobbing townsite village, and the Perth-Kalgoorlie Railway line. The southern Koolyanobbing Range is not pristine (undisturbed); having been subject to mining since 1950, as well as agriculture under the former Brontie Pastoral Lease since 1967. In this context, the proposed Haul Road will not introduce any new or different environmental impacts at the Koolyanobbing Ranges, and as the Haul Road will be rehabilitated the environmental effects will be temporary (direct, indirect, cumulative, and holistic effects).</p> <p>The DWER submission seeks justification for the Haul Road crossing through the southern Koolyanobbing Ranges. The Haul Road has been designed to connect to the existing mining haul road established for the Koolyanobbing Range F Deposit (as authorised under the Statement 1054 approval), which connects to Mineral Resources' ore processing facilities (Run of Mine Pad ore stockpiles and the Ore Handling Plant for crushing and screening). This proposed alignment provides the shortest possible distance (with the least vegetation clearing) to be able to transport ore to reach these ore processing facilities. As can be seen from the biological field surveys for the Revised Proposal (refer to Figure 8A within the Environmental Review Document), Mineral Resources investigated an option to divert the Haul Road in a westerly direction along the southern side of the Koolyanobbing Range, however, this option would have resulted in a longer road construction with a greater area of native vegetation clearing (including greater clearing of the</p>

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NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p>Koolyanobbing Ranges PEC). Other options were also considered, such as using the public Southern Cross – Koolyanobbing Road, however these options were discounted due to multiple potential constraints (for example, road condition and curvature, upgrades required to the Perth-Kalgoorlie Railway crossing, access into the ore processing facilities).</p> <p><b>Proposed Outcome:</b></p> <p>The effect of the Revised Proposal to the Koolyanobbing Ranges PEC is not considered to be environmentally significant on its own, or in a cumulative perspective, in context with the extent of the existing mining operations and other land disturbances. Whilst the Revised Proposal crosses through part of the southern Koolyanobbing Range, it has been positioned in low relief so as to not impact the ironstone range itself or to the flora/vegetation values that are restricted to the ironstone range.</p> <p>The Koolyanobbing Ranges are extensive, and subject to both natural bisection and multiple existing human-constructed dissections. The Haul Road will not introduce any new or different environmental impact not present at the Koolyanobbing Ranges, and post-mining rehabilitation of the Haul Road will ensure that the environmental effects are temporary (direct, indirect, cumulative or holistic).</p> <p>Mineral Resources has provided justification for the Haul Road alignment as outlined above.</p>
DEPARTMENT OF BIODIVERSITY, CONSERVATION AND ATTRACTIONS (DBCA)		
3	<p>In general, the ERD includes adequate information on the impacts of the proposal, and subject to full implementation of proposed impact avoidance management measures, the proponent appears likely to be able to effectively manage the impacts on identified conservation significant values.</p>	<p><b>Response:</b></p> <p>Mineral Resources thanks DBCA for acknowledging the Environmental Review Document meets its information requirements for assessment of the potential environmental effects and the proposed environmental management approach for the Revised Proposal.</p> <p><b>Proposed Outcome:</b></p> <p>The submission from DBCA is acknowledged and accepted.</p>
SHIRE OF YILGARN		
4	<p>Concern raised that the benefit from additional clearing is not justifiable, given the limited term proposed, and that other options not requiring clearing exist.</p>	<p><b>Response:</b></p> <p>The proposed Haul Road will <i>replace</i> part of the public Emu Fence Road between the Great Eastern Highway and Wheatley Road. The replaced section will be upgraded to a Main Roads' RAV Network 10 standard dual carriageway, comprising a 3.5m lane width and 1.5m shoulder width, with the replacement section to provide an overall improvement in the current road design and condition to provide an overall improvement for public safety in the long-term. This section between the Great Eastern Highway and Wheatley Road will remain a public road accessible to all road users (not for exclusive use by Mineral Resources). As this section will utilise much of the existing disturbance from the existing Emu Fence Road, the extent of native vegetation clearing has been substantially reduced (in comparison to an option for a Haul Road to be constructed adjacent to the Emu Fence Road). The proposed Haul Road section north of Wheatley Road to the Koolyanobbing Range mine operations will be a new road, and similarly, existing cleared areas have been used to the extent possible to minimise the additional native vegetation clearing required.</p> <p>The submission from the Shire of Yilgarn of other ore haulage options being available which do not require native vegetation clearing is acknowledged and accepted. Mineral Resources has assessed multiple alignment options/configurations for the ore haulage, and this has included an option for not proceeding with the Revised Proposal and continuing ore haulage exclusively on existing public roads. In assessment of these multiple alignment options/configurations, Mineral Resources has considered a range of factors including (not in any order) capital expenditure (construction, operation, closure), operational costs, environmental effects, land tenure, and public safety. The Haul Road as proposed is considered by Mineral Resources to provide the most appropriate balance between the range of factors which have been considered, including the consideration of the environmental effects of native vegetation clearing.</p> <p>It should be further noted the extent of the Haul Road has been substantially reduced since its initial referral; reduced from an 88 km length with a maximum of 298 ha of native vegetation clearing, now reduced to 52 km length with a maximum of 173 ha of native vegetation clearing.</p> <p><b>Proposed Outcome:</b></p> <p>The concern of the Shire of Yilgarn on native vegetation clearing is acknowledged. Mineral Resources has outlined above the processes taken to assess the potential ore haulage options, and how the clearing of native vegetation has been minimised for the Revised Proposal.</p>

**TABLE 3 – TERRESTRIAL FAUNA**

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
EPA SERVICES (DEPARTMENT OF WATER AND ENVIRONMENTAL REGULATION, DWER)		
1	<p>The ERD states that due to the linear nature of the proposal and the broad regional extent of habitat that further consideration of impacts to short-range endemic (SRE) invertebrate fauna to not be necessary. However, the results of the surveys indicate that the area has an interesting and unique SRE invertebrate fauna with 28 potential SRE taxa recorded (Phoenix 2022, Table 5-20). The results are reflective of the low level of regional invertebrate survey and may also be due to the complex vegetation types and high incidence of significant flora recorded (Phoenix 2022).</p> <p>The ERD does not state the number of SRE taxa that are only known from the study area or impact areas. However, based on Table 5-20 (Phoenix 2022) at least 17 potentially new taxa were only recorded from single sites within the study area and, therefore, may occur within the haul road alignment. No SRE habitats were mapped as being restricted to the Development Envelope, however, the direct impacts to SRE fauna will include fragmentation of habitats where there are no existing tracks and the potential loss of individuals of novel taxa during the construction of the road.</p> <p>Further details about SRE taxa likely occurring within the development envelope should be provided, including details about management of any potential impacts.</p>	<p><b>Response:</b></p> <p>The purpose of the biological surveys for potential short-range endemic (SRE) invertebrate fauna was to map the habitats which exist, and to gain a broad understanding of the types of SRE invertebrate fauna which may be present. This approach was intended to inform the environmental assessment for the Revised Proposal with a focus on identifying whether there was a risk to SRE invertebrate fauna within restricted habitat types.</p> <p>As outlined by the Environmental Review Document (and acknowledged by the DWER submission), no fauna habitats for potential SRE invertebrate fauna were restricted to the Development Envelope, and with all habitats recorded expected to continue beyond the surveyed area. On the basis that the SRE invertebrate fauna habitats are not restricted a significant effect to restricted potential SRE invertebrate fauna is not expected.</p> <p>Calculations of the potential SRE invertebrate taxa recorded within/outside of the Development Envelope were not included in the Environmental Review Document noting the assessment outcome for the SRE habitats identified above. Any calculations of potential SRE invertebrate taxa within/outside of the Development Envelope would be biased by the location of the field sampling sites (which targeted the Development Envelope) and any perceived indication of restriction using this data would be expected to result in ‘false positives’ (noting the SRE fauna habitats are not restricted, as outlined above). Accordingly, it was not considered appropriate to present calculations for potential SRE invertebrate taxa recorded within/outside of the Development Envelope. Calculations for potential SRE invertebrate taxa recorded within/outside of the Development Envelope are considered relevant only where SRE habitats are restricted, and consequently, that would have triggered a need for additional field surveys to better understand the extent of the SRE habitats and the potential SRE invertebrate taxa which exist (which is not the current case for the Revised Proposal).</p> <p>Mineral Resources does not agree with the DWER submission that “the direct impacts to SRE fauna will include fragmentation of habitats where there are no existing tracks and the potential loss of individuals of novel taxa during the construction of the road”. The majority of the Revised Proposal occurs either over the existing location of the Emu Fence Road public road (~ 14 km length) or immediately adjacent to the access track for the DPIRD State Barrier Fence (~ 25 km length); such that the SRE habitats in these local areas are currently fragmented by local disturbances. Whilst the remaining northern section (~13 km length) does not occur directly over or adjacent to existing disturbance, the surrounding area does include multiple existing disturbances from the Lake Seabrook Road (north) and x3 pastoral tracks which dissect the landscape; such that the SRE habitats across this area are not unfragmented (as was suggested by the DWER submission). As outlined within the Environmental Review Document, the Revised Proposal will not have the effect of fragmenting existing contiguous SRE fauna habitats (in an unfragmented landscape), but rather, may have the effect increasing the existing fragmentation which is present.</p> <p>The Environmental Review Document identifies the potential SRE invertebrate fauna recorded by the biological surveys included mygalomorph trapdoor spiders, scorpions and pseudoscorpions, centipedes and isopods; none of which are of listed conservation significance (refer p139). Each of the potential SRE invertebrate fauna are also listed and mapped on Figure 17A to Figure 17C within the Environmental Review Document (refer p141-143). This detail within the Environmental Review Document was considered suitable for identifying the potential SRE invertebrate fauna occurring within the Development Envelope, with further detailed information on each of the putative taxa available from the biological survey report. As the SRE invertebrate habitats recorded are not restricted and a significant effect to potential SRE invertebrate fauna is not expected, no specific management actions for potential SRE invertebrate fauna are considered necessary or have been proposed.</p> <p><b>Proposed Outcome:</b></p> <p>No fauna habitats for potential short-range endemic (SRE) invertebrate fauna were restricted to the Development Envelope, with all habitats expected to continue beyond the surveyed area. On the basis that the SRE habitats were not restricted, the Revised Proposal is not expected to result in a significant effect to any restricted SRE invertebrate taxa. Calculations of the SRE invertebrate taxa recorded within/outside of the Development Envelope were not included in the Environmental Review Document noting this assessment outcome for the SRE habitats identified above.</p> <p>The Revised Proposal occurs in an existing fragmented landscape. The majority of the Haul Road occurs either over or immediately adjacent to existing disturbance, with the remainder of the Haul Road occurring within broadly fragmented habitats. As outlined within the Environmental Review Document, the Revised Proposal will simply have the effect increasing the existing fragmentation that is present.</p> <p>The Environmental Review Document identifies the potential SRE invertebrate fauna groups recorded by the biological surveys, with each of the potential SRE invertebrate fauna mapped. As the SRE invertebrate habitats recorded are not restricted and a significant effect to potential SRE invertebrate fauna is not expected, no specific management actions for potential SRE invertebrate fauna are proposed.</p>
2	<p>The potential records (diggings and tracks) of a newly recognised species of bandicoot (<i>Isoodon</i> sp.) from the study area may be significant. Additional management is required for this species. The Significant fauna management plan should include <i>Isoodon</i> species in pre-clearance surveys (e.g. avoidance of nests) and include lodging of any further sightings, records or specimens (e.g. road kill) to the WA Museum and Department of Biodiversity, Conservation and Attractions for taxonomic investigation and identification.</p>	<p><b>Response:</b></p> <p>Mineral Resources acknowledges the undescribed Bandicoot <i>Isoodon</i> sp. may be of potential conservation significance. Accordingly, this undescribed Bandicoot was given specific attention within the mapping and text of the Environmental Review Document (similar to the assessment applied to the ‘Threatened’ fauna taxa Malleefowl and Chuditch).</p> <p>As outlined within the Environmental Review Document, conical diggings which resembled distinctive foraging signs of a Bandicoot (<i>Isoodon</i> sp.) were recorded within the Survey Area at multiple locations spanning a length of &gt; 25 km. The locations with Bandicoot diggings were subsequently targeted in searches and</p>

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NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p>camera trapping, however, despite the additional effort, no sightings of Bandicoot individuals or scats or nests were recorded which could be used to positively identify the taxon.</p> <p>Mineral Resources notes the recommendation from DWER for pre-clearance surveys for the undescribed Bandicoot. In context that the additional targeted searches and camera trapping did not record this taxon (by experienced Phoenix personnel over multiple nights and locations), the likelihood of pre-clearance surveys recording this taxon would appear to be equally low.</p> <p>Whilst noting the above, generally the breeding season for Bandicoots (Spring) align with the breeding seasons of Malleefowl (September to January – Spring/Summer) and Chuditch (September to November - Spring). As Mineral Resources has committed within the Significant Fauna Management Plan to undertake pre-clearance fauna surveys during the breeding seasons for Malleefowl and Chuditch, if the undescribed Bandicoot is also identified (either through individuals or nests) then similar avoidance mechanisms could readily be implemented. Consistent with Mineral Resources’ approach used at the Parker Range mine operations, in the event of a fauna mortality of Malleefowl/Chuditch/Bandicoot the specimens can be readily vouchered with the WA Museum or DBCA for taxonomic purposes.</p> <p>Since the submission of the Environmental Review Document, advice received from Phoenix (unpublished) indicates the area of suitable habitat for the undescribed Bandicoot (continuous with the area within which the Bandicoot was recorded) is &gt; 10,000 ha; indicating the extent of suitable habitat is substantially greater than indicated within the Environmental Review Document. The &gt; 10,000 ha area of potentially suitable habitat estimated by Phoenix was based upon the intersection with the relevant vegetation associations, land systems, geology and topography. This affirms the view expressed within the Environmental Review Document that the undescribed Bandicoot is unlikely to be restricted, and accordingly, the Revised Proposal is unlikely to result in a significant impact to this taxon.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources acknowledges the undescribed Bandicoot <i>Isoodon</i> sp. may be of potential conservation significance, with accordingly, the Environmental Review Document giving specific assessment consideration to this undescribed Bandicoot.</p> <p>As the general breeding season for Bandicoots is similar to that of Malleefowl and Chuditch, if during the pre-clearance surveys for Malleefowl and Chuditch the undescribed Bandicoot is identified then similar avoidance mechanisms can readily be implemented (i.e. clearing buffer established, consultation with DBCA).</p> <p>In the event that a mortality is recorded of Malleefowl or Chuditch or Bandicoot, the specimen can readily be vouchered with the WA Museum or DBCA for taxonomic purposes (consistent with the approach applied by Mineral Resources for at the Parker Range mine operations).</p>
3	<p>The Arid Bronze Azure Butterfly is listed as a Threatened species under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> and the <i>Biodiversity Conservation Act 2016</i>. Given the presence of suitable habitat and the presence of the <i>Camponotus</i> host ant colony in proximity to the development envelope, the Significant fauna management plan (Table 9) should include actions to continue to observe and record any potential sightings of the Arid Bronze Azure Butterfly. The plan should also include actions that will be taken in the event that the Arid Bronze Azure Butterfly is confirmed to be present in the area, noting that it is particularly sensitive to habitat disturbance.</p>	<p><b>Response:</b></p> <p>The submitted Significant Fauna Management Plan in Table 9 (Line 6) identifies the proposed monitoring for the Arid Bronze Azure Butterfly includes:</p> <ul style="list-style-type: none"> <li>(a) Monitoring for the presence/absence of the Arid Bronze Azure Butterfly within the identified <i>Camponotus</i> host ant colony, to occur during construction and 1 month following construction, and then annually during operation (during the main flight period of September to October).</li> <li>(b) Monitoring of the <i>Camponotus</i> host any colony (i.e. the habitat) during operation of the Haul Road to ensure the environmental management measures implemented for the Haul Road are adequate to protect the <i>Camponotus</i> host any colony (and the Arid Bronze Azure Butterfly, if present)</li> </ul> <p>Accordingly, the Significant Fauna Management Plan includes monitoring for the Arid Bronze Azure Butterfly as requested by the submission.</p> <p>As outlined within the Environmental Review Document, Mineral Resources has adopted a conservative approach and applied a nominal 100 m separation distance from the identified <i>Camponotus</i> host ant colony (including 98 % of the ant colony located &gt; 200 m from the Haul Road). This conservative approach has been adopted despite nil records of the Arid Bronze Azure Butterfly from the biological surveys. In addition to the avoidance measures taken, Mineral Resources has assessed the potential for an indirect impact of the Haul Road to the Arid Bronze Azure Butterfly (if present) considering multiple factors (e.g. road drainage, vehicle strike) and concluded that a significant effect to the Arid Bronze Azure Butterfly (if present) is unlikely.</p> <p>Mineral Resources acknowledges and accepts the Arid Bronze Azure Butterfly is particularly sensitive to habitat disturbance, and accordingly, the monitoring outlined within the Significant Fauna Management Plan includes monitoring of the <i>Camponotus</i> host any colony (i.e. the potential habitat) during operation to ensure the environmental management measures being implemented for the Haul Road are adequate to protect the <i>Camponotus</i> host any colony (and the Arid Bronze Azure Butterfly, if present).</p> <p>Monitoring for the Arid Bronze Azure Butterfly within the area of the Haul Road during construction and operation has not been proposed as this taxon is considered unlikely to occur within the area of the Haul Road. As described within the Significant Fauna Management Plan, dispersing males of the Arid Bronze Azure Butterfly have a nominal 25 metre flight distance (such they would not reach the Haul Road) and dispersing females typically fly uphill to higher locations as a reproductive strategy (which would be in a direction away from the Haul Road). Accordingly, the monitoring proposed for the Arid Bronze Azure Butterfly is focused on the area of the recorded <i>Camponotus</i> host any colony.</p>

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p>In consideration of the conservative separation distance established between the Haul Road and the <i>Camponotus</i> host ant colony, and the low risk of the Arid Bronze Azure Butterfly (if present within the <i>Camponotus</i> host ant colony) to be present in the area of the Haul Road, additional monitoring or management actions for the Haul Road in the event the Arid Bronze Azure Butterfly is confirmed (within the <i>Camponotus</i> host ant colony) do not appear to be necessary.</p> <p><b>Proposed Outcome:</b></p> <p>The submitted Significant Fauna Management Plan identifies the proposed monitoring in relation to the Arid Bronze Azure Butterfly, which includes monitoring for the presence/absence of the Arid Bronze Azure Butterfly and monitoring of the <i>Camponotus</i> host any colony, during both construction and operation. These monitoring actions are considered to be appropriate.</p> <p>Mineral Resources has adopted a conservative 100 m separation distance between the Haul Road and the identified <i>Camponotus</i> host ant colony. In addition to avoidance, Mineral Resources has assessed the potential for an indirect impact of the Haul Road to the Arid Bronze Azure Butterfly considering multiple factors and has concluded a significant effect to the Arid Bronze Azure Butterfly (if present within the within the <i>Camponotus</i> host ant colony the) is unlikely.</p> <p>Further monitoring or management actions in the event the Arid Bronze Azure Butterfly is confirmed present within the <i>Camponotus</i> host ant colony do not appear to be necessary.</p>
4	<p>The first management target in the Significant fauna management plan (Table 9) incorrectly refers to flora rather than fauna.</p>	<p><b>Response:</b></p> <p>Mineral Resources acknowledges and accepts the submission that Table 9 of the submitted Significant Fauna Management Plan includes a typographical error, which states</p> <p style="padding-left: 40px;"><i>“All site personnel to complete a site induction which includes specific information on the conservation significant <u>flora</u> present, and avoidance/management actions”</i></p> <p style="text-align: right;">(emphasis added by <u>underline</u>).</p> <p>As it is clear this management action within the Significant Fauna Management Plan intended to state “fauna” (not flora), this typographical error is not considered significant to an extent that it would affect its correct interpretation during construction or operation of the Haul Road. Accordingly, this minor typographical error can be readily corrected during a subsequent revision of the Significant Fauna Management Plan.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources acknowledges and accepts the minor typographical error identified by the submission, and notes this minor typographical error can readily be corrected during a subsequent revision of the Significant Fauna Management Plan.</p>
DEPARTMENT OF CLIMATE CHANGE, ENERGY, THE ENVIRONMENT AND WATER (DCCEEW)		
5	<p>The Department notes that the roles and responsibilities for the implementation of the Significant Fauna Management Plan (SFMP) is not included in SFMP. This information will need to be included.</p>	<p><b>Response:</b></p> <p>The submitted Significant Fauna Management Plan will be implemented by Mineral Resources as the Proponent for the Revised Proposal. There are no third-party (external) responsibilities for implementation of the Significant Fauna Management Plan.</p> <p>Table 8 of the Significant Fauna Management Plan identifies the management and monitoring actions to be implemented by Mineral Resources. The final column identifies that Mineral Resources’ Environmental Advisor role will be responsible for implementation of all management and monitoring actions.</p> <p>Mineral Resources acknowledges and accepts the DCCEEW submission indicating that roles and responsibilities could be clearer from an administrative perspective (perhaps outlined in its own specific section), and this administrative change can be included in any subsequent revision of the Significant Fauna Management Plan.</p> <p><b>Proposed Outcome:</b></p> <p>The submitted Significant Fauna Management Plan will be implemented by Mineral Resources as the Proponent for the Revised Proposal, with no third-party (external) responsibilities for implementation. Mineral Resources’ Environmental Advisor role will be responsible for implementation of all management and monitoring actions, as identified by Table 8 within the Significant Fauna Management Plan. Further clarification of the roles and responsibilities can be included in any subsequent revision of the Significant Fauna Management Plan.</p>
6	<p>The Department notes that ‘pre-clearance’ surveys For Malleefowl and Chuditch will be undertaken 30 days prior to the clearing of native vegetation, if the clearing is to be undertaken during breeding season. The Department is of the view that an assessment of the occurrence of Malleefowl and Chuditch should be conducted progressively in areas proposed for disturbance within the project footprint and surrounding areas, prior to construction or mining activities commencing, whether this event coincides with the breeding season or not.</p>	<p><b>Response:</b></p> <p>The submitted Significant Fauna Management Plan outlines a commitment for pre-clearance surveys for Malleefowl and Chuditch during the relevant breeding seasons. The purpose of the pre-clearance surveys is to detect the presence of Malleefowl when tending to active nest mounds containing eggs, or to detect Chuditch in dens with young. During this time, the Malleefowl (including eggs) and Chuditch (including young) are less mobile and therefore susceptible to the impact from clearing activities. Accordingly, the submitted Significant Fauna Management Plan proposes pre-clearance surveys for Malleefowl and Chuditch during the relevant breeding seasons when these taxa are less mobile.</p> <p>As outlined within the Environmental Review Document, Malleefowl have a home range of &gt; 1 km<sup>2</sup>, and Chuditch have a home range of between 3-15 km<sup>2</sup>. Outside of the breeding season, both Malleefowl and Chuditch are highly mobile and can readily move away from clearing disturbance into the adjacent retained</p>

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NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p>fauna habitat. Pre-clearance surveys outside of the breeding season would serve no functional purpose given Malleefowl and Chuditch will naturally move away from any approaching disturbance. Accordingly, the Significant Fauna Management Plan does not include pre-clearance surveys outside of the breeding season when Malleefowl and Chuditch are highly mobile and will move away from approaching disturbance.</p> <p>The approach to undertake pre-clearance surveys for Malleefowl and Chuditch only during the breeding season (and not outside of the breeding season) is consistent with the approach previously accepted and approved by DCCEEW in November 2020 for the Significant Fauna Management Plan applying to the Parker Range Iron Ore Project mining operations (Condition 4 of the EPBC 2010-5435 decision). This same approach has been therefore adopted within the submitted Significant Fauna Management Plan.</p> <p>The baseline environmental surveys completed recorded nil active Malleefowl nest mounds and nil Chuditch dens within the area of the Revised Proposal. Whilst noting this, the further pre-clearance surveys were proposed by Mineral Resources to cater for a low-risk potential that Malleefowl or Chuditch had established nest mounds / dens within the area of the Revised Proposal since the baseline surveys were completed.</p> <p>To further note, in addition to the pre-clearance surveys outlined above, the submitted Significant Fauna Management Plan identifies that a suitably qualified environmental professional will be in attendance during <i>all</i> clearing (both within and outside of relevant breeding periods) to act as a 'fauna spotter' for the management of any significant fauna which may be present. The fauna spotter will be present during all native vegetation clearing to ensure timely identification of fauna and the minimisation of fauna displacement (including Malleefowl and Chuditch).</p> <p><b>Proposed Outcome:</b></p> <p>The submitted Significant Fauna Management Plan identifies the commitment for pre-clearance surveys for Malleefowl and Chuditch during the breeding season; being a time when Malleefowl (including eggs) and Chuditch (including young) are less mobile and therefore susceptible to impact from clearing activities. Although the baseline environmental surveys recorded nil active Malleefowl nest mounds and nil Chuditch dens within the area of the Revised Proposal, pre-clearance surveys have been proposed to cater for a low-risk potential that nest mounds / dens have been established within the area of the Revised Proposal since the baseline surveys were completed.</p> <p>Outside of the relevant breeding seasons, Malleefowl and Chuditch are highly mobile and can readily move away from clearing disturbance into the adjacent retained fauna habitat. Pre-clearance surveys outside of the breeding season would serve no functional purpose given Malleefowl and Chuditch will naturally move away from any approaching disturbance. Accordingly, pre-clearance surveys outside of the relevant breeding season are not considered to be necessary.</p>
7	<p>The Department notes that "if active mounds are identified within the clearing area, an avoidance buffer will be implemented and disturbance avoided, unless otherwise agreed by the CEO". The buffer requirements of clearing vegetation around an active mound/den should be included and references to these requirements should be made throughout.</p>	<p><b>Response:</b></p> <p>The submitted Significant Fauna Management Plan in Table 8 in relation to Malleefowl states:</p> <p><i>"If active mounds are identified within the clearing area, an avoidance buffer will be implemented and disturbance avoided, unless otherwise agreed by the CEO. The buffer and controls to minimise impacts to breeding activities will be determined through consultation with technical experts (DBCA). The following will be considered:</i></p> <ul style="list-style-type: none"> <li>• <i>Revise construction methodology to minimise clearing <u>within 50 m of the active mound</u>. This may include installation of a single lane access road to allow vehicle movement</i></li> <li>• <i>As per Internal Clearing Permit Procedure, clearing boundaries will be clearly marked</i></li> <li>• <i>Any clearing <u>within 50 m of the active mound</u> will be designed to minimise habitat fragmentation, with the retention of continuous habitat considered a priority</i></li> <li>• <i>A decrease in speed limits to 40km/hr to minimise potential vehicle interactions, noise and vibration</i></li> <li>• <i>Camera monitoring of active site until status is classified as inactive"</i></li> </ul> <p style="text-align: right;">(emphasis added by <u>underline</u>)</p> <p>The submitted Significant Fauna Management Plan in Table 8 in relation to Chuditch states:</p> <p><i>"If an active den is identified within the clearing area, an avoidance buffer will be implemented and disturbance avoided, unless otherwise agreed by the CEO. The buffer and controls to minimise impacts to breeding activities will be determined through consultation with technical experts (DBCA). The following will be considered:</i></p> <ul style="list-style-type: none"> <li>• <i>Revise construction methodology to minimise clearing <u>within 50 m of the active den</u>. This may include installation of a single lane access road to allow vehicle movement</i></li> <li>• <i>As per Internal Clearing Permit Procedure, clearing boundaries will be clearly marked</i></li> <li>• <i>Any clearing <u>within 50 m of the active den</u> will be designed to avoid where possible, otherwise minimise, habitat fragmentation, with the retention of continuous habitat considered a priority</i></li> <li>• <i>A decrease in speed limits to 40 km/hr to minimise potential vehicle interactions, noise and vibration</i></li> <li>• <i>Avoidance of activities at night (i.e. activities to be undertaken during daylight hours) to minimise potential vehicle interactions</i></li> <li>• <i>Camera monitoring of active den until status is classified as inactive</i></li> </ul> <p style="text-align: right;">(emphasis added by <u>underline</u>)</p>

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p>As identified above, the submitted Significant Fauna Management Plan identifies a separation distance (buffer) of 50 metres will be implemented for both Malleefowl and Chuditch. As also identified, in the event that an active nest mound / den is recorded then consultation will occur with the DBCA technical experts to further refine the buffer and controls.</p> <p><b>Proposed Outcome:</b></p> <p>The submitted Significant Fauna Management Plan in Table 8 identifies the separation distance (buffer) to be implemented is 50 metres in the event that an active Malleefowl nest mound or a Chuditch den is identified.</p>
8	<p>MRL to note and implement the National Malleefowl Monitoring Procedure (2016).</p>	<p><b>Response:</b></p> <p>The submitted Significant Fauna Management Plan in Table 8 in relation to Malleefowl states:</p> <p><i>“Clearing of the active mound can be undertaken once it has been confirmed as inactive by a fauna specialist as per National Malleefowl Monitoring Procedure (NMRT 2016).”</i></p> <p>The National Malleefowl Monitoring Procedure is also identified within the References section of the Significant Fauna Management Plan. Accordingly, Mineral Resources considers the submitted Significant Fauna Management Plan addresses the DCCEEW submission.</p> <p><b>Proposed Outcome:</b></p> <p>The submitted Significant Fauna Management Plan notes and acknowledges the implementation of the National Malleefowl Monitoring Procedure (2016).</p>
<p>DEPARTMENT OF BIODIVERSITY, CONSERVATION AND ATTRACTIONS (DBCA)</p>		
9	<p>In respect of the proposed offset site, DBCA has determined that it is conditionally suitable for reservation and management under the Conservation and Land Management Act 1984 (CALM Act), noting that formal reservation of land under the CALM Act is subject to processes under the <i>Land Administration Act 1997</i>. These processes require the support of the DMIRS for a change in land tenure from private land to conservation reserve, and there is risk that reservation of the offset site may not be supported.</p>	<p><b>Response:</b></p> <p>Mineral Resources thanks DBCA for confirming the proposed Offset Site (as described in the Fauna Offset Strategy) is suitable for reservation and management as part of the State’s conservation reserve system. It is noted this advice is subsequent to the original advice provided by DBCA to EPA dated September 2021 in which the DBCA also confirmed the acceptability of the proposed Offset Site (as referred to in Section 10 of the Environmental Review Document).</p> <p>Mineral Resources notes that part of the proposed Offset Site is concurrent with the southern part of Exploration Licence E77/2766 granted to Kula Gold Limited and the southern part of Exploration Licence E77/2443 granted to Edna May Operations Pty Ltd (Ramelius Resources Limited), with these tenements also concurrent with parts of the adjoining DBCA conservation reserves. Published information from Kula Gold Limited indicates the northern part of E77/2766 may be prospective for gold as this directly adjoins the Edna May Gold Mine operated by Ramelius Resources Limited (approximately 5 km north), and this is also consistent with the published information from Ramelius Resources Limited which indicates gold prospectivity in north-west and south-east directions from the Edna May Gold Mine following the defined greenstone geological belt. This defined greenstone geological belt for gold prospectivity does coincide with the proposed Offset Site (with the proposed Offset Site occurring within a geology of “<i>Yilgarn Craton granites</i>” as defined by DMIRS (Data source: DMIRS-016 1:500 000 <i>State Interpreted Bedrock Geology</i> available at data.wa.gov.au). Review of the DMIRS’ online systems (Tengraph and Minedex) also indicates there has been no active exploration applications or approvals within the southern parts of E77/2766 or E77/2443 which would indicate the presence of an economic resource in the area of the proposed Offset Site. With no economic ore resource identified, it was anticipated that DMIRS will support proposed reservation under the <i>Conservation and Land Management Act 1984 (WA)</i>. Correspondence subsequently received from DMIRS in November 2022 (DMIRS Ref A0338/202101, provided to EPA on 18 November 2022) has confirmed:</p> <p><i>“DMIRS notes the main area of exploration and mining interest in the area is the greenstone located to the north of Lot 1416 which hosts the Edna May gold mine and numerous gold prospects. The current available drilling data shows the focus of exploration has been on the greenstone unit.</i></p> <p><i>Taking into consideration the importance of the Project and the overall lower prospectivity of this Lot, DMIRS is supportive of the current proposal being the transfer of freehold ownership to DBCA of the Offset Site. DMIRS endorses MRL’s position that the acquisition and transfer of the Offset Site to DBCA as freehold will meet the broad objective to protect the environmental values within the Offset Site, and to allow for implementation of management actions to maintain those environmental values (e.g. fire management, introduced species control).</i></p> <p><i>DMIRS is also supportive of this Offset Site being amalgamated into the adjacent unclassified conservation reserves should DBCA pursue this action...”</i></p> <p><b>Proposed Outcome:</b></p> <p>The submission from DBCA is acknowledged and accepted.</p> <p>Mineral Resources has received confirmation from DMIRS that it will support reservation of the Offset Site as outlined above.</p>

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
10	Any impacts (direct or indirect) on threatened fauna are considered taking under section 40 of the <i>Biodiversity Conservation Act 2016</i> .	<p><b>Response:</b></p> <p>It is noted that any impact to individuals of listed 'Threatened' fauna is defined as 'taking' under the State <i>Biodiversity Conservation Act 2016</i> (WA). At this stage, the Revised Proposal is expected to remove <i>habitat</i> which may be used by the listed 'Threatened' fauna Malleefowl <i>Leipoa ocellata</i> (EPBC-V, BC-V) and Chuditch <i>Dasyurus geoffroii</i> (EPBC-V, BC-V), however, with nil impact to <i>individuals</i> of these taxa. If an impact to individuals of these taxa is anticipated then Mineral Resource will seek the necessary Licence under the <i>Biodiversity Conservation Act 2016</i> (WA) prior to an impact to individuals.</p> <p><b>Proposed Outcome:</b></p> <p>The submission from DBCA is acknowledged and accepted.</p>

TABLE 4 – SOCIAL SURROUNDINGS

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
DEPARTMENT OF PLANNING, LANDS AND HERITAGE (DPLH)		
1	<p>A review of the project's spatial data against the Aboriginal Heritage Register of Places and Objects and DPLH Aboriginal Heritage Database, concludes that the location of the proposed haul road intersects with the public dithered boundary of Aboriginal heritage place ID 38837 (MRL_HR_03), but not the actual boundary as administered by DPLH.</p> <p>DPLH notes that Archaeological and Ethnographic surveys have been undertaken for the proposal, with the most recent being carried out by Terra Rosa in 2020 with representatives of the Marlinyu Ghoorlie group. Despite isolated artefacts being located, as noted in the Stakeholder Consultation Register of the ERD, no Aboriginal sites were located within the development envelope during the surveys. If finalised, DPLH would appreciate the provision of such Surveys for our records.</p> <p>All known Aboriginal sites are acknowledged as being extant in adjacent areas and mitigation strategies of avoidance and minimising any risk to Aboriginal heritage are included in the Social Surroundings table of the ERD. It is noted that consultation has been ongoing with the Marlinyu Ghoorlie group and negotiations are occurring towards a comprehensive native title and heritage agreement (claim wide).</p>	<p><b>Response:</b></p> <p>The Environmental Review Document identifies that Aboriginal heritage surveys have been completed; with nil sites or objects of Aboriginal heritage significance identified as occurring within the Development Envelope (p162). Accordingly, the Revised Proposal is not anticipated to impact any known sites or objects of Aboriginal heritage significance.</p> <p>Mineral Resources has reviewed the location of Other Heritage Place ID 38837 through the DPLH Aboriginal Heritage Inquiry System and concurs with the DPLH submission that the Development Envelope does coincide with the public dithered boundary for this record. Review of the Other Heritage Place ID 38837 through the DPLH Aboriginal Heritage Inquiry System identifies this record to be for the purpose "Artefacts / Scatter, Painting, Rockshelter, Arch Deposit" with mapped area extending a large area of approximately 4 square kilometres (km) (2 km x 2 km). Based on the Aboriginal heritage surveys not identifying such features within the Development Envelope where this record coincides, it is believed these reported heritage values occur beyond the Development Envelope (within the much larger mapped area) and the proposed Haul Road will therefore not present any risk to these reported heritage values. This is consistent with the DPLH submissions which identifies the Revised Proposal does not coincide with the actual boundary as administered by DPLH.</p> <p>Mineral Resources thanks DPLH for acknowledging the ongoing consultation between Mineral Resources and the Traditional Owner Groups for the area of the Revised Proposal. Mineral Resources further thanks DPLH for acknowledging the mitigation strategy of avoidance as outlined within the Social Surroundings component of the Environmental Review Document.</p> <p>Mineral Resources notes the DPLH request for a copy of the Aboriginal heritage survey reports for the Revised Proposal. Mineral Resources will seek the consent of the Traditional Owner Groups to allow for a copy of the Aboriginal heritage survey reports to be provided to DPLH.</p> <p>Further to the information contained within the Environmental Review Document, Mineral Resources can further advise representatives have met with the Marlinyu Ghoorlie Traditional Owner Group throughout 2021 and 2022. The Haul Road has been raised during these meetings as an important part of the scope of ongoing negotiations. The Haul Road was raised specifically at the following meetings:</p> <ul style="list-style-type: none"> <li>(a) June 2021 – Project overview and comprehensive update on heritage survey outcomes.</li> <li>(b) October 2021 – Project overview (including likely approvals pathway).</li> <li>(c) June 2022 - Project overview, summary of geotechnical (stability) assessment of the rockshelter and heritage management strategies. The environmental assessment process was also discussed, including that there would be an upcoming opportunity for public comment.</li> <li>(d) October 2022 – Confirmation that the environmental assessment process was ongoing and that no heritage places would be impacted.</li> </ul> <p>As noted above, in June 2021 the completed heritage investigations were presented and discussed in detail with the Marlinyu Ghoorlie members. Mineral Resources intention to avoid all the identified heritage places was discussed and supported by the Marlinyu Ghoorlie members. No concerns were raised regarding the adequacy of the survey processes or the survey outcomes.</p> <p>A further project update will be presented to the Marlinyu Ghoorlie group at the next meeting (scheduled for December 2022).</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources will seek the consent of the Traditional Owner Groups to allow for a copy of the Aboriginal heritage survey reports to be provided to DPLH.</p>

**TABLE 6 – OFFSETS**

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
EPA SERVICES (DEPARTMENT OF WATER AND ENVIRONMENTAL REGULATION, DWER)		
1	<p>It is identified that the cumulative impact to the regional population for <i>Lepidosperma</i> sp. Mt Caudan (P1), <i>Westringia acifolia</i> (P1), <i>Baeckea grandibracteata</i> ssp. Parker Range (P3) are greater than 10 percent, with majority of the impacts resulting from the approved Parker Range (Mt Caudan) Iron Ore Mine proposal.</p> <p>The Residual Impact Significance Model (table 37 of ERD) should be updated to include these taxa in the section identifying impacts that may require offsets in the context of the Revision to the approved proposal.</p>	<p><b>Response:</b></p> <p>The Environmental Review Document identifies the biological field surveys recorded &gt; 400 native flora taxa representing &gt; 50 families and &gt; 160 genera, with the flora recorded including 25 native flora taxa classified by DBCA as 'Priority'. Priority flora is a classification system by DBCA for flora taxa which are known from one, a few or several occurrences, which may or may not be under threat, or may otherwise be rare. The majority of flora taxa were recorded as a complete count of each individual present, however, for a number of flora taxa the number of individuals identified was too large to count each individual, and accordingly, the incomplete count of individuals was supplemented by accurately mapping the spatial extent (area in hectares) of these flora taxa.</p> <p>Mineral Resources acknowledges the submission relating to the impacts of the Revised Proposal and the Approved Proposal (Parker Range mining operations) combined, in context with the known regional population estimates. To provide context, the regional population estimates as outlined within the Environmental Review Document identify the currently recorded regional population of each taxon based upon published biological surveys known to Mineral Resources' environmental consultants. As much of the Yilgarn area has not been subject to biological survey (with the majority of surveys limited to areas of proposed mineral exploration/mining and infrastructure), the regional population estimates are generally considered to present an underestimation of the actual regional population and further regional surveys would likely yield additional records (resulting in an increase in the regional population estimates).</p> <p>To respond to the flora taxa identified by the submission, each of the flora taxa are considered separately below:</p> <p>(a) <i>Lepidosperma</i> sp. Mt Caudan (DBCA-P1)</p> <p>The Environmental Review Document identifies a known regional population of <i>Lepidosperma</i> sp. Mt Caudan (DBCA-P1) of &gt; 11,100 individuals, of which 64 individuals (&lt; 1 %) coincide with the Indicative Footprint (and with 179 individuals (&lt; 2 %) recorded within the broader Development Envelope).</p> <p>Mineral Resources' (2020) Significant Flora Monitoring and Management Plan applying to the Parker Range mining operations (the Approved Proposal) identifies an estimated (extrapolated) &gt; 75,000 individuals of <i>Lepidosperma</i> sp. Mt Caudan within a 10 km radius of the mining operations, of which the Parker Range mining operations are anticipated to impact approximately 3,630 individuals (5 %) (with 10,350 individuals (14 %) recorded within the broader Development Envelope). The estimated (extrapolated) &gt; 75,000 individuals of <i>Lepidosperma</i> sp. Mt Caudan identified within the Significant Flora Monitoring and Management Plan is substantially larger than presented within the Environmental Review Document.</p> <p>Based on the indicative disturbance footprints for both the proposed Haul Road and the approved Parker Range mining operations, and the estimated (extrapolated) &gt; 75,000 individuals of <i>Lepidosperma</i> sp. Mt Caudan within a 10 km radius of the mining operations, the direct effect to <i>Lepidosperma</i> sp. Mt Caudan by the Approved Proposal and the Revised Proposal (combined) is anticipated to be &lt; 10 % of the estimated regional population.</p> <p>In consideration of the above, environmental offsets for <i>Lepidosperma</i> sp. Mt Caudan (DBCA-P1) through the Residual Impact Significance Model does not appear necessary.</p> <p>(b) <i>Westringia acifolia</i> (DBCA-P1)</p> <p>The Environmental Review Document identifies a known regional population of <i>Westringia acifolia</i> (DBCA-P1) of &gt; 4,000 individuals. As the number of individuals of <i>Westringia acifolia</i> was too large to count each individual, only an incomplete count of 913 individuals was made, however, this taxon was mapped as covering an extent covering 160 ha. The Indicative Footprint for the Haul Road coincides with &lt; 1 ha (&lt; 1 %) of the mapped area (with 1 ha (&lt; 1 %) recorded within the Development Envelope). The Environmental Review Document did not identify the number of individuals of <i>Westringia acifolia</i> within the Indicative Footprint or Development Envelope, or a percentage impact calculation, noting the incomplete count of individuals as this would produce an unreliable (statistically invalid) calculated result.</p> <p>The Environmental Review Document identifies <i>Westringia acifolia</i> also occurs at the approved Parker Range mining operations (refer to Figure 11A(iii)). Whilst noting this, Mineral Resources' (2020) Mining Proposal for the Parker Range mining operations identifies that nil recorded individuals occur within the disturbance footprint for the mining operations.</p> <p>Based on the mapped spatial extent of <i>Westringia acifolia</i> recorded by the biological surveys (160 ha), and noting the Indicative Footprint coincides with &lt; 1 ha (&lt; 1 %) of this mapped spatial extent, the direct effect to <i>Westringia acifolia</i> will be &lt; 10 % of the mapped local extent. By that calculation, the direct effect to <i>Westringia acifolia</i> will also then be &lt; 10 % of the regional extent.</p> <p>In consideration of the above, environmental offsets for <i>Westringia acifolia</i> (DBCA-P1) through the Residual Impact Significance Model does not appear necessary.</p> <p>(c) <i>Baeckea grandibracteata</i> ssp. Parker Range (DBCA-P3)</p> <p>Mineral Resources acknowledges the regional records for <i>Baeckea grandibracteata</i> ssp. Parker Range are low, noting the biological surveys suggest this taxon cryptic and taxonomically difficult to identify.</p>

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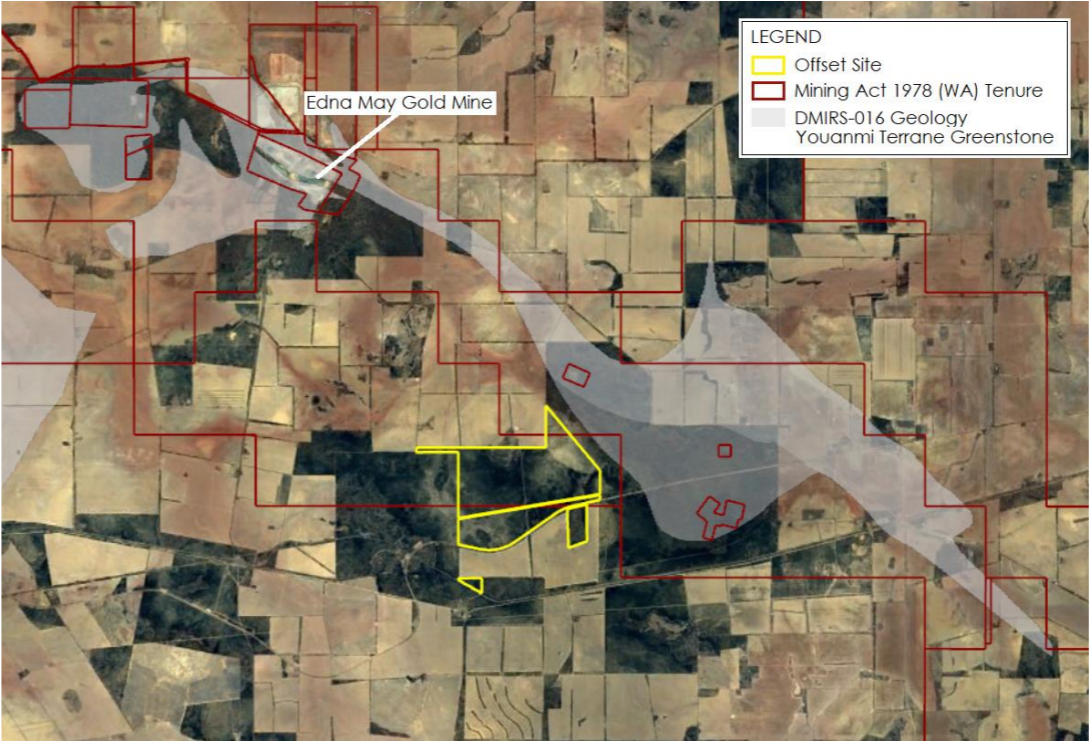
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		<p>The Environmental Review Document identifies a known regional population of <i>Baeckea grandibracteata</i> ssp. Parker Range (DBCA-P3) of &gt; 200 individuals (221 individuals), of which 2 individuals (&lt; 1 %) coincide with the Indicative Footprint (with 14 individuals (7 %) recorded within the broader Development Envelope).</p> <p>Mineral Resources' (2020) Mining Proposal and its accompanying Botanica (2010) flora survey for the Approved Proposal (Parker Range mining operations) identifies 22 individuals of <i>Baeckea grandibracteata</i> ssp. Parker Range will be removed, representing approximately 10 % of the known regional population of 221 individuals. This value of 22 individuals is consistent with the assessment of the Approved Proposal as outlined within EPA (2010).</p> <p>Mineral Resources notes that based upon the regional population of 221 individuals identified within the Environmental Review Document, the combined effect of the Revised Proposal (2 individuals) and the Approved Proposal (22 individuals) will be above 10 % (11 %) of the known regional population of 221 individuals.</p> <p>Whilst noting the above, more recent studies by Botanica (2022) as part of Western Areas' Jilbadji Exploration Project indicates a revised known regional population of <i>Baeckea grandibracteata</i> ssp. Parker Range of &gt; 340 individuals.</p> <p>To further note, in its assessment of the Approved Proposal, the EPA (2010) acknowledged and accepted an impact of approximately 14 % to <i>Baeckea grandibracteata</i> ssp. Parker Range, based upon a (then) known lower regional population of 158 individuals.</p> <p>The combined effect of the Approved Proposal (22 individuals) and the Revised Proposal (1 individual) to <i>Baeckea grandibracteata</i> ssp. Parker Range will be 23 individuals, representing approximately 7 % of the revised regional population of 340 individuals. This combined effect is below the 10 % impact value identified in the submission, and also notably lower than the 14 % impact value previously considered acceptable by EPA (2010).</p> <p>In consideration of the above, environmental offsets for <i>Baeckea grandibracteata</i> ssp. Parker Range (DBCA-P3) through the Residual Impact Significance Model does not appear necessary.</p> <p>Mineral Resources notes that <i>Baeckea grandibracteata</i> ssp. Parker Range (DBCAP3) was taxonomically reassigned to <i>Balaustion grandibracteatum</i> ssp. <i>grandibracteatum</i> (DBCA-P3) in July 2022 (following finalisation of the Environmental Review Document), as outlined by Rye (2022). This taxon now has a recognised broader distribution of approximately 80 km linear distance, and was described by Rye (2022) as having "numerous collections". Whilst Rye (2022) does not provide revised population data for this taxon, the DBCA's FloraBase system identifies an expanded distribution with &gt; 20 location records. This further information supports the view that this taxon has a broader regional distribution than previously considered, and the effect of the Revised Proposal to this taxon is unlikely to be environmentally significant.</p> <p>The table below provides the updated flora information for <i>Lepidosperma</i> sp. Mt Caudan (DBCA-P1), <i>Westringia acifolia</i> (DBCA-P1) and <i>Baeckea grandibracteata</i> ssp. Parker Range (DBCA-P3)</p> <table border="1"> <thead> <tr> <th rowspan="2">SPECIES</th> <th colspan="4">NO. INDIVIDUALS / AREA (HA)</th> <th colspan="2">CUMULATIVE IMPACT</th> </tr> <tr> <th>REGIONAL INDIVIDUALS</th> <th>APPROVED PROPOSAL</th> <th>HAUL ROAD (INDICATIVE FOOTPRINT)</th> <th>KOOLYANOBBLING OPERATIONS</th> <th>INDIVIDUALS / AREA (HA)</th> <th>%</th> </tr> </thead> <tbody> <tr> <td><i>Lepidosperma</i> sp. Mt Caudan (DBCA-P1)</td> <td>&gt; 75,000</td> <td>3,630</td> <td>64</td> <td>0</td> <td>3,694</td> <td>&lt; 5 %</td> </tr> <tr> <td><i>Westringia acifolia</i> (DBCA-P1)</td> <td>&gt; 4,000 &gt; 160 ha</td> <td>0 0</td> <td>Not recorded (&lt; 1 ha)</td> <td>0 0</td> <td>- (&lt; 1 ha)</td> <td>- &lt; 1 %</td> </tr> <tr> <td><i>Balaustion grandibracteatum</i> ssp. <i>grandibracteatum</i> (DBCA-P3) (formerly <i>Baeckea grandibracteata</i> ssp. Parker Range)</td> <td>&gt; 340</td> <td>22</td> <td>1</td> <td>0</td> <td>23</td> <td>&lt; 7 %</td> </tr> </tbody> </table> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources notes the submission on the proportional impacts to the flora taxa <i>Lepidosperma</i> sp. Mt Caudan (DBCA-P1), <i>Westringia acifolia</i> (DBCA-P1) and <i>Baeckea grandibracteata</i> ssp. Parker Range (DBCA-P3) (now <i>Balaustion grandibracteatum</i> ssp. <i>grandibracteatum</i> (DBCA-P3)). In consideration of the proportional impacts being &lt; 10 % as described above, consideration environmental offsets for these flora taxa through the Residual Impact Significance Model do not appear necessary.</p>	SPECIES	NO. INDIVIDUALS / AREA (HA)				CUMULATIVE IMPACT		REGIONAL INDIVIDUALS	APPROVED PROPOSAL	HAUL ROAD (INDICATIVE FOOTPRINT)	KOOLYANOBBLING OPERATIONS	INDIVIDUALS / AREA (HA)	%	<i>Lepidosperma</i> sp. Mt Caudan (DBCA-P1)	> 75,000	3,630	64	0	3,694	< 5 %	<i>Westringia acifolia</i> (DBCA-P1)	> 4,000 > 160 ha	0 0	Not recorded (< 1 ha)	0 0	- (< 1 ha)	- < 1 %	<i>Balaustion grandibracteatum</i> ssp. <i>grandibracteatum</i> (DBCA-P3) (formerly <i>Baeckea grandibracteata</i> ssp. Parker Range)	> 340	22	1	0	23	< 7 %
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2	<p>There is a discrepancy in area of the offset site between the ERD (section 10.3) and the Fauna Offset Strategy. Please confirm whether the area is 880 ha or 878 ha and ensure that the correct value is used in the offset calculators.</p>	<p><b>Response:</b></p> <p>Mineral Resources confirms the proposed Offset Site is 878 ha. The value of 878 ha is identified in both the Environmental Review Document and the submitted Fauna Offset Strategy, with this value correctly used in the relevant offset calculations.</p> <p>Mineral Resources notes there is a single descriptive reference within the Environmental Review Document which states "approximately 880 ha". This text intended to identify to the reader the scale of the proposed Offset Site, and was not intended to suggest a specific value (and appropriately, the term</p>																																		

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p>“approximately” was used in this reference). The specific value of the proposed Offset Site of 878 ha is identified within the Environmental Review Document in both Figure 18 and Table 39 (calculation values).</p> <p>The spatial area of the Offset Site of 878 ha has been based upon geographical information system (GIS) (computer) desktop mapping. It is anticipated that as part of the land transfer process the proposed Offset Site may be subject to on-site spatial re-survey to reconfirm the area value for the proposed Offset Site.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources confirms the proposed Offset Site is 878 ha. The value of 878 ha is identified in both the Environmental Review Document and the submitted Fauna Offset Strategy, with this value correctly used in the offset calculations.</p>
3	<p>The Fauna Offset Strategy states that an Offset Management Plan will be developed following the agreement of key stakeholders including the EPA, the Department of Biodiversity, Conservation and Attractions, and the Department of Agriculture, Water and the Environment. The WA EPA has similar requirements to DEECCW in this regard (see comments below) and identifying the management actions that will be undertaken is important for considering the appropriateness of values entered into the offset metric and determining whether the proposed offset meets the principles of the WA Environmental Offsets Policy. As a draft Plan has not been provided, a full comparison to the Offset Policy is unable to be made.</p> <p>A draft Offset Management Plan or other similar document should be provided to assess the appropriateness of the proposed offset. This document should include proposed monitoring methods, targets, expected timeframes and contingencies to provide confidence that the habitat quality can be improved to achieve the desired benefits for Chuditch and Malleefowl. It should also provide justification that the species are likely to be present after the management actions are implemented. The document should include commitments to management actions to improve habitat quality value such as 1080 baiting for cats and foxes.</p>	<p><b>Response:</b></p> <p>The Environmental Review Document identifies that to support the submitted Fauna Offset Strategy, following approval of the Haul Road, an Offsets Management Plan (OMP) will be developed and submitted in accordance with the environmental conditions of approval under the State <i>Environmental Protection Act 1986</i> (WA) and the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (C'th). The purpose of the Offset Management Plan will be to include further specific details of the Offset Site and the approach for ongoing management and monitoring, including the relevant agreement with DBCA as to the short, medium and long-term management and monitoring. It is acknowledged in the Environmental Review Document that further consultation with DAWE and EPA will seek to confirm the offset calculations within the Fauna Offset Strategy, prior to the development of the Offset Management Plan.</p> <p>Mineral Resources understands that the accepted approach of EPA and DCCEEW for environmental assessments requiring environmental offsets is for the preparation and submission of an overarching Offset Strategy for consideration at the environmental assessment stage, and then following the granting of environmental approval the Offset Strategy is refined with more specific management and monitoring actions, methods and targets through an Offset Management Plan. This approach has been outlined and followed throughout the environmental assessment for this Revised Proposal since its initial referral to EPA in May 2021 and referral to DCCEEW in June 2021.</p> <p>Mineral Resources believes the submitted Fauna Offset Strategy provides sufficient information to determine whether the proposed Offset Site will meet the principles of the WA Environmental Offset Policy, having regard to potential scale and effects of the Revised Proposal, the extent and environmental values within the proposed Offset Site, and the management and monitoring actions which have been proposed. Mineral Resources acknowledges the Offset Management Plan to be submitted post-approval will further refine this detail to improve the current level of confidence of the proposed Offset Site meeting the relevant policy and guidelines.</p> <p>The submission further requests justification that Malleefowl and Chuditch are likely to be present after the management actions are implemented within the proposed Offset Site. Verified records of current occurrence of both Malleefowl and Chuditch within the proposed Offset Site can be demonstrated, and accordingly, it is reasonable to infer that with implementation of the proposed management actions that both fauna taxa will continue to persist within the proposed Offset Site. Verified records of current occurrence of both Malleefowl and Chuditch within the proposed Offset Site has been demonstrated as outlined below:</p> <p>(a) Malleefowl <i>Leipoa ocellata</i> (EPBC-V, BC-V)</p> <p>The Phoenix (2021) assessment recorded an old Malleefowl nest mound within the Offset Site, as well as a set of recent Malleefowl tracks in the adjoining (connected) DBCA Reserve 18583 (west); both recorded within the same (connected) habitat type of Open Mallee over <i>Allocasuarina/Acacia</i> shrubland. Whilst the nest mound was old, the recent Malleefowl tracks in the connected habitat provides a verified record of recent Malleefowl use within this habitat type. In addition to the submitted Phoenix (2021) report, Mineral Resources has subsequently located an earlier report for the proposed Offset Site prepared by Ecoscape (2020) (for Covalent Lithium) which identified an active Malleefowl nest mound (2019 breeding cycle) within the central area of the Offset Site; this record confirming recent Malleefowl presence (and breeding) within the proposed Offset Site. Accordingly, the requirement for recent verified records of Malleefowl within the proposed Offset Site has been met.</p> <p>(b) Chuditch <i>Dasyurus geoffroyi</i> (EPBC-V, BC-V)</p> <p>The Phoenix (2021) assessment recorded two sets of Chuditch scats at the northern end of the proposed Offset Site. In addition, Phoenix (2021) recorded scats in the adjoining DBCA Reserve 18583 (west) and the adjoining DBCA Reserve 16000 (east). Although the scats recorded were not ‘fresh’ (i.e. within a few weeks) the scats are likely to be relatively recent (&lt; 5 years). Accordingly, the requirement for recent verified records of Chuditch within the proposed Offset Site has been met.</p> <p>Mineral Resources notes the submission request to include commitments for management actions to improve the habitat quality value, such as 1080 baiting for cats and foxes. Table 14 within the submitted Fauna Offset Strategy identifies the management measures include “<i>Involvement in regional feral animal management to minimise predation impacts, if required</i>” (refer to Table 14, Item 5 in Column 2). This approach for the introduced fauna control within the proposed Offset Site to form part of regional introduced fauna management is in recognition of its connection to x3 conservation reserves (R18583, R18584, R16000) managed by DBCA, and it is considered the specific fauna control method (for example, whether sodium fluoroacetate 1080 poison baiting, or other alternate/complementary approach) will be guided by the professional advice of DBCA (as the land manager for the State conservation reserve system) and in consultation with other local landowners. Mineral Resources considers this submission item has been addressed noting the submitted Fauna Offset Strategy identifies a commitment for management actions for introduced predator fauna control.</p>

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NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p><b>Proposed Outcome:</b></p> <p>An Offsets Management Plan will be prepared and submitted following approval of the Haul Road, with the Offsets Management Plan to include further specific details of the approach for ongoing management and monitoring as currently outlined within the submitted Fauna Offset Strategy. This approach for an Offset Strategy during the environmental assessment, followed by an Offset Management Plan following environmental approval, is consistent with the accepted approach for environmental assessments by EPA and DCCEEW. Mineral Resources considers the submitted Fauna Offset Strategy provides sufficient information to determine whether the proposed Offset Site will meet the principles of the WA Environmental Offset Policy at this stage of the environmental assessment, having regard to potential scale and effects of the Revised Proposal, the extent and environmental values within the proposed Offset Site, and the management and monitoring actions which have been proposed.</p> <p>Verified records of recent occurrence of both Malleefowl and Chuditch within the proposed Offset Site has been demonstrated, and accordingly, it is reasonable to infer that with implementation of the proposed management actions that both fauna taxa will continue to persist within the proposed Offset Site.</p> <p>The submitted Fauna Offset Strategy identifies a commitment for management actions for introduced predator fauna control as part of regional introduced fauna management (to be incorporated with the adjoining x3 conservation reserves) with the specific fauna control method(s) to be guided by DBCA and in consultation with other local landowners.</p>
4	<p>There is no reasoning provided for the relevance of offset Principle 3 in Table 7 of the Fauna Offset Strategy. The table should include a summary of evidence that the impacted values are present at the offset site to ensure that it is like-for-like.</p>	<p><b>Response:</b></p> <p>Table 7 of the submitted Fauna Offset Strategy seeks to identify how the Strategy aligns to the relevant Government of Western Australia (2011, 2014) documents <i>WA Environmental Offset Policy</i> and <i>WA Environmental Offset Guidelines</i>. The reasoning for this assessment of alignment is presented within the introductory text of Section 2.5 <i>Alignment with Policy and Guidelines</i> within the submitted Fauna Offset Strategy.</p> <p>Principle 3 in Table 7 of the submitted Fauna Offset Strategy is taken from the <i>WA Environmental Offset Policy</i> document, which states”</p> <p style="padding-left: 40px;"><i>“3. Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted.”</i></p> <p>The response provided by Mineral Resources to Principle 3 within the submitted Fauna Offset Strategy states:</p> <p style="padding-left: 40px;"><i>“The acquisition, improvement and protection of Lot 1416 (refer Section 3) is considered a cost-effective way of increasing habitat within the Eastern Wheatbelt. The quantum of offsets based on calculations by the Commonwealth Offset Calculator (Table 13) are proportionate to the significance of the environmental value being impacted.”</i></p> <p>The response provided by Mineral Resources within the submitted Fauna Offset Strategy to address Principle 3 of the <i>WA Environmental Offset Policy</i> identifies key points that the proposed environmental offset is both “cost-effective” and “proportionate” (based upon the relevant calculations). The intent of this response was to provide an overview of the alignment between the submitted Fauna Offset Strategy and the <i>WA Environmental Offset Policy</i>; and Mineral Resources believes this intent has been achieved.</p> <p>Mineral Resources notes the submission seeks “evidence that the impacted values are present at the offset site to ensure that it is like-for-like” and acknowledges this submission request fits within the context of the term “relevant” under Principle 3 of the <i>WA Environmental Offset Policy</i>. To this extent, Mineral Resources acknowledges that its response to Principle 3 could have been expanded with a minor text adjustment to confirm that the proposed Offset Site contains habitat for Malleefowl and Chuditch which is suitable to offset (counterbalance) the removal of Malleefowl and Chuditch habitat by the Revised Proposal (however, Mineral Resources equally notes this context is readily inferred from multiple other locations within the submitted Fauna Offset Strategy).</p> <p><b>Proposed Outcome:</b></p> <p>Table 7 of the submitted Fauna Offset Strategy seeks to identify how the submitted Fauna Offset Strategy aligns to the relevant environmental offset policy and guidance, with Mineral Resources’ response to Principle 3 of the WA Environmental Offset Policy considered to address the key points of the environmental offset being “cost-effective” and “proportionate”. Mineral Resources acknowledges the response could have been more explicit to address the term “relevant” as contained within Principle 3, however, this item can be readily inferred from other parts of the submitted Fauna Offset Strategy.</p>
5	<p>MRL should establish early contact with the Department of Mines, Industry Regulation and Safety (DMIRS) to seek their support to assist the process of transferring the land acquisition offset to conservation estate. Evidence of support from DMIRS would provide the EPA confidence in the offset being long term and enduring.</p>	<p><b>Response:</b></p> <p>Mineral Resources acknowledges the submission which suggests consultation with DMIRS to seek support with the process of transferring the proposed Offset Site into the State’s conservation reserve system. Mineral Resources notes that formal reservation of land under the State <i>Conservation and Land Management Act 1984</i> (WA) is subject to processes under the State <i>Land Administration Act 1997</i> (WA), and this process requires consultation with DMIRS.</p> <p>To provide clarification, the proposed Offset Site is currently held as ‘Freehold’ land tenure, recently acquired by Mineral Resources. Mineral Resources proposes to transfer ownership of the proposed Offset Site to DBCA in its current Freehold land tenure, and following, the DBCA may then seek to incorporate the Offset Site into the State’s conservation reserve system through the relevant legislative provisions administered by DBCA. Mineral Resources supports the incorporation of the proposed Offset Site into the State’s conservation reserve system, however, it is DBCA (and the Conservation Commission of Western Australia) that control the statutory processes for reservation under the <i>Conservation and Land Management Act 1984</i> (WA). In consultation with DMIRS to date, Mineral Resources has not received any indication from DMIRS that it will not support the transfer or reservation of the proposed Offset Site.</p>



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		<p>Mineral Resources notes that part of the proposed Offset Site is concurrent with the southern part of Exploration Licence E77/2766 granted to Kula Gold Limited and the southern part of Exploration Licence E77/2443 granted to Edna May Operations Pty Ltd (Ramelius Resources Limited), with these tenements also concurrent with parts of the adjoining DBCA conservation reserves (refer to image below). Published information from Kula Gold Limited indicates the northern part of E77/2766 may be prospective for gold as this directly adjoins the Edna May Gold Mine operated by Ramelius Resources Limited (approximately 5 km north), and this is also consistent with the published information from Ramelius Resources Limited which indicates gold prospectivity in north-west and south-east directions from the Edna May Gold Mine following the defined greenstone geological belt. This defined greenstone geological belt for gold prospectivity does coincide with the proposed Offset Site (with the proposed Offset Site occurring within a geology of “Yilgarn Craton granites” as defined by DMIRS (Data source: DMIRS-016 1:500 000 State Interpreted Bedrock Geology available at data.wa.gov.au). Review of the DMIRS’ online systems (Tengraph and Minedex) also indicates there has been no active exploration applications or approvals within the southern parts of E77/2766 or E77/2443 which would indicate the presence of an economic resource in the area of the proposed Offset Site. With no economic ore resource identified, it is anticipated that DMIRS is likely to support proposed reservation under the <i>Conservation and Land Management Act 1984 (WA)</i>.</p> <p>The proposed Offset Site is currently held as ‘Freehold’ land tenure owned by Mineral Resources. Noting the adjacent x3 conservation reserves (R18583, R18584, R16000) are listed as ‘Class C’ reserves, it may be anticipated DBCA will similarly seek a Class C reservation for the proposed Offset Site. Alternatively, the DBCA may seek to retain the proposed Offset Site in its current Freehold tenure. Mining Act tenure may occur concurrently with either a Class C reservation or the current Freehold land tenure,</p> <p><b>Proposed Outcome:</b></p> <p>The submission which suggests consultation with DMIRS to seek support to assist in the process of transferring the proposed Offset Site into the State’s conservation reserve system is acknowledged and accepted.</p>  <p>Proposed Offset Site with Mining Act Tenure and Geology</p>
6	<p>The proponent has proposed ‘banking’ the remainder of the purchased land not required to offset this proposal for another future proposal. It is important that the choice to ‘bank’ does not delay or restrict the transfer of the land to conservation estate (e.g., through subdividing). If offset banking is implemented, it is critical that it is clear what portion of the parcel of land is being used to offset which proposal and that land management arrangements are clear.</p>	<p><b>Response:</b></p> <p>The submitted Fauna Offset Strategy identified the proposed Offset Site meets &gt; 125 % of the offset requirement for effects of the Revised Proposal to Malleefowl and Chuditch habitat. The submitted Fauna Offset Strategy in Section 5 <i>Offset Banking</i> therefore outlines the approach to ‘bank’ excess offset value (i.e. the value above the 100 % target) so that this excess can be credited towards any future environmental offset requirement. Offset banking is an accepted and established approach for the identification, management and accounting for land acquisition environmental offsets.</p> <p>As identified in Section 5 <i>Offset Banking</i>, key advantages of an ‘offset banking’ approach include:</p> <ul style="list-style-type: none"> <li>(a) Allow for early management of a larger offset area in advance of the full offset value being required (conservation benefit).</li> <li>(b) Encourage minimisation of total clearing, by increasing the amount available in the offset bank.</li> </ul>

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		<p>Mineral Resources proposes that the whole of the proposed Offset Site is transferred to the State conservation reserve system, rather than only the required part of the site being transferred (through subdivision or other process). As noted above under item (a) , this approach provides a conservation benefit through allowing for the early management of the larger area.</p> <p>As also noted within Section 5 <i>Offset Banking</i>, a post-construction survey assessment will be conducted to allow for a re-calculation of the offset requirement. This re-calculation will consider the area of fauna habitat cleared for the Haul Road (which may be less than the maximum 173 ha to be authorised) and the corresponding offset requirement, with the remainder of the area of the proposed Offset Site to form the banked vale. This post-construction accounting approach, consistent with item (b) above, will provide an incentive to Mineral Resources to minimise the clearing for the Haul Road during construction works noting that any savings in habitat clearing during construction will result in a larger retained 'bank' credit. Noting this post-construction accounting approach, it is not necessary (or appropriate) at this stage to spatially apportion which parts of the proposed Offset Site are being used for offset and which parts are to be credited to offset banking.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources proposes that the whole of the proposed Offset Site is transferred to the State conservation reserve system (rather than only the required part of the site being transferred); thereby providing a conservation benefit of managing the proposed Offset Site as a whole.</p> <p>A post-construction survey assessment will be conducted to allow for a re-calculation of the offset requirement, with the remainder of the area of the proposed Offset Site to form the 'banked' value. This post-construction accounting approach will provide an incentive to Mineral Resources to minimise the clearing for the Haul Road during construction works.</p>
7	<p>The habitat quality of the offset site is proposed to be improved through several measures, with the intention to increase the presence of Malleefowl and Chuditch.</p> <p>The vegetation quality of the site is considered pristine so there is limited option for improving the vegetation to contribute to future quality. It is unclear if the proposed improvement to habitat quality is achievable given the proposed management actions. Further details about the carrying capacity of the conservation area for Malleefowl and Chuditch is also required.</p>	<p><b>Response:</b></p> <p>As outlined within the submitted Fauna Offset Strategy, the proposed Offset Site is considered suitable to offset the loss of fauna habitat for Malleefowl <i>Leipoa ocellata</i> (EPBC-V, BC-V) and Chuditch <i>Dasyurus geoffroii</i> (EPBC-V, BC-V) to be removed by the Revised Proposal.</p> <p>The management actions to be implemented within the proposed Offset Site (e.g. introduced fauna control, fencing and fire management) can be expected to improve/maintain the quality of the fauna habitat present. These management actions to improve/maintain the fauna habitat quality are intended to ensure the continued presence of Malleefowl and Chuditch. Improved/maintained fauna habitat may <i>potentially</i> result in an increased abundance of Malleefowl and/or Chuditch within the proposed Offset Site (subject to other factors, e.g. climatic conditions), however, an increase in abundance of Malleefowl or Chuditch is not an explicit objective/target of the submitted Fauna Offset Strategy.</p> <p>Mineral Resources agrees with the submission that the majority of the native vegetation (fauna habitat) within the proposed Offset Site is in 'pristine' condition. It is this pristine condition of the native vegetation - together with its connection with x3 conservation reserves (R18583, R18584, R16000) - which will make this proposed Offset Site a particularly valuable addition into the State's conservation reserve system.</p> <p>Whilst it is acknowledged there will be limited opportunities to improve the pristine vegetation condition, opportunity remains to improve the fauna habitat value for the protection and conservation of Malleefowl and Chuditch. Mineral Resources propose to implement a range of active management controls to maintain and improve the habitat quality for Malleefowl and Chuditch, including fencing, management of introduced flora (weeds), management of fire (to protect fauna habitat) and management of introduced (predator) fauna. In the absence of such controls, a potential for a reduction in the habitat quality for Malleefowl and Chuditch exists.</p> <p>The submitted Fauna Offset Strategy does not seek to define metrics for the "carrying capacity" of the proposed Offset Site as suggested by the submission, nor is carrying capacity a measurement 'target' or 'criteria' for the submitted Fauna Offset Strategy. As outlined within the Environmental Review Document, Malleefowl and Chuditch both have large 'home ranges' and occur in naturally low abundance; such that the number of individuals of each taxon within any site would be expected to be naturally low. Resident individuals of Malleefowl and Chuditch are likely to use both the proposed Offset Site and the adjoining x3 conservation reserves as part of their natural home range; such that any consideration of the capacity of the proposed Offset Site would also need to consider the capacity of the adjoining x3 conservation reserves. As both Malleefowl and Chuditch occur in naturally low abundance and have large home ranges, it may be expected the proposed Offset Site and the adjoining x3 conservation reserves may <i>theoretically</i> provide sufficient habitat for a only limited number of breeding pairs; however noting any such calculation would not appear to be of any meaningful benefit for the proposed Offset Site (i.e. any carrying capacity value calculated would not alter the management or monitoring actions which have been proposed).</p> <p><b>Proposed Outcome:</b></p> <p>The management actions to be implemented within the proposed Offset Site can be expected to improve/maintain the quality of the fauna habitat present. The improvements in fauna habitat quality are intended to ensure the continued presence of Malleefowl and Chuditch, and may <i>potentially</i> result in an increased abundance of Malleefowl and/or Chuditch.</p> <p>The submitted Fauna Offset Strategy does not seek to define metrics for the "carrying capacity" of the proposed Offset Site. Calculation of a carrying capacity would not appear to benefit or alter the management or monitoring actions to be implemented within the proposed Offset Site.</p>

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
DEPARTMENT OF CLIMATE CHANGE, ENERGY, THE ENVIRONMENT AND WATER (DCCEEW)		
8	<p>The Department notes that performance criteria are measured in relation to reference sites nearby. Baseline data from the surrounding DBCA reserves showing if there are Malleefowl (<i>Leipoa ocellata</i>) and Chuditch (<i>Dasyurus geoffroii</i>) in the area likely to use the proposed offset site will need to be provided.</p>	<p><b>Response:</b></p> <p>The submitted Fauna Offset Strategy identifies preliminary performance criteria in Table 14, which for Malleefowl and Chuditch are identified as:</p> <ul style="list-style-type: none"> <li>(a) “Active Malleefowl mound (as per NMRT methodology) or Malleefowl sighting (via camera or fauna specialist) within ten years of monitoring”</li> <li>(b) “Chuditch sighting (via camera, trap, or fauna specialist) during breeding season within ten years of monitoring”</li> </ul> <p>To provide clarification, the above criteria for Malleefowl and Chuditch presence are <u>not</u> measured in relation to reference sites.</p> <p>The performance criteria that are measured against reference sites relate to habitat quality (i.e. weed cover, percentage of leave and vegetation litter). As these habitat quality parameters can change over time (for example, changes in rainfall and temperature) it is relevant for comparison to be made against the reference sites using year on year monitoring data rather than using a fixed baseline.</p> <p>Mineral Resources notes the request from DCCEEW for baseline data for Malleefowl and Chuditch from the surrounding DBCA reserves. As outlined within the Phoenix (2021) flora and fauna assessment, database records held by DBCA were obtained for a 20 km radius surrounding the proposed Offset Site to inform the field assessment, with this area including the adjoining conservation reserves managed by DBCA. In response to this DCCEEW request, these database records for Malleefowl and Chuditch have been mapped are presented in Appendix 1.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources notes the request from DCCEEW for baseline data from the surrounding DBCA conservation reserves, with the baseline data mapped and presented at Appendix 1.</p>
9	<p>It is noted that MRL has stated rabbits, pigs and goats may occur in low numbers in the local area and that they are not considered to present a potential risk for competition of resources. Noting that the Flora and Fauna Assessment of Lot 1416 recorded evidence of foraging and scats of rabbits, further justification of why rabbits are not a risk to the threatened species should be provided.</p>	<p><b>Response:</b></p> <p>Whilst the Phoenix (2021) field survey recorded the European Rabbit <i>Oryctolagus cuniculus</i> as present within the Offset Site, the number of observations was small (total of 5 individuals observed) and impacts from the European Rabbit to the quality of the fauna habitat were not evident (as indicated by the ‘pristine’ vegetation condition). On this basis, whilst the European Rabbit was present, the low number of individuals and the absence of impact to the fauna habitat confirms that the European Rabbit is unlikely to result in a significant impact to Malleefowl or Chuditch (at present, and into the future).</p> <p>As noted by Phoenix (2021), the introduced predator fauna taxa Cat <i>Felis catus</i> (12 records), European Fox <i>Vulpes vulpes</i> (10 records) and Dog <i>Canis familiaris</i> (6 records) were confirmed as present and with abundance that may present a threat to Malleefowl and Chuditch. The potential threat of mortality that is posed by introduced predator fauna is substantially higher than a potential threat of competition for food resources from herbivores such as the European Rabbit. Accordingly, the control of the introduced predator fauna is a key component of the management actions to be implemented within the Offset Site to reduce the existing predator threat posed to Malleefowl and Chuditch.</p> <p><b>Proposed Outcome:</b></p> <p>Justification of the low potential threat of the European Rabbit to fauna habitat of Malleefowl and Chuditch within the Offset Site has been provided above.</p>
10	<p>It is noted that a future Offset Management Plan (OMP) will be developed to include preliminary and final completion criteria, and detailed management measures following the agreement of key stakeholders of the offsite suitability and the draft Offset Strategy. Requirements for this future OMP include:</p> <p>The proposed offset package must include as a minimum:</p> <ul style="list-style-type: none"> <li>• a description of the proposed offset site(s) including location, size, condition and relevant ecological/species habitat features, landscape context and cadastre boundaries of the offset site(s) (supported by mapping)</li> <li>• evidence of the presence of, or usage by, relevant protected matter(s) on, or adjacent to the offset site(s), and the presence and quality of habitat for protected matter(s) on the offset site</li> <li>• these details should be based on recent site surveys or analysis of available contemporary site data, reference to research, studies or other publications relevant to the protected matter(s) and include reference to the site survey and habitat assessment methodology used</li> <li>• current and likely future tenure of the proposed offset site and details of how the offset site will be legally secured for the full duration of the impact</li> </ul>	<p><b>Response:</b></p> <p>The DCCEEW is correct that a Fauna Offset Management Plan will be developed (post-approval), with the Fauna Offset Management Plan to provide finer-detail as to the management, environmental monitoring and completion criteria currently presented within the submitted Fauna Offset Strategy. Mineral Resources supports the DCCEEW view for the Fauna Offset Management Plan to be developed in consultation with key stakeholders.</p> <p>Mineral Resources thanks the DCCEEW for the guidance and confirms the Fauna Offset Management Plan to be developed (post-approval) will have consideration of this.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources thanks the DCCEEW for the guidance and confirms the Fauna Offset Management Plan to be developed (post-approval) will have consideration of this.</p>

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
	<p>Details and justification demonstrating how the proposed direct offset package will maintain or improve the viability of the protected matter(s) consistent with the EPBC Environmental Offsets Policy and EPBC Act Offsets Assessment Guide. This includes, but is not limited to:</p> <ul style="list-style-type: none"> <li>• offset completion criteria (i.e., environmental outcomes) to be achieved, and reasoning for these in reference to relevant statutory recovery plans, conservation advice, and threat abatement plans This information could be provided in a table format</li> <li>• milestones to demonstrate adequate progress towards achieving the offset completion criteria</li> <li>• specific environmental management activities and mitigation measures that will attain and maintain the completion criteria, including the management of threats to relevant species and the timing of actions (e.g. complete the planting, and ensure a survival rate of 90%, of at least 15,000 seed, sapling or tube stock (or equivalent) food tree species within x years following commencement of the action; reduce the invasive weed coverage on the offset site to 5% within x years following commencement of the action; implement an annual non-native feral pest control program over a time period). This information could be provided in a table format</li> <li>• baseline survey information to determine the presence of relevant protected matters and the extent and quality of the respective habitat(s) at the offset site(s) in accordance with the Department's survey guidelines or using a scientifically robust and repeatable methodology</li> <li>• a monitoring and corrective action program to measure the success of the environmental outcomes, which must include performance indicators, milestone outcomes, monitoring requirements, trigger values, corrective measures, and identified roles and responsibilities in accordance with the requirements in section 3 of the Department's Environmental Management Plan Guidelines: <a href="https://www.environment.gov.au/epbc/publications/environmental-management-plan-guidelines">https://www.environment.gov.au/epbc/publications/environmental-management-plan-guidelines</a></li> <li>• evidence of how the proposed offset completion criteria for the proposed offset will be achieved and maintained over the duration of the impact.</li> </ul>	
11	<p>For Lot 1416 (the offset site) to be a suitable offset the DCCEEW must be provided with primary evidence of recent Malleefowl and Chuditch presence.</p>	<p><b>Response:</b></p> <p>The DCCEEW requirement for verified records of recent presence of Chuditch and Malleefowl within the Offset Site is acknowledged and accepted. Mineral Resources considers this requirement has been met.</p> <p>The DCCEEW document <i>Habitat Scoring System for Chuditch</i> (received from DCCEEW on 30 September 2022) identifies that “verified records” for Chuditch are required, noting that verified records may be met through either “primary evidence” (e.g. camera detections or trap records) or “secondary evidence” (e.g. scats, tracks, hairs). The scoring system identifies that either primary evidence or secondary evidence is suitable for meeting DCCEEW’s offset requirements. The Phoenix (2021) assessment recorded two sets of Chuditch scats at the northern end of the proposed Offset Site. In addition, Phoenix (2021) recorded scats in the adjoining DBCA Reserve 18583 (west) and the adjoining DBCA Reserve 16000 (east). Although the scats recorded were not ‘fresh’ (i.e. within a few weeks) the scats are likely to be relatively recent (&lt; 5 years). Accordingly, the requirement for verified records of Chuditch within the proposed Offset Site has been met.</p> <p>The DCCEEW document <i>Habitat Scoring Tool for Malleefowl</i> (received from DCCEEW on 30 September 2022) identifies that “verified records” of Malleefowl are required, however, this scoring system does not define the term verified records. Similarly to Chuditch (above), it is interpreted that the requirement for verified records may be met through either “primary evidence” (e.g. camera detections or observations of individuals) or “secondary evidence” (e.g. tracks, feathers, scratchings). The Phoenix (2021) assessment recorded an old Malleefowl nest mound within the Offset Site, as well as a set of recent Malleefowl tracks in the adjoining (connected) DBCA Reserve 18583 (west); both recorded within the same (connected) habitat type of Open Mallee over <i>Allocasuarina/Acacia</i> shrubland. Whilst the nest mound was old, the recent Malleefowl tracks in the connected habitat provides primary evidence of Malleefowl use within this habitat type. In addition to the submitted Phoenix (2021) report, Mineral Resources has subsequently located an earlier report for the proposed Offset Site prepared by Ecoscape (2020) (for Covalent Lithium) which identified an active Malleefowl nest mound (2019 breeding cycle) within the central area of the Offset Site; this record confirming recent primary evidence of Malleefowl presence (and breeding) within the proposed Offset Site. Accordingly, the requirement for verified records of Malleefowl within the proposed Offset Site has been met.</p> <p><b>Proposed Outcome:</b></p> <p>The DCCEEW requirement for verified records of recent presence of Malleefowl and Chuditch within the Offset Site has been met.</p>

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NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p>A copy of the Ecoscape (2020) assessment report covering the Offset Site is publicly available through the EPA's website at: <a href="https://www.epa.wa.gov.au/sites/default/files/Referral_Documentation/Threatened%20Fauna%20Offset%20Environmental%20Management%20Plan%20%282021%29.pdf">https://www.epa.wa.gov.au/sites/default/files/Referral_Documentation/Threatened%20Fauna%20Offset%20Environmental%20Management%20Plan%20%282021%29.pdf</a> (refer to Appendix A of the linked document – note as Mineral Resources does not have copyright of this Ecoscape document a copy is unable to be provided directly).</p>
12	<p>The DCCEEW disagrees with the adequacy of the statement by MRL that if the species have not been identified on site within 10 years, alternative offset areas will be sourced. In accordance with the Environmental Offsets Policy, primary evidence of recent Malleefowl and Chuditch presence must be established at the offset site and for the life of the project, with regular monitoring to conclude utilisation of the site.</p>	<p><b>Response:</b></p> <p>Mineral Resources acknowledges and accepts with the DCCEEW submission. As verified records of recent presence of Malleefowl and Chuditch has been demonstrated within the Offset Site (refer to response above), any need for an 'alternative' offset site has been superseded.</p> <p>Mineral Resources will ensure the Fauna Offset Management Plan (to be developed post-approval) does not include reference to an alternative offset site.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources acknowledges and accepts the DCCEEW submission. Mineral Resources will ensure the Fauna Management Plan (to be developed post-approval) does not include reference to an alternative offset site.</p>
13	<p>The DCCEEW notes that MRL believes the risk of the offset option not fulfilling the aims for which it is designed (Completion Criteria) is considered to be low (Section 6) despite a targeted survey suggesting that there is no primary evidence of Malleefowl presence. Therefore, risk level should be reconsidered. The value of the site to Malleefowl and Chuditch can only be improved if there is primary evidence of their presence.</p>	<p><b>Response:</b></p> <p>As outlined in the responses above, the DCCEEW requirement for verified records of recent presence of Malleefowl and Chuditch within the Offset Site has been met. Accordingly, the assessment outcome of a low risk of the Offset Site not meeting the Completion Criteria is considered to be appropriate.</p> <p><b>Proposed Outcome:</b></p> <p>The DCCEEW requirement for verified records of recent presence of Malleefowl and Chuditch within the Offset Site has been met. Accordingly, the assessment outcome of a low risk of the Offset Site in not meeting the Completion Criteria is considered to be appropriate.</p>
14	<p>The National Recovery Plan for Malleefowl recommends reducing fire threats. Fire management plans should be drafted and implemented for all large reserves. These plans should focus on strategic ways of limiting the spread of large fires, and promoting more patchy burns when wildfire occurs. Areas that are most important for Malleefowl should be identified and strategies should be developed in fire management plans for protecting these areas in particular. Fire management requires considerable planning and may require habitat modifications (e.g., installing effective firebreaks, patch burns etc.). Aboriginal people should be encouraged to conduct traditional burning where this does not threaten dense mulga habitats or Malleefowl nests. The Department requires further information on the offset site fire management plan.</p>	<p><b>Response:</b></p> <p>The submitted Fauna Offset Strategy outlines that fire management will be a key management action for the Offset Site, with Completion Criteria targeting the establishment/maintenance of fire tracks and to ensure no 'unplanned' fires occur. The Fauna Offset Strategy identifies that the subsequent Fauna Offset Management Plan to be developed (post-approval) will include consultation with key stakeholders for the Offset Site (DBCA, EPA and DCCEEW).</p> <p>Mineral Resources agrees with the DCCEEW submission that fire management requires considerable planning. Mineral Resources envisages that fire management for the Offset Site will be considered as part of strategic fire management for the broader connected x3 conservation reserves (R18583, R18584, R16000), rather than the Offset Site independently. As DBCA is the 'lead agency' responsible for management of the State conservation reserve system, the finer detail of the fire management actions to be implemented strategically across the x3 conservation reserves and the Offset Site will be guided by DBCA in the first instance, with subsequent input from EPA and DCCEEW as key stakeholders. This finer detail (to be discussed and agreed) will be outlined within the Fauna Offset Management Plan (to be developed post-approval).</p> <p>Mineral Resources notes and supports the view of DCCEEW in involving Traditional Owners in fire management. The involvement of Traditional Owners in fire management can be considered as part of the Fauna Offset Management Plan.</p> <p><b>Proposed Outcome:</b></p> <p>The submitted Fauna Offset Strategy outlines that fire management will be a key management action for the Offset Site, with Completion Criteria targeting the establishment/maintenance of fire tracks and to ensure no 'unplanned' fires occur. Fire management for the Offset Site will likely be part of the strategic fire management with broader connected x3 conservation reserves (R18583, R18584, R16000) rather than the Offset Site independently, to be led by DBCA as the 'lead agency' responsible for the State conservation reserve system. The subsequent Fauna Offset Management Plan to be developed (post-approval) will be the mechanism through which the finer detail of fire management will be considered.</p>
15	<p>Although DCCEEW encourages the use of Advanced Offsets as outlined in Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy, the Commonwealth at the moment does not have a mechanism to take them into account. There is currently work underway, however, the DCCEEW cannot guarantee the outcome in time for its implementation.</p> <p>The DCCEEW recommends that you do an offset management plan for the advanced offset and run calculations per the offsets assessment guide with two scenarios, one for the portion of the estimated impact and one for the whole advanced offset.</p>	<p><b>Response:</b></p> <p>Mineral Resources notes and acknowledges the support of DCCEEW in using 'Advanced Offsets' (i.e. 'Offset Banking' as described in Section 5 of the Fauna Offset Strategy). Mineral Resources further notes the absence of a current mechanism by which DCCEEW can take account of Advanced Offsets, however, that such a mechanism is being progressed by DCCEEW.</p> <p>As the Advanced Offsets approach has been included within the Fauna Offset Strategy, Mineral Resources has preserved its ability to 'bank' any surplus portion of the Offset Site, whilst still allowing for the total area of the Offset Site to be provided and managed for conservation benefit (rather than only providing a portion of the Offset Site at this stage). If in the future Mineral Resources needs to call upon the surplus, then at that time the Fauna Offset Strategy / Fauna Offset Management Plan for this Revised Proposal can readily be amended and re-approved so as to separate-out the surplus portion, which would allow for that portion to be used for a secondary purpose (for example, to meet the offset requirement for another Mineral Resources' project).</p>

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p><b>Proposed Outcome:</b></p> <p>Mineral Resources notes and acknowledges the support of DCCEEW in using Advanced Offsets and the absence of a current mechanism for accounting. No action is necessary at this stage as Mineral Resources preserved its ability to 'bank' any surplus portion of the Offset Site, and this can be called-upon in the future through an amendment of the Fauna Offset Strategy / Fauna Offset Management Plan in the future (if required).</p>
16	<p>There is very limited scope to improve habitat quality, in the semi-arid agricultural region the offsite site is located in. There is little/no human access to the site, no grazing, few weeds and limited scope for predator control. Evidence to justify quality improvements will be required.</p>	<p><b>Response:</b></p> <p>Mineral Resources acknowledges and accepts with the DCCEEW submission of the high habitat quality within the proposed Offset Site, however, Mineral Resources does not agree with the submission as to limited opportunity to improve its conservation value.</p> <p>The Offset Site has previously not been actively managed for conservation purposes. Mineral Resources propose to implement a range of active management controls to maintain and improve the habitat quality for Malleefowl and Chuditch, including fencing, management of introduced flora (weeds), management of fire, and management of introduced (predator) fauna. In the absence of such controls, there exists a potential for a reduction in the habitat quality and a reduction in the abundance of Malleefowl and Chuditch.</p> <p>As general commentary, the existing high habitat quality of the Offset Site is surprising in context with many other native vegetation remnants across the Wheatbelt. It is perhaps by chance that the Offset Site has had multiple factors in its favour to retain the high habitat quality - including <i>inter alia</i> (a) the landowner fencing the adjoining agricultural lands which has minimised access/egress points for humans and introduced fauna, (b) the 'buffering' of potential impacts along the western and eastern boundaries by the x3 conservation reserves, (c) physical separation along the southern boundary by a wide (~ 30 m) and fenced corridor for rail/power, and (d) minimal other human disturbance due to its separation from major town centres. The ability to include this Offset Site as part of the State's conservation reserve system and connect x3 conservation reserves (to form one of the largest single conservation reserves in the Wheatbelt) represents an outstanding opportunity for Malleefowl and Chuditch conservation.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources acknowledges and accepts the DCCEEW submission of the high habitat quality within the Offset Site, however, Mineral Resources does not agree with the submission as to limited opportunity to improve its conservation value. Mineral Resources propose to implement a range of active management controls to maintain and improve the habitat quality and occurrence of Malleefowl and Chuditch, including fencing, management of introduced flora (weeds), management of fire, and management of introduced predator fauna. In the absence of such controls, a real potential exists for a reduction in the habitat quality and a reduction in Malleefowl and Chuditch occurrence.</p>
17	<p>It is noted that the offset site (Lot 1416) has already been acquired by MRL. Please clarify when the offsite site was purchased and what was the reasoning at the time of its purchase.</p>	<p><b>Response:</b></p> <p>The Offset Site was acquired by Mineral Resources (through Mineral Resources' subsidiary Yilgarn Iron Pty Ltd) in March 2022.</p> <p>The reasoning for the timing of this purchase was due to:</p> <ul style="list-style-type: none"> <li>(a) DBCA, as the lead agency for the State conservation reserve system, had confirmed to Mineral Resources and EPA in late 2021 that the Offset Site was conditionally suitable for reservation and management under the <i>State Conservation and Land Management Act 1984 (WA)</i> to be managed for the protection of flora and fauna.</li> <li>(b) The Offset Site was the key component of the Fauna Offset Strategy for the effects of the Revised Proposal to the clearing of Malleefowl and Chuditch habitat, with the Offset Site identified to meet &gt; 125 % of the offset requirement for each of these fauna taxa.</li> <li>(c) Freehold land with the required Malleefowl and Chuditch values is scarce in the Wheatbelt region. No other land holdings of equivalent size and value had been identified which may provide suitable alternatives.</li> <li>(d) The Offset Site is directly connected to x3 conservation reserves (R18583, R18584, R16000). The opportunity for Mineral Resources to acquire the Offset Site to assist the State to form one of the largest single conservation reserves in the Wheatbelt represents an outstanding opportunity for Malleefowl and Chuditch conservation.</li> <li>(e) Land acquisitions are complex and time-limited. Early acquisition to secure the Offset Site was considered advantageous to Mineral Resources from a commercial and risk perspective, and enabled the purchase agreement to be completed to the satisfaction of the Landowner (as the Landowner is not involved in the Haul Road assessment/approval processes it is not in the interest of the Landowner to link the purchase timing to those processes).</li> </ul> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources has responded to the DCCEEW query as outlined above.</p>
18	<p>Information that DCCEEW will require to be addressed in the Offset management plan include the following measures:</p> <ul style="list-style-type: none"> <li>• Habitat improvement/restoration management</li> <li>• Arid Bronze Azure Butterfly host ant colony management</li> </ul>	<p><b>Response:</b></p> <p>Mineral Resources notes the listed matters which DCCEEW requests be addressed within the Fauna Offset Management Plan (to be developed post-approval), including habitat improvement/restoration management, introduced flora (weed) management, introduced fauna management, fire management, environmental</p>

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NO	SUBMISSION	MINERAL RESOURCES RESPONSE
	<ul style="list-style-type: none"> <li>• Weeds and feral animal management</li> <li>• Monitoring and adaptive management</li> <li>• Fire Management.</li> </ul>	<p>monitoring and adaptive management. As outlined above, the Fauna Offset Management Plan will be prepared in consultation with key stakeholders (DBCA, EPA, DCCEEW) to ensure the listed matters are addressed and the environmental objectives for the Offset Site are met.</p> <p>As outlined within the Environmental Review Document, Mineral Resources has proposed an environmental offset to mitigate the potential for a significant residual impact by the Revised Proposal to the habitat of Malleefowl and Chuditch. The submitted Fauna Offset Strategy outlines proposed management actions to be implemented within the Offset Site that are focused on the control of 'Threatening Processes' for these taxa.</p> <p>As also outlined within the Environmental Review Document, the Revised Proposal has avoided the area of the identified <i>Camponotus</i> sp. nr <i>terebrans</i> host ant colony within which the Arid Bronze Azure Butterfly (<i>Ogyris subterrestris petrina</i>) (EPBC-CE, BC-CE) may or may not occur. As a result of this avoidance, the Revised Proposal is not expected to result in a significant residual impact to the Arid Bronze Azure Butterfly and an environmental offset for this taxon is not required. Accordingly, the Fauna Offset Strategy (and the Fauna Offset Management Plan to be developed) does not include any offset component related to the Arid Bronze Azure Butterfly. Mineral Resources notes, however, that in the event the Arid Bronze Azure Butterfly is recorded within the Offset Site then the management actions that have been proposed (e.g. weed management, fire management) would assist in the protection of this taxon (if present).</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources notes the listed matters which DCCEEW requests be addressed within the Fauna Offset Management Plan (to be developed post-approval). The Fauna Offset Management Plan will be prepared in consultation with key stakeholders (DBCA, EPA, DCCEEW) to ensure the matters identified by DCCEEW are addressed and the environmental objectives for the Offset Site are met. The purpose of the environmental offset is to mitigate the potential significant residual impact of the Revised Proposal to the habitat of Malleefowl and Chuditch.</p> <p>Mineral Resources requests the DCCEEW note the Revised Proposal will not result in a significant residual impact to the Arid Bronze Azure Butterfly (<i>Ogyris subterrestris petrina</i>), and accordingly, the Fauna Offset Strategy (and the Fauna Offset Management Plan) is not intended to address this taxon. If, however, the Arid Bronze Azure Butterfly is later recorded within the Offset Site then the management actions that have been proposed for Malleefowl and Chuditch (e.g. weed management, fire management) would assist in the protection of this taxon (if present).</p>
19	<p>The Department notes that further discussions between Mineral Resources Ltd (MRL), WA EPA and Department of Climate Change, Energy, the Environment and Water (DCCEEW) will be undertaken regarding the acceptability of the offset site including Offset calculator, adequacy of number of hectares to be offset and measures to improve the vegetation within the offset site, noting that the vegetation condition is classified as pristine and there will be limited ways to further improve the vegetation.</p>	<p><b>Response:</b></p> <p>Mineral Resources acknowledges and accepts the DCCEEW submission, and welcomes further discussion with DCCEEW on the proposed Offset Site.</p> <p>As outlined within the submitted Fauna Offset Strategy, the proposed Offset Site is considered suitable to offset the loss of fauna habitat for Malleefowl <i>Leipoa ocellata</i> (EPBC-V, BC-V) and Chuditch <i>Dasyurus geoffroii</i> (EPBC-V, BC-V) to be removed by the Revised Proposal. Calculations undertaken by Mineral Resources using the DCCEEW's Offsets Assessment Guide (offsets calculator) indicates that the proposed Offset Site substantially exceeds the required offset value (by &gt; 25 % above the 100 % target). Mineral Resources notes that further discussion with DCCEEW on the input values used may alter this value, however, the proposed Offset Site is expected to remain appropriate as any adjustment to the input values is not expected to lower the calculated offset value below the 100 % target. Mineral Resources acknowledges receipt of the DCCEEW's updated 'habitat scoring tool' for Malleefowl and Chuditch (received September 2022) and these can be used in the review of the input values (as outlined above). Noting the Fauna Offset Strategy will be refined to a Fauna Offset Management Plan to be developed (post-approval), Mineral Resources considers this proposed review and adjustment of the calculated values can be undertaken in consultation with DCCEEW and EPA as part of this post-approval process.</p> <p>Mineral Resources agrees with the DCCEEW that the majority of the native vegetation (fauna habitat) within the proposed Offset Site is in 'pristine' condition, and accordingly, there will be limited opportunities to improve this vegetation condition. Whilst noting the limited opportunities, it is this pristine condition of the native vegetation - together with its connection with x3 conservation reserves (R18583, R18584, R16000) - which will make this proposed Offset Site a particularly valuable addition into the State's conservation reserve system.</p> <p>It is noted that for the recent environmental approvals granted under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (C'th) have imposed implementation conditions which require a Fauna Offset Strategy / Fauna Offset Management Plan to be finalised within 12 months of the relevant approval. Similarly, implementation conditions for recent approvals granted under the State <i>Environmental Protection Act 1986</i> (WA) have also imposed implementation conditions which require offsets be finalised within 12 months of approval. Consistent with this approach, Mineral Resources considers further discussions between DCCEEW, EPA and Mineral Resources on the proposed Offset Site (as described above) can readily be completed within the 12-month post-assessment period.</p> <p><b>Proposed Outcome:</b></p> <p>The submission from DCCEEW is acknowledged and accepted. Further consultation can occur with DCCEEW in relation to the proposed Offset Site and the input values using the DCCEEW's Offsets Assessment Guide, as part of the proposed Fauna Offset Management Plan to be finalised within 12 months (post-approval).</p>

**TABLE 7 – OTHER**

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
DEPARTMENT OF CLIMATE CHANGE, ENERGY, THE ENVIRONMENT AND WATER (DCCEEW)		
1	<p>When reviewing Environment Management Plans/Action Plans, the Department will take into consideration the Department's Environmental Management Plan Guidelines (2014) (Guidelines) available at:  <a href="http://www.environment.gov.au/epbc/publications/environmental-management-plan-guidelines">http://www.environment.gov.au/epbc/publications/environmental-management-plan-guidelines</a></p>	<p><b>Response:</b></p> <p>The DCCEEW submission that it will take into consideration the Environmental Management Plan Guidelines (2014) when reviewing environmental management plans / action plans is acknowledged and accepted.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources acknowledges that the DCCEEW will take into consideration the Environmental Management Plan Guidelines (2014) when reviewing environmental management plans / action plans.</p>
2	<p>Maps and figures need to incorporate coordinates – either in the form of standalone feature labels or by including a 'graticule' or 'grid' – to make the location of the project clear. Maps and figures should also label main roads for contextual information of the area.</p>	<p><b>Response:</b></p> <p>Mineral Resources notes the request from DCCEEW for maps/figures to incorporate coordinates to make the location of the Revised Proposal clear, and to include labels of main roads for contextual information.</p> <p>Overview maps (i.e. Regional Location) included in the submitted Environmental Review Document and the supporting plans identified the location of major townsites (Southern Cross and Marvel Loch) and major roads (Great Eastern Highway) to provide local context. Mineral Resources considers that these features assist to identify the location of the Revised Proposal.</p> <p>Mineral Resources notes that coordinates were not included on the maps/figures. Coordinates were not added in an effort to maintain simplicity in the presentation of maps/figures simplified noting the large volume of detailed biological survey information which needed to be presented (with a view that the addition of coordinates would add visual complexity to the maps/figures). Mineral Resources has supplied DCCEEW with shape file coordinates for the Revised Proposal, and this was thought to be sufficient should the DCCEEW be required to review the Revised Proposal location in a finer detail. Whilst noting the above, Mineral Resources acknowledges and accepts the DCCEEW request for maps/figures to incorporate coordinates, and will ensure that future submissions have regard to this to this DCCEEW request.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources acknowledges and accepts the DCCEEW request for maps/figures to incorporate coordinates, and will ensure that future submissions have regard to this request.</p>

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**TABLE 8 – RESPONSE TO SUBMISSIONS ADDITIONAL INFORMATION REQUEST (EPA SERVICES LETTER, 30 NOVEMBER 2022)**

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
EPA SERVICES (DEPARTMENT OF WATER AND ENVIRONMENTAL REGULATION, DWER)		
1	<p>The Significant Flora Construction Management Plan (Revision 2) requires the following updates: The weed hygiene procedures are for during construction only. The Plan should also address ongoing weed hygiene management, or alternatively, justification on why this is not required.</p>	<p><b>Response:</b></p> <p>The submitted Significant Flora Construction Management Plan focuses on the construction period for the Haul Road; being the period when significant direct and indirect impacts to flora and vegetation values may occur. In relation to introduced flora (weeds), Table 6 within the Significant Flora Construction Management Plan identifies the “<i>key impacts and risks</i>” for introduced flora as the “<i>potential for construction vehicles and associated earthworks to lead to the introduction and/or spread of introduced flora taxa (weeds)</i>”.</p> <p>The Significant Flora Construction Management Plan identifies Mineral Resources’ “Management Targets” for introduced flora as:</p> <ul style="list-style-type: none"> <li>(a) Compliance with weed hygiene procedures including completion of a weed hygiene certificate for all vehicles/machinery</li> <li>(b) No new weed species introduced through construction activities.</li> <li>(c) No increase in introduced flora extent following construction activities</li> </ul> <p>In order to meet the Management Targets above, the Significant Flora Construction Management Plan identifies the Haul Road construction area will be monitored weekly during construction, and then at 1 month following construction (i.e. post-construction). Where infestations of introduced flora are identified then such infestations will be appropriately controlled (e.g. chemical spray).</p> <p>The operational period of the Haul Road represents a substantially lower risk of introduced flora impacting upon flora and vegetation values. Mineral Resources’ haulage vehicles will travel between the Parker Range mine operations and the Koolyanobbing Range mine operations; both sites having established hygiene procedures in place that have previously been assessed and approved by EPA and DMIRS under their relevant Government approvals. These haulage vehicles will travel between these sites on sealed (bitumenised) roads (not on unsealed roads or tracks). In context of the haulage vehicles coming from ‘clean’ mining operations implementing hygiene practices and travelling on sealed roads the risk of Mineral Resources’ haulage vehicles picking-up and spreading introduced flora is considered minimal. Accordingly, the introduced flora hygiene procedures outlined within the Significant Flora Construction Management Plan does not extend to operation of the Haul Road.</p> <p>Further to the above, it should be noted that substantial parts of the Haul Road are concurrent with public roads (sections of the Haul Road to replace and upgrade existing public roads). These public road sections will be used by private vehicles as well as Mineral Resources’ haulage vehicles. Mineral Resources is unable to control vehicle hygiene of private vehicles on public roads. Consequently, it would not be appropriate for Mineral Resources to be held responsible for introduced flora that may be introduced or spread by private vehicles. Further, the area of the Haul Road is positioned in a landscape dominated by agricultural development which have introduced and spread multiple introduced flora (with a total of 14 introduced flora taxa present as identified by the biological surveys). In context with the surrounding agricultural landscape, it would not be appropriate for Mineral Resources to be held responsible for introduced flora that are spread by these surrounding agricultural land uses.</p> <p>Whilst noting the above, if during operation periodic inspections of the Haul Road identify infestations of introduced flora, then such infestations will be appropriately controlled (e.g. chemical spray) by Mineral Resources, including where appropriate consultation with Main Roads (for the Great Eastern Highway) and the Shire of Yilgarn (for Local Government-controlled public roads). The periodic inspections during operations, and any required introduced flora control, can be undertaken outside of the scope of the Significant Flora Construction Management Plan (i.e. does not need regulation/control by EPA through an environmental management plan).</p> <p>Further, as it is proposed the Haul Road will be removed and the area rehabilitated at the completion of the Parker Range mine operations (in the absence of an ongoing beneficial use), any introduced flora which may be present will then be controlled as part of the removal and rehabilitation process. The management of introduced flora during this removal and rehabilitation process will be regulated through the Mine Closure Plan as required under the State <i>Mining Act 1978</i> (WA).</p> <p><b>Proposed Outcome:</b></p> <p>The Significant Flora Construction Management Plan identifies the key risk for introduced flora as being the “<i>potential for construction vehicles and associated earthworks to lead to the introduction and/or spread of introduced flora taxa (weeds)</i>”, with management targets specified to appropriately manage and control this risk. The Haul Road construction area will be monitored weekly during construction, and then at 1 month following construction (i.e. post-construction). Where infestations of introduced flora are identified then such infestations will be appropriately controlled.</p> <p>The operational period for the Haul Road represents a substantially lower risk of introduced flora impacting upon flora and vegetation values, with justification of this low risk outlined above.</p> <p>Mineral Resources considers the Significant Flora Construction Management Plan will appropriately manage the risk of introduced flora for the Project. Accordingly, further revision of the Significant Flora Construction Management Plan is not considered to be necessary.</p>

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NO	SUBMISSION	MINERAL RESOURCES RESPONSE
2	<p>The Significant Flora Construction Management Plan (Revision 2) requires the following updates: Clarification should be provided on how indirect impacts have been considered in relation to potential impacts to priority flora species.</p>	<p><b>Response:</b></p> <p>The potential risk of indirect effects to DBCA-classified 'priority' flora taxa was considered within the Environmental Review Document in Section 5.5.2 <i>Potential Indirect Impacts</i> (p103 – p106). Section 5.5.2 <i>Potential Indirect Impacts</i> provided an assessment of the potential indirect effects associated with:</p> <ul style="list-style-type: none"> <li>(a) Dust deposition</li> <li>(b) Hydrocarbons and chemicals</li> <li>(c) Altered surface water drainage</li> <li>(d) Introduced flora</li> <li>(e) Altered fire regimes</li> </ul> <p>The Environmental Review Document in Table 18 of Section 5.4.4 <i>Priority Flora</i> quantified the potential effect to DBCA-classified 'priority' flora based upon a conservative 50 m distance from the Indicative Footprint (as potential impacts from dust, spills, altered fire or surface water are likely to be confined within this distance). As identified, this 50 m value for potential indirect effects was based on the DWER (2014) document <i>Clearing Regulation Fact Sheet 24: Environmentally Sensitive Areas</i> in which a 50 m separation distance is identified for the protection of 'Threatened' flora taxa.</p> <p>The assessment/consideration of potential impacts to DBCA-classified 'priority' flora taxa is an environmental assessment matter which has been considered within the Environmental Review Document. The Significant Flora Construction Management Plan is not intended to provide such assessment; the purpose of the Significant Flora Construction Management Plan is to outline how such potential effects will be managed. As the environmental assessment within the Environmental Review Document considers the potential effect to DBCA-classified 'priority' flora taxa, it is not considered necessary to duplicate this environmental assessment within the Significant Flora Construction Management Plan.</p> <p><b>Proposed Outcome:</b></p> <p>The potential risk of indirect effects to DBCA-classified 'priority' flora taxa was considered within the Environmental Review Document in Section 5.5.2 <i>Potential Indirect Impacts</i>, with the assessment considering the potential effects of dust deposition, hydrocarbons and chemicals, altered surface water drainage, introduced flora and altered fire regimes. Table 18 of Section 5.4.4 <i>Priority Flora</i> within the Environmental Review Document quantified the potential effect to DBCA-classified 'priority' flora based upon a conservative 50 m distance from the Indicative Footprint.</p> <p>The Significant Flora Construction Management Plan is not intended to provide an assessment of the potential effects to DBCA-classified 'priority' flora taxa, but rather, is intended to outline how such potential effects will be managed. Mineral Resources does not consider it necessary to duplicate the environmental assessment of potential impacts (from the Environmental Review Document) to within the Significant Flora Construction Management Plan. Accordingly, further revision of the Significant Flora Construction Management Plan is not considered to be necessary.</p>
3	<p>The Fauna Offset Strategy (Revision 2) requires the following updates: Additional information to provide confidence that the management controls will improve habitat quality for Malleefowl and Chuditch. Data and evidence from the surrounding reserves and the effectiveness of management measures to the quality of the sites should be included.</p>	<p><b>Response:</b></p> <p>Figure 8 within the Fauna Offset Strategy provides a map identifying all DBCA database records for Malleefowl and Chuditch within the local area (with this map also included as Appendix 1 of this Response to Submissions document). These DBCA database records for Malleefowl and Chuditch assist to confirm the presence of Malleefowl and Chuditch individuals and habitat within the Offset Site and the adjacent Conservation Reserves. The DBCA confirmed to Mineral Resources that the current records for Malleefowl and Chuditch (as indicated by Figure 8) represent all records for these taxa in the vicinity of the Offset Site, with much of the focus of fauna monitoring by DBCA undertaken in other reserve areas across the State (pers. com. L Bourke of DBCA, September 2022). Figure 8 within the Fauna Offset Strategy therefore meets the request for "data and evidence from the surrounding reserves".</p> <p>Mineral Resources notes the further request component for "the effectiveness of management measures to the quality of the sites should be included" for adjoining Conservation Reserves. This request would appear to seek both "without management" and "with management" scenarios for the adjoining Conservation Reserves to determine effectiveness of management measures. Mineral Resources is not aware of any "without management" measures within these adjoining Conservation Reserves, noting these adjoining Conservation Reserves have been part of DBCA's broader conservation reserve system for many years. The DBCA database records for Malleefowl and Chuditch within these adjoining Conservation Reserves may be considered to represent the "with management" scenario; with these areas containing multiple records of the presence of Malleefowl and Chuditch extending over many years. Due to the absence of a "without management" scenario for the adjoining Conservation Reserves, an assessment of the effectiveness of management measures to the quality of the fauna habitat within the adjoining Conservation Reserves is unable to be provided.</p> <p>As outlined within the Fauna Offset Strategy in Section 4.3 <i>Habitat Quality Assessment</i>, the "Habitat Quality Scoring Tools" for Malleefowl and Chuditch supplied by DCCEEW have been used to assist in determining the relative quality of the fauna habitat within the proposed Offset Site. The Habitat Quality Scoring Tools assess and assign scores for each attribute to the 'Impact Site' (i.e. the fauna habitat to be removed by the Project), and to the Offset Site in the scenarios of its 'Start Quality' (current condition) and a prediction of the future habitat quality 'Without Offset' and 'With Offset'. The "With Offset" scenario is based upon management actions to control threatening processes within the Offset Site through:</p> <ul style="list-style-type: none"> <li>(a) Introduced (predator) fauna control – baiting/trapping/culling of introduced predator fauna (fox, cat, dog) to reduce the risk of predation on Malleefowl and Chuditch.</li> </ul>

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p>(b) Fire management – installation and maintenance of fire breaks and low-intensity fuel reduction burns to reduce the risk of large high-intensity fires to protect Malleefowl and Chuditch habitat.</p> <p>(c) Fencing – Installation and maintenance of exclusion fencing to prevent human and large herbivore access to protect Malleefowl and Chuditch habitat.</p> <p>By contrast, the “Without Offset” scenario assumes the proposed Offset Site will remain unmanaged for introduced (predator) fauna, fire and access.</p> <p>The Fauna Offset Strategy predicts that for the “Without Offset” scenario (i.e. without the management actions) the habitat quality for Malleefowl and Chuditch will reduce over time (‘1-step’ reduction) due to uncontrolled threatening processes (introduced fauna, fire and access). The prediction for the proposed Offset Site for the “With Offset” scenario is that control of the threatening processes will maintain/improve the habitat quality for Malleefowl and Chuditch over time (‘1-step’ increase). Justification for the anticipated reduction/increase in the scoring is outlined within the Habitat Scoring Tools. The assessed reduction/increase in fauna habitat quality is considered to be conservative, reasonable, and consistent with previous offset assessments.</p> <p>The nature of the Habitat Scoring Tools is that they require a <i>prediction</i> of future habitat quality based upon the current site condition/management, knowledge of the target taxa, and an expectation of the effectiveness of the management measures. As the assessment is predictive of future quality, it is not possible to provide monitoring data/evidence of a future quality.</p> <p><b>Proposed Outcome:</b></p> <p>Figure 8 within the Fauna Offset Strategy provides a map identifying all DBCA database records for Malleefowl and Chuditch within the local area. Figure 8 therefore meets the request for “<i>data and evidence from the surrounding reserves</i>”.</p> <p>The further request component for “<i>the effectiveness of management measures to the quality of the sites should be included</i>” cannot be met, as this would require both “without management” and “with management” scenarios for the adjoining Conservation Reserves; the adjoining Conservation Reserves have been part of DBCA’s broader conservation reserve system for many years and therefore a “without management” scenario does not exist for the adjoining Conservation Reserves.</p> <p>The Fauna Offset Strategy assesses habitat quality of the proposed Offset Site in accordance with the DCCEEW “<i>Habitat Quality Scoring Tools</i>” for Malleefowl and Chuditch. The Habitat Quality Scoring Tools require a <i>prediction</i> of the future habitat quality ‘Without Offset’ and ‘With Offset’. The “With Offset” scenario is based upon the implementation of management actions within the Offset Site to control threatening processes (introduced predator fauna, fire management, access management), whereas the “Without Offset” scenario assumes the threatening processes will remain unmanaged. The assessment predicts habitat quality for Malleefowl and Chuditch will increase over time if the threatening processes are managed, and by contrast, the habitat quality will reduce if threatening processes remain unmanaged. The assessed changes in fauna habitat quality are considered to be conservative, reasonable, and consistent with previous offset assessments. The nature of the Habitat Scoring Tools is that they require a <i>prediction</i> of future habitat quality, and as such, it is not possible to provide monitoring data/evidence of a future quality.</p> <p>Mineral Resources considers the requested additional information is addressed within the submitted Fauna Offset Strategy. Accordingly, further revision of the Fauna Offset Strategy is not considered to be necessary.</p>
4	<p>The Fauna Offset Strategy (Revision 2) requires the following updates: Habitat improvements are required to increase habitat quality. This may include improving denning opportunities and planting roosting trees.</p>	<p><b>Response:</b></p> <p>As outlined within the Fauna Offset Strategy in Section 4.3 <i>Habitat Quality Assessment</i>, the “<i>Habitat Quality Scoring Tools</i>” for Malleefowl and Chuditch supplied by DCCEEW have been used to assist in determining the relative quality of the fauna habitat within the proposed Offset Site. The Habitat Quality Scoring Tools assess and assign scores for each attribute to the ‘Impact Site’ (i.e. the fauna habitat to be removed by the Project), and to the Offset Site in the scenarios of its ‘Start Quality’ (current condition) and a <i>prediction</i> of the future habitat quality ‘Without Offset’ and ‘With Offset’. The “With Offset” scenario is based upon management actions to control threatening processes within the Offset Site through:</p> <p>(a) Introduced (predator) fauna control – baiting/trapping/culling of introduced predator fauna (fox, cat, dog) to reduce the risk of predation on Malleefowl and Chuditch.</p> <p>(b) Fire management – installation and maintenance of fire breaks and low-intensity fuel reduction burns to reduce the risk of large high-intensity fires to protect Malleefowl and Chuditch habitat.</p> <p>(c) Fencing – Installation and maintenance of exclusion fencing to prevent human and large herbivore access to protect Malleefowl and Chuditch habitat.</p> <p>The Fauna Offset Strategy predicts that for the “With Offset” scenario the threatening processes will maintain/improve the habitat quality for Malleefowl and Chuditch over time (‘1-step’ increase). Justification for the anticipated increase in the scoring is outlined within the Habitat Scoring Tools. The assessed reduction/increase in fauna habitat quality is considered to be conservative, reasonable, and consistent with previous offset assessments.</p> <p>The greatest threats to Malleefowl and Chuditch within the Offset Site are from predation by introduced fauna and loss of habitat from unmanaged fire. In the absence of introduced (predator) fauna management and fire management, the occurrence and persistence of both Malleefowl and Chuditch within the Offset Site is at risk. Accordingly, introduced (predator) fauna management and fire management are the focus of the proposed management measures outlined within the Fauna Offset Strategy.</p> <p>Mineral Resources does not agree that “<i>habitat improvements</i>” such as “<i>improving denning opportunities</i>” and “<i>planting roosting trees</i>” are necessary to improve habitat quality within the Offset Site. The Offset Site is wholly vegetated and includes large areas suitable for denning of Chuditch and roosting of Malleefowl.</p>

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		<p>The suggestion of providing additional denning or the planting roosting trees will be of little benefit Malleefowl or Chuditch in a scenario where these taxa may be lost from within the Offset Site as a result of predation and/or habitat loss. Management of introduced (predator) fauna and management of fire (to prevent habitat loss) will provide the most effective improvements in habitat quality for both Malleefowl and Chuditch</p> <p><b>Proposed Outcome:</b></p> <p>The greatest threats to Malleefowl and Chuditch within the Offset Site are from predation by introduced fauna and loss of habitat from unmanaged fire. Accordingly, introduced (predator) fauna management and fire management are the focus of the proposed management measures outlined within the Fauna Offset Strategy.</p> <p>Mineral Resources does not agree that “habitat improvements” such as “improving denning opportunities” and “planting roosting trees” are necessary to improve habitat quality within the Offset Site. The Offset Site is wholly vegetated and includes large areas suitable for denning of Chuditch and roosting of Malleefowl; such that providing additional denning or the planting roosting trees will be of little benefit Malleefowl or Chuditch. Management of introduced (predator) fauna and management of fire (to prevent habitat loss) will provide the most effective improvements in habitat quality for both Malleefowl and Chuditch</p> <p>Mineral Resources considers the requested additional information is addressed within the submitted Fauna Offset Strategy. Accordingly, further revision of the Fauna Offset Strategy is not considered to be necessary.</p>
5	<p>The Fauna Offset Strategy (Revision 2) requires the following updates: The timeframe to implement a contingency response should be based on achieving a satisfactory species stocking rate in a period proposed by species experts and based on local knowledge and information on species habitat management. If Malleefowl and Chuditch presence/use is not established at the offset site within 5 years or a satisfactory period proposed by species experts, an alternative offset site will have to be acquired to meet the direct offset target established under the Environment Protection and Biodiversity Conservation Act 1999 environmental offsets policy.</p>	<p><b>Response:</b></p> <p>As identified within the Fauna Offset Strategy in each of the Habitat Quality Scoring Tools, the success of implementation of the environmental offset will be measured against:</p> <ul style="list-style-type: none"> <li>(a) Acquisition of the Offset Site and transfer to DBCA for protection and conservation</li> <li>(b) Management of the Offset Site (introduced predator fauna control, fire management, installation/maintenance of exclusion fencing</li> <li>(c) Implementation of annual monitoring within the Offset Site.</li> </ul> <p>Implementation of the actions above are considered readily achievable by Mineral Resources, with implementation able to commence immediately following approval of the Fauna Offset Strategy. To clarify, whilst presence and abundance of Malleefowl and Chuditch within the Offset Site will be monitored annually, the presence or abundance output values from the annual monitoring are not applied as a measure of success for the Offset Site (i.e. a species stocking rate is <u>not</u> a measure proposed within the Fauna Offset Strategy).</p> <p>Following from the Habitat Quality Scoring Tools, the Fauna Offset Strategy identifies the calculation inputs to be used in Offsets Assessment Guide have the following values applied:</p> <ul style="list-style-type: none"> <li>(a) “Confidence in result (%)” to be set at a conservative value of 75 %. Whilst confidence in implementing the acquisition/transfer, management and monitoring actions is high (and potentially a &gt; 90% confidence may be applied), it is noted typically a maximum 75 % value has been accepted by DCCEEW for environmental offsets.</li> <li>(b) “Time until ecological benefit” to be set at a conservative value of 5 years value. Whilst the ecological benefit from implementation of the management measures will be achieved within a relatively short time period (and potentially a 2-year value could be applied), a more conservative 5-year value has been applied to allow a longer time period for which the environmental monitoring can demonstrate the long-term ecological benefit.</li> </ul> <p>The Fauna Offset Strategy in Section 6.2 <i>Contingency Response and Corrective Actions</i> identifies the contingency measures do not include consideration of an option to acquire an alternate offset site. The Management Measures, and their associated Completion Criteria, are focused on actions and outcomes which can readily be achieved by Mineral Resources within the Offset Site to protect, manage and monitor fauna habitat for Malleefowl and Chuditch; and for which a high confidence level of implementation success applies.</p> <p>Mineral Resources notes the comment of “If Malleefowl and Chuditch presence/use is not established at the offset site within 5 years or a satisfactory period proposed by species experts, an alternative offset site will have to be acquired”. As outlined within the Fauna Offset Strategy, identification of an alternate offset site is <u>not</u> proposed within the Fauna Offset Strategy. Verified evidence of both Malleefowl and Chuditch within the Offset Site has already been established through the completed biological surveys, and accordingly, it is not necessary to propose or identify an alternate offset site for an event of these taxa not being recorded within the Offset Site.</p> <p><b>Proposed Outcome:</b></p> <p>The Fauna Offset Strategy identifies the success of implementation of the environmental offset will be measured against:</p> <ul style="list-style-type: none"> <li>(a) Acquisition of the Offset Site and transfer to DBCA for protection and conservation</li> <li>(b) Management of the Offset Site (introduced predator fauna control, fire management, installation/maintenance of exclusion fencing</li> <li>(c) Implementation of annual monitoring within the Offset Site.</li> </ul>

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		<p>Implementation of the actions above are considered readily achievable by Mineral Resources, with implementation able to commence immediately following approval of the Fauna Offset Strategy.</p> <p>Species stocking rate is <u>not</u> a measure proposed within the Fauna Offset Strategy. The presence and abundance of Malleefowl and Chuditch within the Offset Site will be monitored annually, the presence or abundance output values are not applied as a measure of success.</p> <p>Identification of an alternate offset site is <u>not</u> proposed within the Fauna Offset Strategy. Verified evidence of both Malleefowl and Chuditch within the Offset Site has previously been established through the completed biological surveys.</p> <p>Mineral Resources considers the requested additional information is addressed within the submitted Fauna Offset Strategy. Accordingly, further revision of the Fauna Offset Strategy is not considered to be necessary.</p>
6	<p>The Fauna Offset Strategy (Revision 2) requires the following updates: More information to support a finding of secondary evidence of Malleefowl and Chuditch presence/use should be provided. The database from where the surrounding records of Malleefowl and Chuditch were derived from should be included to support the mapping and findings, including dates and times the species were recorded along with any other relevant information.</p>	<p><b>Response:</b></p> <p>The submitted biological surveys within the Offset Site (and adjoining Conservation Reserves) undertaken by Ecoscape (2020) and Phoenix (2021) provide verified evidence of both Malleefowl and Chuditch. The content of the Ecoscape (2020) and Phoenix (2021) biological survey reports are complete in terms of the survey methodology and the survey outcomes. There is no “<i>more information</i>” in relation to these completed biological surveys, however, Mineral Resources would be happy to liaise with Ecoscape and/or Phoenix should there be any specific enquiries on survey methodology or the survey outcomes.</p> <p>Mineral Resources has included a revised figure at Appendix 1 which indicates the local records for Malleefowl and Chuditch in the vicinity of the Offset Site. The date (month and year) of each of the records as per the DBCA database is now identified, as requested. The DBCA database provides for a consolidation of records from across multiple biological surveys in Western Australia, including surveys undertaken by DBCA and environmental consultants. The database records assist to affirm the view that the Offset Site (and the surrounding areas of native vegetation) provide suitable fauna habitat for Malleefowl and Chuditch.</p> <p>In addition to the above, Mineral Resources has since received additional biological survey information for the Offset Site, as outlined in the Memorandum by Phoenix (2022) provided at Appendix 2. As outlined within the Memorandum, additional targeted surveys were undertaken within the Offset Site and the adjacent Conservation Reserves between October 2022 and December 2022. The results of the additional surveys provide further verified evidence of both Malleefowl and Chuditch individuals and habitat in the local area (in addition to the verified records identified by Ecoscape 2020 and Phoenix 2021). A full report on the additional surveys (to replace the interim Memorandum) is anticipated to be completed by Phoenix at the end Q1 2023 (a copy of which can be provided to EPA, DCCEE and DBCA when available). The results of the additional biological survey do not alter the outcomes presented in the submitted Fauna Offset Strategy, and accordingly, an amendment to the Fauna Offset Strategy is not necessary.</p> <p><b>Proposed Outcome:</b></p> <p>The submitted biological surveys by Ecoscape (2020) and Phoenix (2021) provide verified evidence of both Malleefowl and Chuditch, and are complete in terms of the survey methodology and the survey outcomes. No “<i>more information</i>” in relation to these completed biological surveys.</p> <p>Mineral Resources has included a revised figure at Appendix 1 which indicates the local records for Malleefowl and Chuditch in the vicinity of the Offset Site, which includes the date (month and year) of each record, as requested.</p> <p>Mineral Resources has since received additional biological survey information as outlined in the Memorandum by Phoenix (2022) provided at Appendix 2. The results of the additional surveys provide further verified evidence of both Malleefowl and Chuditch individuals and habitat in the local area, in addition to the verified records identified by Ecoscape (2020) and Phoenix (2021).</p> <p>Mineral Resources considers the requested additional information is addressed above. As the above information does not alter the outcomes presented in the submitted Fauna Offset Strategy, accordingly, further revision of the Fauna Offset Strategy is not considered to be necessary.</p>
7	<p>The Fauna Offset Strategy (Revision 2) requires the following updates: Expert advice on fire history of the site and best practice fire management is required to reduce the threat to Matters of National Environmental Significance, including the requirement for a fire management plan as part of a future Offset Management Plan to be annually reviewed.</p>	<p><b>Response:</b></p> <p>The fire history of the Offset Site and the adjacent Conservation Reserves is known, as identified by published DBCA records (Data source <i>DBCA Fire History (DBCA-060)</i> available at <a href="http://data.wa.gov.au">data.wa.gov.au</a>) and identified by the image below. The DBCA records identify fires have occurred in the local area in 2010, 2012, 2014 and 2015. The fire records are identified within the Fauna Offset Strategy (as part of the Habitat Quality Scoring Tool justifications). The fire records affirm the identified risk of fire to the fauna habitat quality as outlined within the Fauna Offset Strategy. As the fire history of the Offset Site is known, additional “expert advice” on fire history is not considered necessary.</p> <p>As outlined within the Fauna Offset Strategy at Table 12 <i>Management Measures and Completion Criteria</i>, fire management within the Offset Site is proposed to be undertaken as part of broader regional fire management programs coordinated by DBCA, in recognition of the adjacent x4 Conservation Reserves managed by DBCA. The specific fire control methods (firebreak clearing, low-intensity fuel reduction burns) will be guided by the professional advice of DBCA as the ‘lead agency’ for conservation, and in consultation with other local landowners. The DBCA have statutory responsibility for fire management within Conservation Reserves as part of its statutory responsibilities under the State <i>Conservation and Land Management Act 1984 (WA)</i>; with its corporate expertise in fire management within conservation areas now approaching 40 years. In implementing fire management, the DBCA must also achieve “<i>best practice</i>” in order to meet its statutory responsibilities for the conservation of biodiversity (including for the ‘Threatened’ fauna Malleefowl and Chuditch) in accordance with the State <i>Biodiversity Conservation Act 2016 (WA)</i>. In consideration that fire management for the Offset Site will be undertaken together with the adjoining Conservation</p>

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		<p>Reserves, and noting the expertise and statutory responsibilities of DBCA for both fire management and conservation, additional “expert advice” on fire management to reduce the threat to Malleefowl and Chuditch is not considered to be necessary.</p> <p><b>Proposed Outcome:</b></p> <p>The fire history of the Offset Site and the adjacent Conservation Reserves is known, and accordingly, additional “expert advice” on fire history is not considered necessary.</p> <p>Fire management within the Offset Site is proposed to be undertaken as part of broader regional fire management programs coordinated by DBCA. The specific fire control methods will be guided by the professional advice of DBCA as the ‘lead agency’ for conservation, and noting DBCA’s statutory responsibilities under both the <i>State Conservation and Land Management Act 1984 (WA)</i> and the <i>State Biodiversity Conservation Act 2016 (WA)</i>. Additional “expert advice” on fire management to reduce the threat to Malleefowl and Chuditch is not considered to be necessary.</p> <p>Mineral Resources considers the requested additional information is addressed above. As the above information does not alter the outcomes presented in the submitted Fauna Offset Strategy, accordingly, further revision of the Fauna Offset Strategy is not considered to be necessary.</p> <div> </div> <p style="text-align: center;">Fire history records for the Offset Site and adjoining Conservation Reserves (Data Source: DBCA-060)</p>
8	<p>The latest version of the Significant Flora Construction Management Plan, Significant Fauna Management Plan and Fauna Offset Strategy should be included as an appendix to the RtS document.</p>	<p><b>Response:</b></p> <p>As requested, the following documents are included within the Appendices of this Response to Submissions document:</p> <ul style="list-style-type: none"> <li>(a) Significant Flora Construction Management Plan (Revision 2, November 2022) – Appendix 3</li> <li>(b) Significant Fauna Management Plan ( Revision 2, November 2022) - Appendix 4</li> <li>(c) Fauna Offset Strategy ( Revision 2, November 2022) - Appendix 5</li> </ul> <p><b>Proposed Outcome:</b></p> <p>The Significant Flora Construction Management Plan, Significant Fauna Management Plan and Fauna Offset Strategy are included within the Appendices of this Response to Submissions document, as requested.</p>

NO	SUBMISSION	MINERAL RESOURCES RESPONSE
9	<p>Table 3 – Terrestrial fauna: The response in Submission 9 should be updated to reflect the recent discussions about tenure of the offset site between Mineral Resources Ltd and the Department of Mines, Industry Regulation and Safety.</p>	<p><b>Response:</b></p> <p>Mineral Resources’ response in Item 9 of Table 3 has been revised to reflect recent correspondence with DMIRS which confirms support for the transfer of the Offset Site from Mineral Resources to DBCA in freehold land tenure, and further, confirms support for DBCA to amalgamate the Offset Site into the adjacent unclassified conservation reserves. A copy of the DMIRS correspondence was provided by Mineral Resources to EPA on 18 November 2022. Please refer to Item 9 of Table 3 for the consolidated response.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources’ response in Item 9 of Table 3 has been revised to reflect recent correspondence with DMIRS, as requested. Please refer to Item 9 of Table 3 for the consolidated response.</p>
10	<p>Table 6 – Offsets: Submission 1 includes updated data on flora taxa from that in Table 19 of the Environmental Review Document. Clarification that additional data was sourced, resulting in an update in the taxon count should be provided in the response. The response should also include an updated table to illustrate the cumulative impacts on flora taxon.</p>	<p><b>Response:</b></p> <p>Item 1 in Table 6 off the Response to Submissions document identifies updated information for the flora taxa <i>Lepidosperma</i> sp. Mt Caudan (DBCA-P1), <i>Westringia acifolia</i> (DBCA-P1) and <i>Baeckea grandibracteata</i> ssp. Parker Range (DBCA-P3) (now <i>Balaustion grandibracteatum</i> ssp. <i>grandibracteatum</i> (DBCA-P3)). This information supersedes the information on these flora taxa outlined within the earlier Environmental Review Document.</p> <p>Mineral Resources’ response to Item 1 in Table 6 identifies the data sources of the additional information. Clarification of the data sources is therefore not considered to be necessary.</p> <p>Mineral Resources has amended Item 1 in Table 6 to include a table identifying the updated data. The effect of the Haul Road to these flora taxa will be &lt; 10 % of the recorded regional populations, for both the direct effect of the Haul Road and as a cumulative effect when considered in context with both the approved Parker Range mining operations and the approved Koolyanobbing Range mine operations.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources’ response to Item 1 in Table 6 off the Response to Submissions document identifies the data sources of the additional information, and accordingly, further clarification of the data sources is therefore not considered to be necessary.</p> <p>Mineral Resources’ response to Item 1 in Table 6 to include a table identifying the updated data. The effect of the Haul Road to these flora taxa will be &lt; 10 % of the recorded regional populations.</p>
11	<p>Table 6 – Offsets: Submission 7 does not provide adequate justification for the offset calculator values that habitat quality will be improved. Further information is required to justify improvements in habitat quality scores.</p>	<p><b>Response:</b></p> <p>As outlined within the Fauna Offset Strategy in Section 4.3 <i>Habitat Quality Assessment</i>, the “<i>Habitat Quality Scoring Tools</i>” for Malleefowl and Chuditch supplied by DCCEEW have been used to assist in determining the relative quality of the fauna habitat within the proposed Offset Site. The Habitat Quality Scoring Tools assess and assign scores for each attribute to the ‘Impact Site’ (i.e. the fauna habitat to be removed by the Project), and to the Offset Site in the scenarios of its ‘Start Quality’ (current condition) and a <i>prediction</i> of the future habitat quality ‘Without Offset’ and ‘With Offset’. The “With Offset” scenario is based upon management actions to control threatening processes within the Offset Site through:</p> <ul style="list-style-type: none"> <li>(a) Introduced (predator) fauna control – baiting/trapping/culling of introduced predator fauna (fox, cat, dog) to reduce the risk of predation on Malleefowl and Chuditch.</li> <li>(b) Fire management – installation and maintenance of fire breaks and low-intensity fuel reduction burns to reduce the risk of large high-intensity fires to protect Malleefowl and Chuditch habitat.</li> <li>(c) Fencing – Installation and maintenance of exclusion fencing to prevent human and large herbivore access to protect Malleefowl and Chuditch habitat.</li> </ul> <p>The Fauna Offset Strategy predicts that for the “With Offset” scenario the threatening processes will maintain/improve the habitat quality for Malleefowl and Chuditch over time (‘1-step’ increase). Justification for the anticipated increase in the scoring is outlined within the Habitat Scoring Tools. The assessed reduction/increase in fauna habitat quality is considered to be conservative, reasonable, and consistent with previous offset assessments.</p> <p>The greatest threats to Malleefowl and Chuditch within the Offset Site are from predation by introduced fauna and loss of habitat from unmanaged fire. In the absence of introduced (predator) fauna management and fire management, the occurrence and persistence of both Malleefowl and Chuditch within the Offset Site is at risk. Management of introduced (predator) fauna and management of fire (to prevent habitat loss) will provide the most effective improvements in habitat quality for both Malleefowl and Chuditch. Accordingly, introduced (predator) fauna management and fire management are the focus of the proposed management measures outlined within the Fauna Offset Strategy.</p> <p><b>Proposed Outcome:</b></p> <p>The greatest threats to Malleefowl and Chuditch within the Offset Site are from predation by introduced fauna and loss of habitat from unmanaged fire. Accordingly, introduced (predator) fauna management and fire management are the focus of the proposed management measures outlined within the Fauna Offset Strategy. Management of introduced (predator) fauna and management of fire (to prevent habitat loss) will provide the most effective improvements in habitat quality for both Malleefowl and Chuditch.</p>

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NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p>Mineral Resources considers the requested information is addressed within the submitted Fauna Offset Strategy. Accordingly, further revision of the Fauna Offset Strategy is not considered to be necessary.</p>
12	<p>Table 6 – Offsets: Submission 11 provides evidence of Malleefowl and Chuditch presence/use at the offset site, however this is not acceptable as primary evidence.</p>	<p><b>Response:</b></p> <p>The submitted biological surveys within the Offset Site (and adjoining Conservation Reserves) undertaken by Ecoscape (2020) and Phoenix (2021) provide verified evidence of both Malleefowl and Chuditch.</p> <p>As outlined above, Mineral Resources has since received additional biological survey information for the Offset Site, as outlined in the Memorandum by Phoenix (2022) provided at Appendix 2. The results of the additional surveys provide further verified evidence of both Malleefowl and Chuditch individuals and habitat in the local area (in addition to the verified records identified by Ecoscape 2020 and Phoenix 2021).</p> <p>The Habitat Quality Scoring Tools prepared by DCCEEW for assessment of environmental offsets identify a requirement for “verified records”. The DCCEEW Habitat Quality Scoring Tool for Chuditch defines verified records as:</p> <p style="padding-left: 40px;"><i>“primary (e.g. camera detections or trap records) or secondary (e.g. scats, tracks, hairs) evidence”</i></p> <p>Based upon the above, the verified records may comprise “primary” or “secondary” evidence; there is <u>no</u> requirement for “primary” evidence only as suggested by the additional information request.</p> <p>Accordingly, the biological surveys identifying the presence/use by Malleefowl and Chuditch of the Offset Site has met the requirement for “verified records”.</p> <p><b>Proposed Outcome:</b></p> <p>The submitted biological surveys within the Offset Site (and adjoining Conservation Reserves) provide verified evidence of both Malleefowl and Chuditch.</p> <p>The Habitat Quality Scoring Tools prepared by DCCEEW for assessment of environmental offsets identify a requirement for “verified records”; which may include primary evidence and/or secondary evidence as identified by the DCCEEW Habitat Quality Scoring Tools.</p> <p>Accordingly, the biological surveys identifying the presence/use by Malleefowl and Chuditch of the Offset Site has met the requirement for “verified records”.</p> <p>Mineral Resources considers the requested information is addressed within the submitted Fauna Offset Strategy. Accordingly, further revision of the Fauna Offset Strategy is not considered to be necessary.</p>
13	<p>Table 6 – Offsets: Submission 12 has not been adequately addressed. The requirement to provide a contingency plan of an alternative offset site is not superseded by the requirement for the provision of primary evidence of species presence/use at the proposed offset site.</p>	<p><b>Response:</b></p> <p>As identified within the Fauna Offset Strategy, the success of implementation of the environmental offset will be measured against:</p> <ul style="list-style-type: none"> <li>(a) Acquisition of the Offset Site and transfer to DBCA for protection and conservation</li> <li>(b) Management of the Offset Site (introduced predator fauna control, fire management, installation/maintenance of exclusion fencing)</li> <li>(c) Implementation of annual monitoring within the Offset Site.</li> </ul> <p>Implementation of the actions above are considered readily achievable by Mineral Resources, with implementation able to commence immediately following approval of the Fauna Offset Strategy.</p> <p>The Fauna Offset Strategy identifies the calculation inputs to be used in Offsets Assessment Guide have the following values applied:</p> <ul style="list-style-type: none"> <li>(a) “Confidence in result (%)” to be set at a conservative value of 75 %. Whilst confidence in implementing the acquisition/transfer, management and monitoring actions is high (and potentially a &gt; 90% confidence may be applied), it is noted typically a maximum 75 % value has been accepted by DCCEEW for environmental offsets.</li> <li>(b) “Time until ecological benefit” to be set at a conservative value of 5 years value. Whilst the ecological benefit from implementation of the management measures will be achieved within a relatively short time period (and potentially a 2-year value could be applied), a more conservative 5-year value has been applied to allow a longer time period for which the environmental monitoring can demonstrate the long-term ecological benefit.</li> </ul> <p>The Fauna Offset Strategy in Section 6.2 <i>Contingency Response and Corrective Actions</i> identifies the contingency measures do not include consideration of an option to acquire an alternate offset site. The management measures and their associated Completion Criteria are focused on actions and outcomes which can readily be achieved by Mineral Resources within the Offset Site to protect, manage and monitor fauna habitat for Malleefowl and Chuditch; and for which a high confidence level of implementation success applies.</p> <p>As outlined within the Fauna Offset Strategy, identification of an alternate offset site is <u>not</u> proposed within the Fauna Offset Strategy. Verified evidence of both Malleefowl and Chuditch within the Offset Site has already been established through the completed biological surveys, and accordingly, along with the high confidence of the management measures that have been proposed, it is not necessary by Mineral Resources to propose or identify an alternate offset site.</p>



NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p>Mineral Resources notes the comment of “<i>The requirement to provide a contingency plan of an alternative offset site is not superseded by the requirement for the provision of primary evidence of species presence/use at the proposed offset site</i>”. Mineral Resources has not proposed an alternate offset site based upon:</p> <ul style="list-style-type: none"> <li>(a) Confirmed presence (verified records) of both Malleefowl and Chuditch individuals and habitat within the Offset Site.</li> <li>(b) High confidence in the ability to implement that management actions to control threatening processes to Malleefowl and Chuditch (i.e. introduced predator fauna control, fire management, exclusion fencing).</li> </ul> <p>Identification of an alternate offset site would only be appropriate/necessary if there was uncertainty as to the presence of Malleefowl or Chuditch individuals or habitat within the Offset Site, or uncertainty as to whether the management measures to control threatening processes could be implemented (or if the management measures were experimental in nature). None of the above uncertainties apply to either the Offset Site or to the proposed management measures.</p> <p>Mineral Resources acknowledges that EPA / DCCEEW may have experience with assessment of proposed environmental offsets which have substantial uncertainty (e.g. rehabilitation works to restore fauna habitats where the restoration success is uncertain, or the translocation of fauna into habitats where their survival is uncertain). The proposed Offset Site and the proposed management measures do not present such uncertainty, and accordingly, it is respectfully requested that both EPA and DCCEEW acknowledge this outcome and not seek to unnecessarily require the identification and/or acquisition of an alternate offset site.</p> <p><b>Proposed Outcome:</b></p> <p>The Fauna Offset Strategy identifies the contingency measures do not include consideration of an option to acquire an alternate offset site. The proposed management measures and their associated Completion Criteria are focused on actions and outcomes which can readily be achieved by Mineral Resources within the Offset Site to protect, manage and monitor fauna habitat for Malleefowl and Chuditch; and for which a high confidence level of implementation success applies.</p> <p>As outlined within the Fauna Offset Strategy, identification of an alternate offset site is <u>not</u> proposed within the Fauna Offset Strategy. Mineral Resources has not proposed an alternate offset site based upon:</p> <ul style="list-style-type: none"> <li>(a) Confirmed presence (verified records) of both Malleefowl and Chuditch individuals and habitat within the Offset Site.</li> <li>(b) High confidence in the ability to implement that management actions to control threatening processes to Malleefowl and Chuditch (i.e. introduced predator fauna control, fire management, exclusion fencing).</li> </ul> <p>Identification of an alternate offset site would only be appropriate/necessary if there was uncertainty as to the presence of Malleefowl or Chuditch individuals or habitat within the Offset Site, or uncertainty as to whether the management measures to control threatening processes could be implemented (or if the management measures were experimental in nature). None of the above uncertainties apply to either the Offset Site or to the proposed management measures.</p> <p>Mineral Resources considers the requested additional information is addressed above. As the above information does not alter the outcomes presented in the submitted Fauna Offset Strategy, accordingly, further revision of the Fauna Offset Strategy is not considered to be necessary.</p>
14	<p>Table 6 – Offsets: Submission 14 requests for further information on the offset site fire management plan. A best practice fire management plan should be included as part of the Offset Management Plan.</p>	<p><b>Response:</b></p> <p>The fire history of the Offset Site and the adjacent Conservation Reserves is known, as identified by published DBCA records (Data source <i>DBCA Fire History (DBCA-060)</i> available at <a href="http://data.wa.gov.au">data.wa.gov.au</a>). The DBCA records identify fires have occurred in the local area in 2010, 2012, 2014 and 2015. The fire records are identified within the Fauna Offset Strategy (as part of the Habitat Quality Scoring Tool justifications). The fire records affirm the identified risk of fire to the fauna habitat quality as outlined within the Fauna Offset Strategy.</p> <p>As outlined within the Fauna Offset Strategy at Table 12 <i>Management Measures and Completion Criteria</i>, fire management within the Offset Site is proposed to be undertaken as part of broader regional fire management programs coordinated by DBCA, in recognition of the adjacent x4 Conservation Reserves managed by DBCA. The specific fire control methods (firebreak clearing, low-intensity fuel reduction burns) will be guided by the professional advice of DBCA as the ‘lead agency’ for conservation, and in consultation with other local landowners. The DBCA have statutory responsibility for fire management within Conservation Reserves as part of its statutory responsibilities under the State <i>Conservation and Land Management Act 1984 (WA)</i>; with its corporate expertise in fire management within conservation areas now approaching 40 years. In implementing fire management, the DBCA must also achieve “<i>best practice</i>” in order to meet its statutory responsibilities for the conservation of biodiversity (including for the ‘Threatened’ fauna Malleefowl and Chuditch) in accordance with the State <i>Biodiversity Conservation Act 2016 (WA)</i>. In consideration that fire management for the Offset Site will be undertaken together with the adjoining Conservation Reserves, and noting the expertise and statutory responsibilities of DBCA for both fire management and conservation, an additional “fire management plan” specifically for the Offset Site is not considered to be necessary. Additional detail on fire management within the Offset Site will be included in the Offset Management Plan (to be prepared post-approval), with this additional detail to be prepared in consultation with DBCA.</p>

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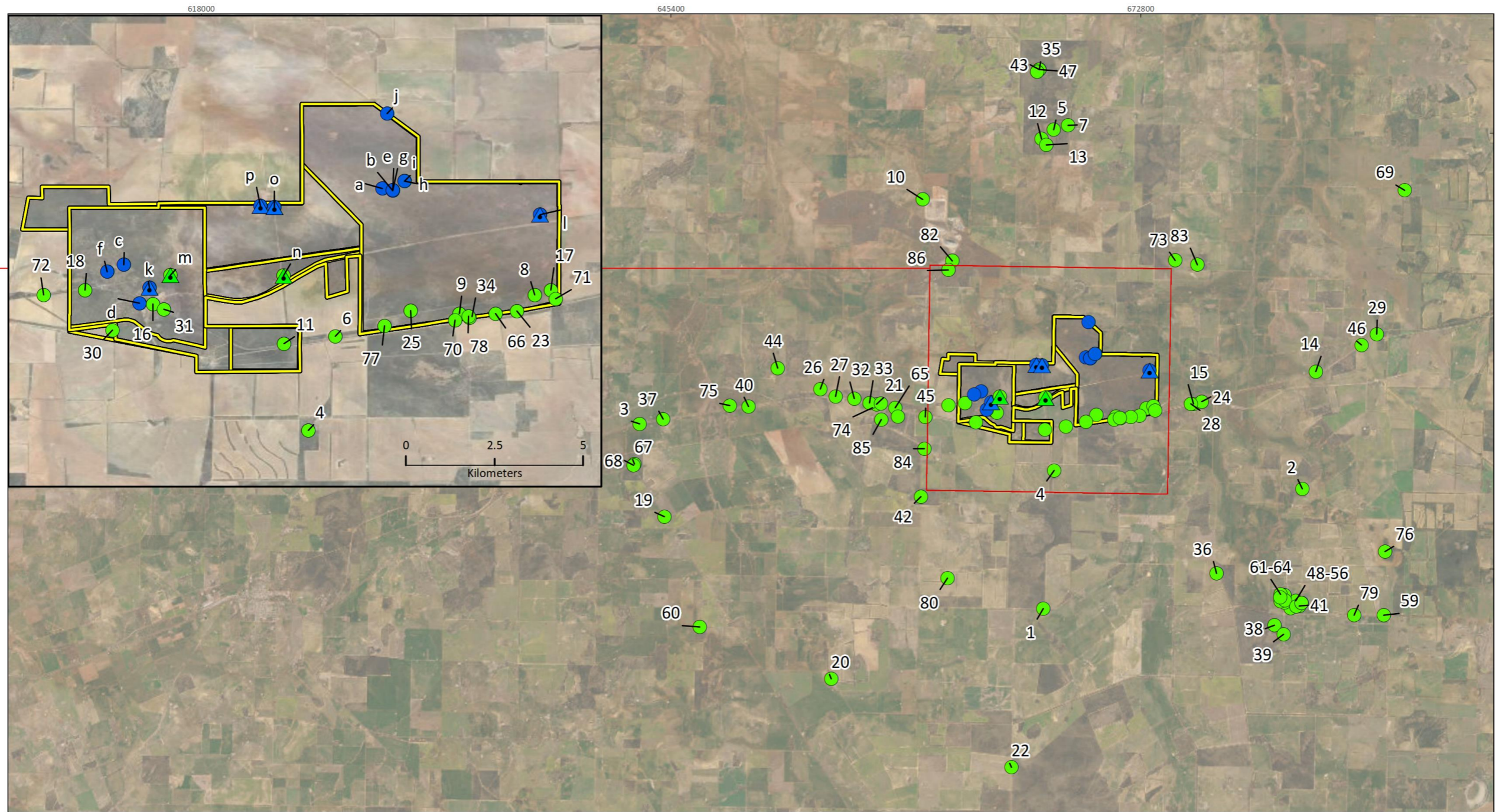
NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p><b>Proposed Outcome:</b></p> <p>The fire history of the Offset Site and the adjacent Conservation Reserves is known. Fire management within the Offset Site is proposed to be undertaken as part of broader regional fire management programs coordinated by DBCA. The specific fire control methods will be guided by the professional advice of DBCA as the 'lead agency' for conservation, and noting DBCA's statutory responsibilities under both the State <i>Conservation and Land Management Act 1984</i> (WA) and the State <i>Biodiversity Conservation Act 2016</i> (WA). An additional "fire management plan" specifically for the Offset Site is not considered to be necessary, however, it should be noted that additional detail on fire management will be included in the Offset Management Plan (to be prepared post-approval), to be prepared in consultation with DBCA.</p> <p>Mineral Resources considers the requested additional information is addressed above. As the above information does not alter the outcomes presented in the submitted Fauna Offset Strategy, accordingly, further revision of the Fauna Offset Strategy is not considered to be necessary.</p>
15	<p>Table 6 – Offsets: Submission 16 has not been adequately addressed. Additional information is required to provide confidence that the management controls will improve the habitat quality for Malleefowl and Chuditch (as noted above).</p>	<p><b>Response:</b></p> <p>As outlined within the Fauna Offset Strategy in Section 4.3 <i>Habitat Quality Assessment</i>, the "Habitat Quality Scoring Tools" for Malleefowl and Chuditch supplied by DCCEEW have been used to assist in determining the relative quality of the fauna habitat within the proposed Offset Site. The Habitat Quality Scoring Tools assess and assign scores for each attribute to the 'Impact Site' (i.e. the fauna habitat to be removed by the Project), and to the Offset Site in the scenarios of its 'Start Quality' (current condition) and a <i>prediction</i> of the future habitat quality 'Without Offset' and 'With Offset'. The "With Offset" scenario is based upon management actions to control threatening processes within the Offset Site through:</p> <ul style="list-style-type: none"> <li>(a) Introduced (predator) fauna control – baiting/trapping/culling of introduced predator fauna (fox, cat, dog) to reduce the risk of predation on Malleefowl and Chuditch.</li> <li>(b) Fire management – installation and maintenance of fire breaks and low-intensity fuel reduction burns to reduce the risk of large high-intensity fires to protect Malleefowl and Chuditch habitat.</li> <li>(c) Fencing – Installation and maintenance of exclusion fencing to prevent human and large herbivore access to protect Malleefowl and Chuditch habitat.</li> </ul> <p>The Fauna Offset Strategy predicts that for the "With Offset" scenario the threatening processes will maintain/improve the habitat quality for Malleefowl and Chuditch over time ('1-step' increase). Justification for the anticipated increase in the scoring is outlined within the Habitat Scoring Tools. The assessed reduction/increase in fauna habitat quality is considered to be conservative, reasonable, and consistent with previous offset assessments.</p> <p>The greatest threats to Malleefowl and Chuditch within the Offset Site are from predation by introduced fauna and loss of habitat from unmanaged fire. In the absence of introduced (predator) fauna management and fire management, the occurrence and persistence of both Malleefowl and Chuditch within the Offset Site is at risk. Management of introduced (predator) fauna and management of fire (to prevent habitat loss) will provide the most effective improvements in habitat quality for both Malleefowl and Chuditch. Accordingly, introduced (predator) fauna management and fire management are the focus of the proposed management measures outlined within the Fauna Offset Strategy.</p> <p><b>Proposed Outcome:</b></p> <p>The greatest threats to Malleefowl and Chuditch within the Offset Site are from predation by introduced fauna and loss of habitat from unmanaged fire. Accordingly, introduced (predator) fauna management and fire management are the focus of the proposed management measures outlined within the Fauna Offset Strategy. Management of introduced (predator) fauna and management of fire (to prevent habitat loss) will provide the most effective improvements in habitat quality for both Malleefowl and Chuditch.</p> <p>Mineral Resources considers the requested information is addressed within the submitted Fauna Offset Strategy. Accordingly, further revision of the Fauna Offset Strategy is not considered to be necessary.</p>
16	<p>The proposal is assessed as a significant amendment under section 40AA of the Environmental Protection Act 1986. In finalising its assessment, the EPA will be considering whether a separate Ministerial Statement from the existing Parker Range (Mount Caudan) Iron Ore Mine Project approved under Ministerial Statement 892 is appropriate. Further information and justification should be provided in to support the EPA's consideration.</p>	<p><b>Response:</b></p> <p>In Mineral Resources correspondence to EPA dated 12 October 2022, Mineral Resources requested that in accordance with Section 40AA(6)(a) of the <i>Environmental Protection Act 1986</i> (WA), a separate Statement approval applying only to the Haul Road component (the Significant Amendment) be granted, <i>in lieu</i> of amending the current Statement 892 approval which applies to the Parker Range mining operations.</p> <p>As outlined by Mineral Resources, Section 40AA(6) <i>Assessment of Significant Amendments</i> states:</p> <p><b>40AA. Assessment of significant amendments</b></p> <p>...</p> <p>(6) If a statement is served and published under subsection 45(8), it may be in the form of -</p> <ul style="list-style-type: none"> <li>(a) <u>a statement that only applies to the significant amendment</u>; or</li> <li>(b) a statement that includes the implementation conditions for the approved proposal as amended by the significant amendment, and supersedes the previous Ministerial statement relating to the approved proposal.</li> </ul> <p style="text-align: right;">(emphasis added by <u>underline</u>)</p>


NO	SUBMISSION	MINERAL RESOURCES RESPONSE
		<p>As outlined by Mineral Resources with the request, and subsequent additional information provided to EPA on 8 November 2022, a separate Statement approval for the Haul Road is considered appropriate due to:</p> <ul style="list-style-type: none"> <li>(a) The potential risks and the proposed environmental management for the Haul Road (the Significant Amendment) are notably different to that of the previously approved Parker Range mining operations (the Approved Proposal under Statement 892), specifically: <ul style="list-style-type: none"> <li>(i) In relation to the environmental factor of 'Terrestrial Fauna', the clearing of fauna habitats for the Haul Road will be diffuse (compared to concentrated for the Parker Range mine operations) and with a key risk being vehicle strike (with vehicle strike at the Parker Range mine operations a low risk due to slow-moving mining vehicles, reduced speed limits)</li> <li>(ii) In relation to the environmental factor of 'Flora and Vegetation', the Haul Road has few flora taxa or vegetation units that are common to the Parker Range mine operations.</li> </ul> </li> <li>(b) As a result of (a) above, separate Environmental Management Plans/Strategies have been prepared specifically for the Haul Road to meet the EPA's objectives for the environmental factors of 'Flora and Vegetation' and 'Terrestrial Fauna', being: <ul style="list-style-type: none"> <li>(i) Significant Flora Construction Management Plan</li> <li>(ii) Significant Fauna Management Plan</li> <li>(iii) Fauna Offset Strategy</li> </ul> <p>The above plans/strategies were prepared and submitted to EPA to inform the environmental assessment for the Haul Road. These plans/strategies apply only to the Haul Road (the Parker Range mine operations are not covered by these plans/strategies).</p> </li> <li>(c) The proposed Haul Road is now spatially separated from the Parker Range mine operations by &gt; 30 km. The Parker Range mine operations and the proposed Haul Road were initially connected at the time of the s38 Referral (May 2021). Changes since made in accordance with s43A of the EP Act have substantially reduced the extent of the Haul Road; such that there is now a substantial separation between the Parker Range mining operations and the proposed Haul Road. The effect is that the proposed Haul Road now has no direct connection to the Parker Range mine operations. Whilst the Revised Proposal does include a small area (~1 ha) near the Parker Range mine operations, this covers a slight alignment change for the Parker Range Road Bypass (a public road managed by the Shire of Yilgarn) and will not be used for Mineral Resources' ore haulage.</li> <li>(d) As outlined within Mineral Resources' Environmental Review Document, the proposed Haul Road (once constructed) will be a substantial infrastructure asset which may have a potential future beneficial use by a third-party (e.g. Shire of Yilgarn, other mining company). Noting this, it would be sensible to have a separate Statement approval for the Haul Road, rather than later trying to 'uncouple' the Haul Road from the Statement approval for the Parker Range mine operations. Although a potential future beneficial use by a third-party has yet to be identified pre-construction, it is probable such future beneficial use will only be identified once the haul road is constructed and operational (i.e. when third-parties can see it and contemplate its use). In addition to the potential future use of the Haul Road as a whole, parts of the Haul Road will be retained as they will replace parts of the public roads Emu Fence Road and the Parker Range Bypass.</li> <li>(e) A separate Statement approval approach will be consistent with the separate approval to be granted by under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (C'th).</li> </ul> <p>Section 40AA(6)(a) of the <i>Environmental Protection Act 1986</i> (WA) provides an appropriate mechanism through which a separate Statement approval applying only to the Haul Road component (the Significant Amendment) can be granted, and without revision to the Statement 892 approval for the Approved Proposal.</p> <p><b>Proposed Outcome:</b></p> <p>Mineral Resources requests that the EPA recommend to the Minister that a separate Statement approval applying only to the Haul Road component (the Significant Amendment) be granted, <i>in lieu</i> of amending the current Statement 892 approval which applies to the Parker Range mining operations.</p>

**APPENDIX 1**

**FIGURE – DESKTOP RESULTS FOR MALLEEFOWL AND CHUDITCH 20KM RADIUS SURROUNDING OFFSET SITE**

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**Parker Range Iron Ore Project  
Mineral Resources**

Project No	1314-PR-MRL-VER
Date	1/12/2022
Drawn by	BK
Map author	SP

0 5 10  
Kilometers

1:300,000 (at A4) GDA 1994 MGA Zone 50

All information within this map is current as of 1/12/2022. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.  
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Study area

**Phoenix records**

- ▲ Chuditch
- ▲ Malleefowl


**Desktop records**

- Chuditch
- Malleefowl



**Figure 1**

**Desktop and Phoenix records of Malleefowl and Chuditch**



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ID	Month	Year	Common Name	Observation Type	Data Source
1	April	2017	Malleefowl	Not specified	BIRDATA
2	May	2014	Malleefowl	Not specified	BIRDATA
3	November	2013	Malleefowl	Sighting	TFAUNA
4	March	2012	Malleefowl	Unknown	FAUNASURVEY
5	July	2011	Malleefowl	Not specified	TFAUNA
6	April	2011	Malleefowl	Sighting	TFAUNA
7	January	2011	Malleefowl	Not specified	TFAUNA
8	December	2010	Malleefowl	Not specified	TFAUNA
9	December	2010	Malleefowl	Not specified	TFAUNA
10	July	2010	Malleefowl	Not specified	TFAUNA
11	June	2009	Malleefowl	Not specified	TFAUNA
12	April	2009	Malleefowl	Secondary sign	TFAUNA
13	April	2009	Malleefowl	Sighting	TFAUNA
14	January	2008	Malleefowl	Sighting	TFAUNA
15	January	2008	Malleefowl	Sighting	TFAUNA
16	November	2007	Malleefowl	Sighting	TFAUNA
17	November	2007	Malleefowl	Not specified	TFAUNA
18	November	2007	Malleefowl	Not specified	TFAUNA
19	January	2007	Malleefowl	Sighting	TFAUNA
20	January	2007	Malleefowl	Sighting	TFAUNA
21	July	2006	Malleefowl	Sighting	TFAUNA
22	July	2006	Malleefowl	Not specified	BIRDATLAS2
23	June	2006	Malleefowl	Sighting	TFAUNA
24	June	2006	Malleefowl	Not specified	TFAUNA
25	June	2006	Malleefowl	Sighting	TFAUNA
26	June	2006	Malleefowl	Not specified	TFAUNA
27	June	2006	Malleefowl	Sighting	TFAUNA
28	June	2006	Malleefowl	Not specified	TFAUNA
29	June	2006	Malleefowl	Sighting	TFAUNA
30	May	2006	Malleefowl	Sighting	TFAUNA
31	May	2006	Malleefowl	Sighting	TFAUNA
32	May	2006	Malleefowl	Not specified	TFAUNA
33	May	2006	Malleefowl	Sighting	TFAUNA
34	December	2005	Malleefowl	Dead	TFAUNA
35	July	2005	Malleefowl	Not specified	BIRDATLAS2
36	May	2005	Malleefowl	Sighting	TFAUNA
37	May	2005	Malleefowl	Sighting	TFAUNA
38	April	2005	Malleefowl	Sighting	TFAUNA
39	April	2005	Malleefowl	Sighting	TFAUNA
40	April	2005	Malleefowl	Sighting	TFAUNA
41	April	2005	Malleefowl	Sighting	TFAUNA
42	March	2005	Malleefowl	Sighting	TFAUNA
43	March	2005	Malleefowl	Not specified	BIRDATLAS2
44	March	2005	Malleefowl	Not specified	BIRDATLAS2

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ID	Month	Year	Common Name	Observation Type	Data Source
45	December	2004	Malleefowl	Not specified	BIRDATLAS2
46	November	2003	Malleefowl	Sighting	TFAUNA
47	October	2003	Malleefowl	Not specified	BIRDATLAS2
48	July	2003	Malleefowl	Secondary sign	TFAUNA
49	July	2003	Malleefowl	Secondary sign	TFAUNA
50	July	2003	Malleefowl	Secondary sign	TFAUNA
51	July	2003	Malleefowl	Secondary sign	TFAUNA
52	July	2003	Malleefowl	Secondary sign	TFAUNA
53	July	2003	Malleefowl	Secondary sign	TFAUNA
54	July	2003	Malleefowl	Secondary sign	TFAUNA
55	July	2003	Malleefowl	Secondary sign	TFAUNA
56	July	2003	Malleefowl	Secondary sign	TFAUNA
57	January	2003	Malleefowl	Sighting	TFAUNA
58	January	2003	Malleefowl	Sighting	TFAUNA
59	May	2002	Malleefowl	Dead	TFAUNA
60	November	2001	Malleefowl	Sighting	TFAUNA
61	January	2000	Malleefowl	Not specified	BIRDATLAS2
62	August	1999	Malleefowl	Not specified	BIRDATLAS2
63	June	1999	Malleefowl	Not specified	BIRDATLAS2
64	February	1999	Malleefowl	Not specified	BIRDATLAS2
65	August	1998	Malleefowl	Sighting	TFAUNA
66	April	1998	Malleefowl	Sighting	TFAUNA
67	December	1997	Malleefowl	Sighting	TFAUNA
68	December	1997	Malleefowl	Sighting	TFAUNA
69	November	1997	Malleefowl	Sighting	TFAUNA
70	August	1997	Malleefowl	Sighting	TFAUNA
71	April	1997	Malleefowl	Sighting	TFAUNA
72	February	1997	Malleefowl	Sighting	TFAUNA
73	August	1996	Malleefowl	Sighting	TFAUNA
74	July	1996	Malleefowl	Sighting	TFAUNA
75	October	1995	Malleefowl	Sighting	TFAUNA
76	August	1995	Malleefowl	Sighting	TFAUNA
77	December	1994	Malleefowl	Sighting	TFAUNA
78	December	1994	Malleefowl	Sighting	TFAUNA
79	January	1994	Malleefowl	Sighting	TFAUNA
80	January	1993	Malleefowl	Sighting	TFAUNA
81	January	1993	Malleefowl	Sighting	TFAUNA
82	January	1990	Malleefowl	Sighting	TFAUNA
83	January	1990	Malleefowl	Sighting	TFAUNA
84	May	1988	Malleefowl	Sighting	TFAUNA
85	May	1988	Malleefowl	Sighting	TFAUNA
86	Not specified	Not specified	Malleefowl	Sighting	TFAUNA
a	November	2022	Chuditch	Scat	PES_FIELD_RECORDS
b	November	2022	Chuditch	Scat	PES_FIELD_RECORDS

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ID	Month	Year	Common Name	Observation Type	Data Source
c	November	2022	Chuditch	Scat	PES_FIELD_RECORDS
d	November	2022	Chuditch	Tracks	PES_FIELD_RECORDS
e	November	2022	Chuditch	Scat	PES_FIELD_RECORDS
f	November	2022	Chuditch	Scat	PES_FIELD_RECORDS
g	November	2022	Chuditch	Scat	PES_FIELD_RECORDS
h	November	2022	Malleefowl	Photos	PES_FIELD_RECORDS
i	November	2022	Chuditch	Scat	PES_FIELD_RECORDS
j	November	2022	Chuditch	Scat	PES_FIELD_RECORDS
k	April	2021	Chuditch	Scat	PES_FIELD_RECORDS
l	March	2021	Chuditch	Scat	PES_FIELD_RECORDS
m	March	2021	Malleefowl	Tracks	PES_FIELD_RECORDS
n	March	2020	Malleefowl	Mound	PES_FIELD_RECORDS
o	March	2020	Chuditch	Scat	PES_FIELD_RECORDS
p	March	2020	Chuditch	Scat	PES_FIELD_RECORDS

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**APPENDIX 2**

**MEMORANDUM: TARGETED CHUDITCH AND MALLEEFOWL  
SURVEYS OF LOT 1416, OCTOBER - DECEMBER 2022**

**(PHOENIX 2022)**

# Memo

To: Neil Smith

From: Caitlin Nagle, Patrick Williams, Floyd Holmes

Date: 1/12/2022

Subject: Targeted Chuditch and Malleefowl Surveys of Lot 1416 October – November 2022



## 1 INTRODUCTION AND SCOPE OF WORKS

Mineral Resources (MinRes) is proposing to develop a haul road between its existing Parker Range Iron Ore Project (PRIOP) and its Koolyanobbing Operations. In order to offset the significant environmental effect to Malleefowl and Chuditch habitat associated with the proposed haul road, MinRes has acquired Lot 1416 as a potential offset site.

MinRes engaged Phoenix Environmental Sciences (Phoenix) in March 2020 to conduct a high-level assessment of the conservation values present within the lot (Phoenix 2021). In 2022, MinRes engaged Phoenix to undertake a further field survey to provide information on Chuditch (*Dasyurus geoffroi*) and Malleefowl (*Leipoa ocellata*) habitat and occurrence within Lot 1416 and the adjacent Conservation Reserves to support the assessment of Lot 1416 as a potential offset site. The 2022 survey program is still underway with camera traps currently deployed onsite. This memo provides interim results of the survey program, based on data collected to date.

## 2 METHODS

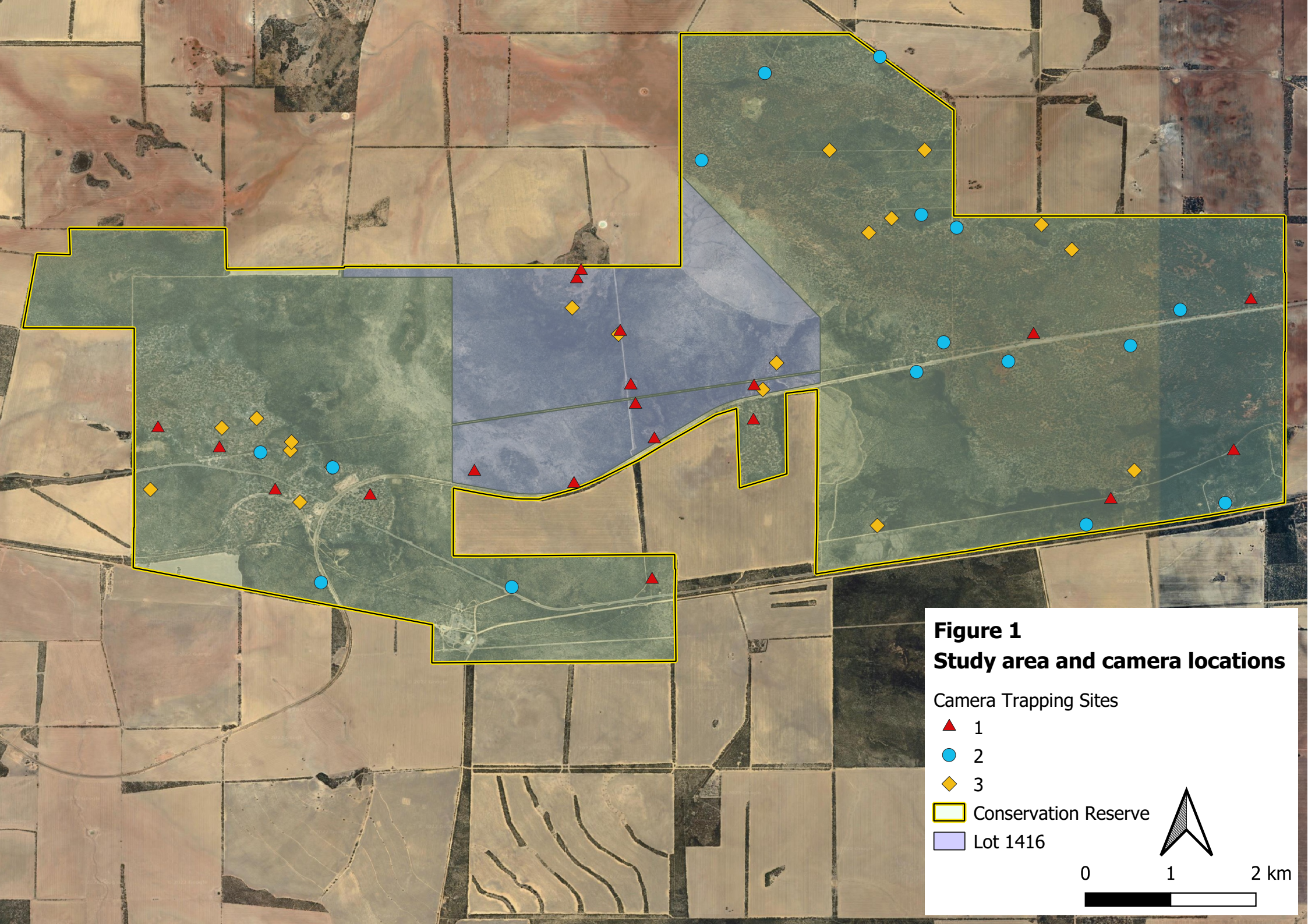
The targeted fauna survey is being conducted in accordance with relevant survey guidelines and guidance, including EPA Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA 2020). Field methods include camera trapping for Chuditch and active searches for evidence of Malleefowl and other significant species within the study area.

Phoenix deployed camera traps on three separate occasions across 54 sites within Lot 1416 and the adjacent Conservation Reserves (Table 1; Figure 1). Cameras will have been deployed for approximately 972 trapping nights once collected in December (dependant on date of collection). One known Malleefowl mound was also visited within the study area.

**Table 1 Camera trapping efforts at lot 1416 and the adjacent Conservation Reserves**

Trip	Number of cameras			Trapping period	Effort
	Lot 1416	Conservation reserves	Total		
1	8	11	19	~5/10/22 - 20/10/22	269
2	0	19	19	29/10/22 - 10/11/22	228
3	4	15	19	~15/11/2022 - ~12/12/22*	475
<b>Total</b>			<b>56</b>	<b>Total</b>	<b>~972</b>

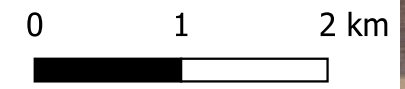
\*The third deployment of cameras are still to be collected from the study area.



**Figure 1**  
**Study area and camera locations**

Camera Trapping Sites

- ▲ 1
- 2
- ◆ 3
- Conservation Reserve
- Lot 1416



# Memo

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## 3 RESULTS

### 3.1 CHUDITCH

Chuditch was recorded from eight scat records and one set of tracks, located in the surrounding DBCA reserves (Figure 7). Six of the scat records were located in the reserve north-east of Lot 1416, and the remaining two were found in the reserve to the west of Lot 1416 along with a set of tracks (Figure 2; Figure 3; Figure 7).



**Figure 2** Chuditch scats found within the adjacent Conservation Reserves



**Figure 3** Chuditch tracks found within the adjacent Conservation Reserve

# Memo

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## 3.2 MALLEEFOWL

Malleefowl was recorded on the 6 November 2022 by a camera trap in the reserve north-east of Lot 1416 (Figure 4; Figure 7).

A previously documented Malleefowl mound was visited during the third deployment of cameras and was deemed Inactive (sub-class 2; Figure 5; Figure 7). The mound was in good condition and considered likely to have been used within the last two years. The mound was classed as Inactive (sub-class 2) as it maintained its shape, but there was no evidence of recent Malleefowl activity, there were monitor diggings throughout the mound and a surface crust had formed showing no recent turnover of dirt and other nesting material.



**Figure 4** Malleefowl captured on camera within adjacent Conservation Reserve



**Figure 5** Inactive (sub-class 2) Malleefowl mound visited at Lot 1416

# Memo

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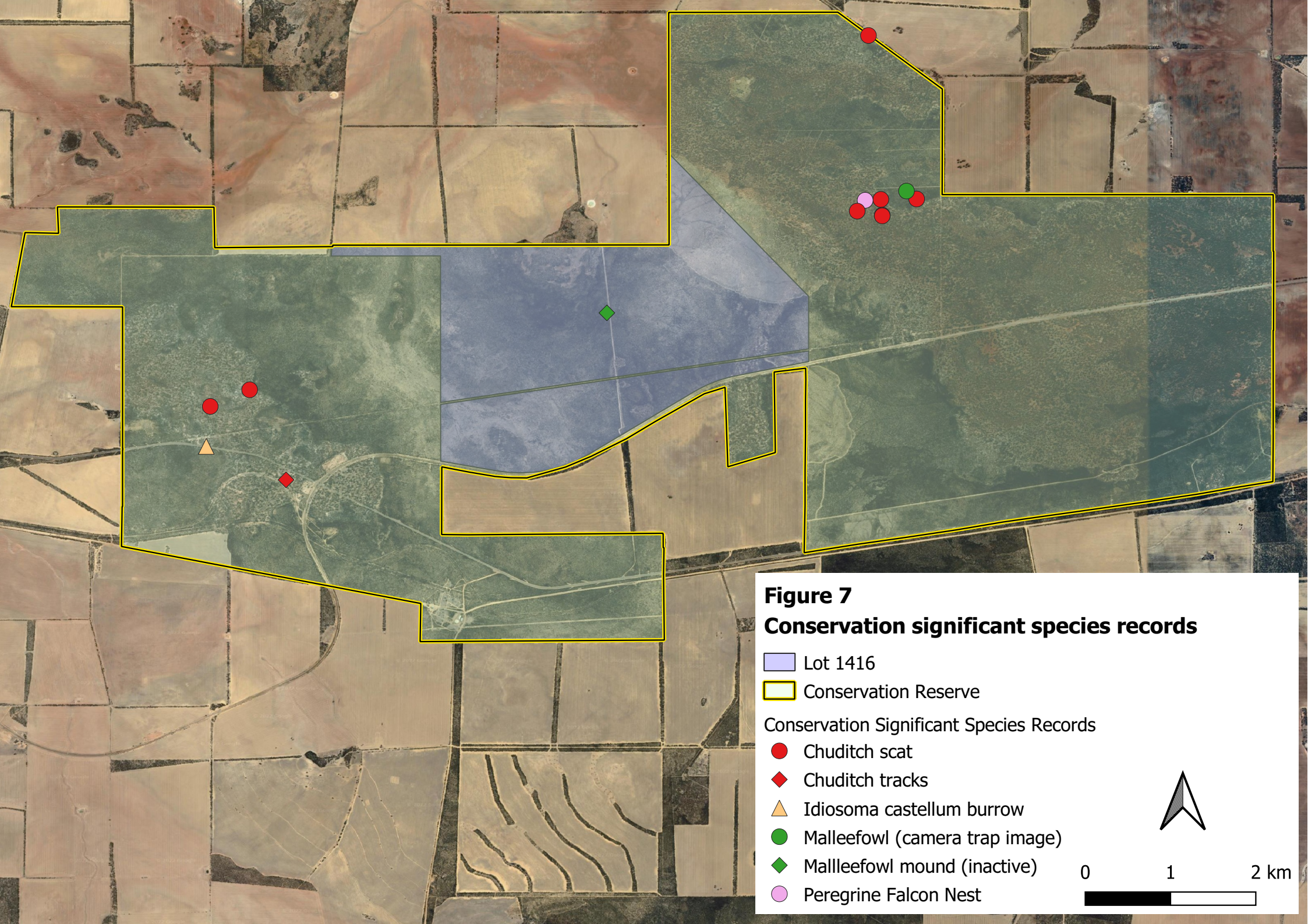
## 3.3 OTHER SIGNIFICANT FAUNA

A Peregrine Falcon (*Falco peregrinus*; OS) nest was found within the study area, with a breeding pair of Peregrines observed on the nest. The nest was in an open woodland in the reserve to the north-east of Lot 1416 (Figure 7).









A Tree-stem Trapdoor Spider (*Idiosoma castellum*; P4) was documented in the reserve to the south-west of Lot 1416 in a small area of dense *Melaleuca* on the fringes of a minor breakaway (Figure 7). The spider was not excavated but was easily identified from the characteristic burrow which was built up the stem of a small shrub (Figure 6).

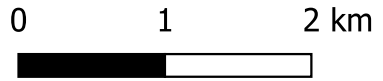


Figure 6 *Idiosoma castellum* burrow found within the adjacent Conservation Reserves



**Figure 7**  
**Conservation significant species records**

-  Lot 1416
-  Conservation Reserve
- Conservation Significant Species Records**
-  Chuditch scat
-  Chuditch tracks
-  Idiosoma castellum burrow
-  Malleefowl (camera trap image)
-  Malleefowl mound (inactive)
-  Peregrine Falcon Nest



# Memo

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## 4 DISCUSSION AND CONCLUSION

Survey efforts to date within Lot 1416 and the surrounding reserves have confirmed the presence of Chuditch and Malleefowl within the study area.

While Chuditch was not recorded within Lot 1416 during this year's camera trapping efforts, they have been previously recorded from secondary evidence within the Lot by Phoenix (2021). It is likely that Chuditch utilise this area for foraging and/or denning activities as suitable habitat is present. Multiple Chuditch scats and one set of tracks were recorded within the adjacent Conservation Reserves in woodland (denning habitat) and shrubland (foraging habitat). The tracks were found in moist ground at the edge of a permanent waterbody. Given the clarity of the tracks and the environmental conditions at the time (i.e., time since last rainfall, moisture of the surrounding ground), it is estimated that these tracks were less than 12 hours old when found. The tracks were small, suggesting a sub-adult animal. With further survey effort it is likely that primary evidence (camera trap photos or direct sightings) of Chuditch would be recorded within Lot 1416.

While primary evidence of Malleefowl was not recorded within the Lot during this survey, an individual was captured on a camera trap in the adjacent Conservation Reserve. There are historical secondary evidence records of Malleefowl within the Lot (two inactive mounds). One of the mounds was visited during the survey and while it was inactive, it was in good condition and likely utilised in the last two years. It is considered likely that Malleefowl are still using the Lot and that more mounds are present in Lot 1416 and the surrounding reserve as they contain large expanses of highly suitable Malleefowl breeding habitat. With further survey effort it is likely that primary evidence (camera trap photos or direct sightings) of Malleefowl would be recorded within Lot 1416.

Yours Sincerely,

Caitlin Nagle

Senior Zoologist

[Caitlin.nagle@phoenixenv.com.au](mailto:Caitlin.nagle@phoenixenv.com.au)

08 6323 5410

2/3 King Edward Rd, Osbourne Park, WA, 6017



# Memo

---

## 5 REFERENCES

- EPA. 2020. *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment*. Environmental Protection Authority, Perth, WA. Available at: [https://epa.wa.gov.au/sites/default/files/Policies\\_and\\_Guidance/EPA-Technical-Guidance-Vertebrate-Fauna-Surveys.pdf](https://epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA-Technical-Guidance-Vertebrate-Fauna-Surveys.pdf)
- Phoenix. 2021. *Flora and fauna assessment of Lot 1416 for the Parker Range Project*. Phoenix Environmental Sciences Pty Ltd, Osborne Park, WA. Unpublished report prepared for Mineral Resources Ltd.

**APPENDIX 3**

**SIGNIFICANT FLORA CONSTRUCTION MANAGEMENT PLAN  
(REVISION 2, NOVEMBER 2022)**

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# Parker Range Iron Ore Project Haul Road

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## SIGNIFICANT FLORA CONSTRUCTION MANAGEMENT PLAN

*Environmental Protection Act 1986 (WA)*



Proponent: Polaris Metals Pty Ltd  
Address: 20 Walters Drive, Osborne Park, WA 6017  
Postal Address: Locked Bag 13, Osborne Park DC, WA 6916  
Corporate contact: Adam Parker  
Phone: +61 8 9315 8788  
Email: adam.parker@mrl.com.au

DOCUMENT CONTROL					
REV	DATE	PREPARED BY	REVIEWED BY	APPROVED BY	DOCUMENT PURPOSE
0	14.05.2021	L Whitley, Strategen JBS&G	N Smith, Mineral Resources	A Parker, Mineral Resources	Draft
1	08.04.2022	V Campagna, Strategen-JBS&G	N Smith, Mineral Resources A Latto, Strategen-JBS&G	Les Purves – General Manager Environment, Approvals, Land Access Mineral Resources	Submission to Environmental Protection Authority (WA) and Department of Climate Change, Energy, the Environment and Water (C'th)
2	18.11.2022	S Hawkins, Globe Environments for Strategen-JBS&G	N Smith, Mineral Resources	Les Purves – General Manager Environment, Approvals, Land Access Mineral Resources  Signature 	Revised submission to Environmental Protection Authority (WA) and Department of Climate Change, Energy, the Environment and Water (C'th)

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## **APPENDICES**

APPENDIX A – FLORA TAXA

APPENDIX B – RISK ASSESSMENT

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## 1. SUMMARY

This Significant Flora Construction Management Plan (SFCMP) has been prepared for the construction of the Parker Range Iron Ore Project (PRIOP) Haul Road (the Proposal) to link the Parker Range surface mining operation with the Koolyanobbing Operations. The SFCMP has been developed to minimise Proposal specific impacts to the environment from activities identified as having the highest risk. These are:

- Clearing;
- Dust emissions associated with construction; and
- Spread of introduced flora (weeds) associated with construction.

The environmental objectives to be met through implementation of this SFCMP are presented in Table 1.

This SFCMP is adaptive and will be implemented for any construction activities over the life of the Proposal (approximately six years). The SFCMP will be updated as required, to be consistent with any new findings on the species in the local, regional and state context. It will be updated in consultation with the Western Australian Environmental Protection Authority (EPA), the Department of Biodiversity, Conservation and Attractions (DBCA), the Department of Mines, Industry Regulation and Safety (DMIRS) and the Commonwealth Department of Agriculture, Water and the Environment (DAWE).

**TABLE 1: PURPOSE OF THE SFCMP**

<b>PROPOSAL NAME</b>	Parker Range (Mt Caudan) Iron Ore Project Haul Road Revised Proposal
<b>PROPONENT NAME</b>	Polaris Metals Pty Ltd
<b>PURPOSE OF THE SFCMP</b>	Provide monitoring and management actions for potential impacts on conservation significant flora and vegetation within the Development Envelope and surrounds
<b>KEY ENVIRONMENTAL FACTOR/S, OUTCOME/S AND OBJECTIVE/S</b>	<i>Flora and Vegetation</i> To protect flora and vegetation so that biological diversity and ecological integrity are maintained. To minimise the potential environmental effect of the Proposal to conservation significant flora and communities.
<b>KEY COMPONENTS IN THE EMP (IF APPLICABLE)</b>	Not applicable – refer to Table 2
<b>EMP REQUIRED PRE-CONSTRUCTION?</b>	Yes

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## 2. CONTEXT, SCOPE, AND RATIONALE

### 2.1 PROJECT DESCRIPTION

The Parker Range (Mt Caudan) Iron Ore Project (PRIOP) is approximately 15 km southeast of Marvel Loch, within the Yilgarn Shire, in the Eastern Wheatbelt Region of Western Australia (Figure 1). The existing PRIOP consists of a mining area and haul road area. Mineral Resources Limited (Mineral Resources) is proposing to construct and operate a mining haul road of approximately 52 km in length from the PRIOP to the Koolyanobbing Operations, to facilitate the transport of ore (Figure 2). A portion of the mining haul road will utilise a public road in Emu Fence Road until approximately 14kms north of Great Eastern Highway.

The PRIOP Haul Road (the Revised Proposal) involves the clearing of up to 173 ha of native vegetation. Additionally, up to 37 ha of already disturbed areas will also be used. This results in an Indicative Footprint of 210 ha within a 339 ha Development Envelope (DE). The proposed extent of the physical and operational elements of the Project are outlined in Table 2 and Table 3.

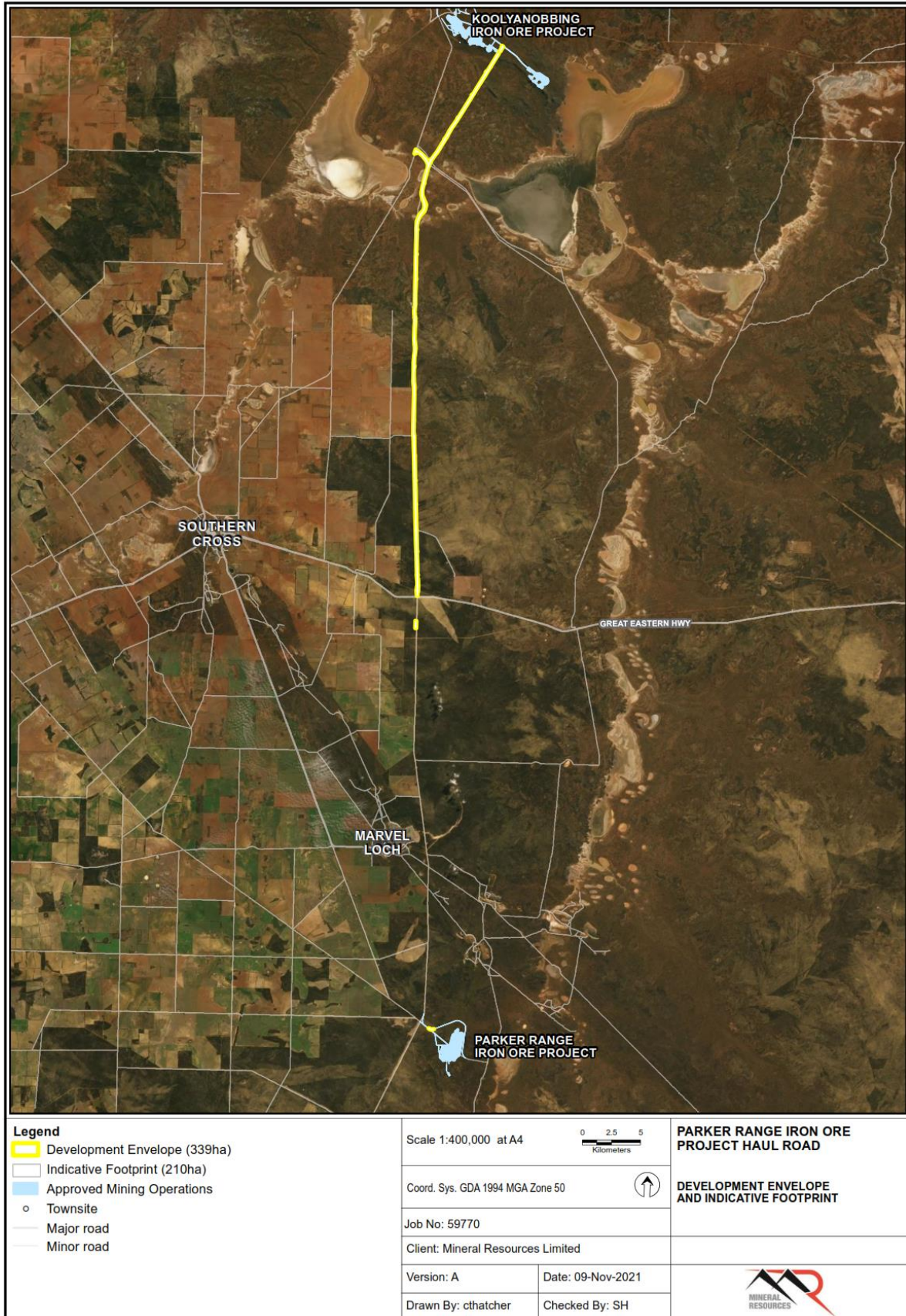
An existing Significant Flora Management Plan (SFMP) (MRL 2020), outlining management and monitoring actions, has been developed to minimise impacts to significant flora, within the PRIOP mining area for mine related activities.

**TABLE 2: SUMMARY OF THE REVISED PROPOSAL**

SUMMARY OF PROJECT	
Proposal Title	Parker Range (Mt Caudan) Iron Ore Project Haul Road Revised Proposal
Proponent Name	Polaris Metals Pty Ltd
Short Description	The Revised Proposal involves the development of a haul road to transport iron ore to Mineral Resources Limited's Koolyanobbing Operations for processing.

**TABLE 3: LOCATION AND PROPOSED EXTENT OF PHYSICAL AND OPERATIONAL ELEMENTS**

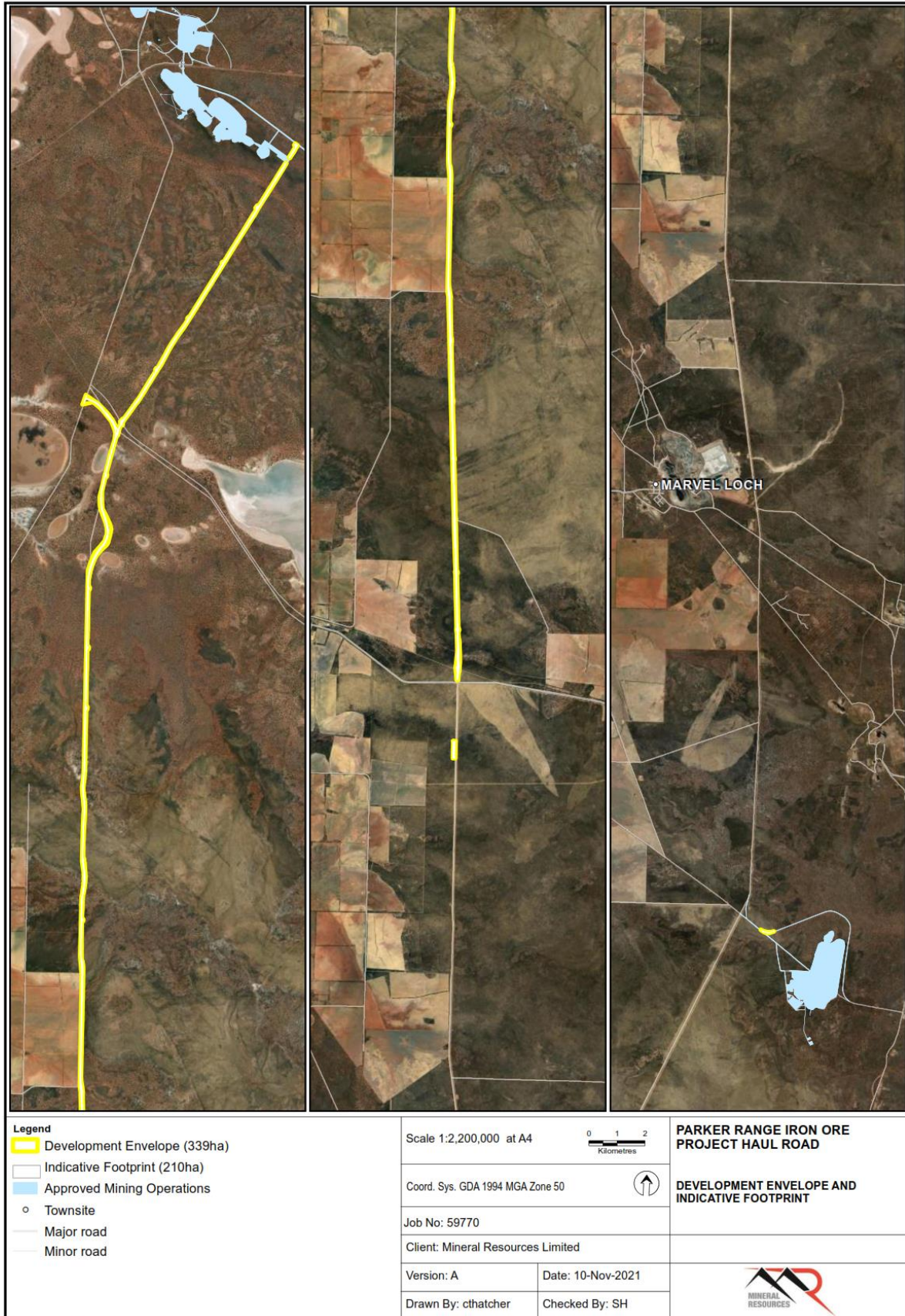
ELEMENT	LOCATION	PROPOSED EXTENT (REVISED PROPOSAL)
Physical Elements		
Haul Road	Figure 2	Clearing of up to 173 hectares (ha) of native vegetation and use of existing disturbed land within a 339 ha development envelope.
Operational Elements		
Haul Road	Figure 2	Construction and operation of approximately 52 kilometres of bitumen seal road with operation 24 hours per day, 365 days per year, with nominally between 110 to 160 of ore haulage vehicle movement per day.



File Name: \\006gpmr004\001\seg.aust\JBS Perth\Projects\1\Open\Mineral Resources\59770 Parker Range Haul Road\GIS\Maps\R10\_Rev\_A\59770\_03\_IndicativeFootprint.mxd  
 Image Reference: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

**FIGURE 1: PARKER RANGE IRON ORE PROJECT HAUL ROAD – REGIONAL LOCATION**

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File Name: \\006gpmpr004\001\seg.aust\JBS Perth\Projects\1\Open\Mineral Resources\59770 Parker Range Haul Road\GIS\Maps\R10\_Rev\_A\59770\_04\_IndicativeFootprint.mxd  
 Image Reference: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

**FIGURE 2: PARKER RANGE IRON ORE PROJECT HAUL ROAD DEVELOPMENT ENVELOPMENT AND INDICATIVE FOOTPRINT**

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## 2.2 KEY ENVIRONMENTAL FACTOR: FLORA AND VEGETATION

The EPA's objective for protection of flora and vegetation is to:

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

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

Flora and vegetation is considered a key environmental factor for the Revised Proposal due to the potential for direct and indirect impacts from the construction of the haul road.

The key environmental factor, risk activities, botanical values and potential impacts are summarised in Table 4. The Revised Proposal will potentially impact 23 Priority flora taxa, 2 locally and regionally restricted vegetation communities associated with the Parker Range Priority Ecological Community (PEC) (EcCaLmc and EcMIMc), and 7 regionally significant vegetation communities. No impacts to the Koolyanobbing PEC are expected.

## 2.3 RATIONALE AND APPROACH

This SFCMP provides monitoring and management actions for potential impacts on conservation significant flora taxa and vegetation within the DE and surrounds.

The SFCMP has been developed in alignment with the *Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans* (EPA 2021) and current approved PRIOP SFMP (MRL 2020). The SFCMP is relevant to construction activities only, as the potential for Proposal specific impacts to Flora and Vegetation during the operational stage is considered to be low. An objective-based approach has been adopted, with no early response triggers included, as monitoring of management actions is considered adequate to meet the objective for Flora and Vegetation.

### 2.3.1 Environmental Management Objectives

This objective-based SFCMP has been developed to ensure that the proposed construction actions are managed to minimise impacts to significant flora species and communities. The SFCMP also includes monitoring indicators to evaluate the effectiveness of management measures for direct and indirect impacts on significant flora taxa and vegetation.

Implementation of this plan will also result in broader benefits of reducing impacts to non-significant flora taxa and vegetation.

**TABLE 4: KEY ENVIRONMENTAL FACTORS, ACTIVITIES, VALUES AND ASSOCIATED IMPACTS**

KEY ENVIRONMENTAL FACTOR	ACTIVITIES	SIGNIFICANT FLORA AND VEGETATION VALUES	IMPACTS
Flora and Vegetation	<p>Clearing of native vegetation</p> <p>Construction vehicle movement</p>	<p>Vegetation health, particularly EcCaLmc and EcMIMc locally and regionally restricted vegetation communities associated with Parker Range PEC.</p> <p>DBCA-classified Priority flora:</p> <p>Priority 1 (DBCA-P1)</p> <ul style="list-style-type: none"> <li>• <i>Chamelaucium</i> sp. Parker Range</li> <li>• <i>Lepidosperma lyonsii</i></li> <li>• <i>Lepidosperma</i> sp. Mt Caudan</li> <li>• <i>Lepidosperma</i> sp. Parker Range</li> <li>• <i>Stylidium validum</i></li> <li>• <i>Verticordia roei</i> subsp. <i>meiogona</i></li> <li>• <i>Westringia acifolia</i></li> </ul> <p>Priority 2 (DBCA-P2)</p> <ul style="list-style-type: none"> <li>• <i>Acacia asepala</i></li> <li>• <i>Acacia concolorans</i></li> <li>• <i>Lissanthe scabra</i></li> <li>• <i>Verticordia multiflora</i> subsp. <i>Solox</i></li> </ul> <p>Priority 3 (DBCA-P3)</p> <ul style="list-style-type: none"> <li>• <i>Acacia desertorum</i> var. <i>nudipes</i></li> <li>• <i>Balaustion grandibracteatum</i> ssp. <i>grandibracteatum</i> (formerly <i>Baekkea grandibracteata</i> ssp. Parker Range)</li> <li>• <i>Bossiaea</i> sp. Jackson Range</li> <li>• <i>Cryptandra crispula</i></li> <li>• <i>Cyathostemon verrucosus</i></li> <li>• <i>Hakea pendens</i></li> <li>• <i>Lepidosperma ferricola</i></li> <li>• <i>Phebalium drummondii</i></li> <li>• <i>Rinzia torquata</i></li> <li>• <i>Verticordia gracilis</i></li> <li>• <i>Verticordia stenopetala</i></li> </ul> <p>Priority 4 (DBCA-P4)</p> <ul style="list-style-type: none"> <li>• <i>Stenanthemum bremerense</i></li> </ul>	<p>Direct loss of native flora and vegetation</p> <p>Indirect impacts:</p> <ul style="list-style-type: none"> <li>• dust deposition</li> <li>• spillage of hydrocarbons</li> <li>• altered surface drainage flow patterns</li> <li>• potential increased spread or introduction of new weeds</li> <li>• alteration of fire regimes</li> </ul>

### 2.3.3 Surveys and Study Findings

In September 2019, Phoenix Environmental Sciences Pty Ltd (Phoenix) was commissioned by Mineral Resources to undertake an ecological desktop review and reconnaissance survey for the Revised Proposal to identify potential terrestrial ecological values and inform further baseline survey requirements. Detailed flora and vegetation surveys were subsequently commissioned in October 2019, based on outcomes of a reconnaissance survey. The detailed survey extended 80 km north-south from the Parker Range Mine (Southern Haul Road Study Area). An additional area was then surveyed for the northern 12 km portion of the haul road to the Koolyanobbing Operations (Northern Extension Study Area).

Southern Haul Road Study Area flora and vegetation surveys were conducted over several seasons, entailing detailed and targeted surveys in October 2019 to October 2020 with additional targeted flora searches in November 2019, July 2020 until October 2020. The initial survey of the Northern Extension Study Area was conducted in October 2020 with the second season surveys conducted in March 2021 (Phoenix, 2022a; b).

Table 5 below outlines the reports prepared by Phoenix Environmental Services for the Project. The surveys were completed in accordance with the standards set out in *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016b) and *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016a).

Fourteen vegetation types were defined and mapped (Figure 3 A; B and C). The majority of the vegetation was in Pristine condition. A small portion was classified as Degraded. Classification of vegetation condition was based on the Keighery condition scale for the South West and Interzone Botanical Province (*Keighery 1994 in EPA 2016b*). No threatened flora taxa listed under the EPBC Act or BC Act were recorded within the study area during the 2020-2021 field surveys (Phoenix 2022a; b). Twenty-seven Priority taxa were recorded from these surveys; the significant flora taxa and their locations in relation to the DE are shown in Figures 4 to 8 (A-C). Further details of these species, including typical habitat are provided in Appendix A. The potential Proposal specific impacts to significant flora taxa are listed in Table 6.

**TABLE 5: FLORA SURVEYS**

REPORT	SURVEY DESCRIPTION	PROJECT
Phoenix (2022a)	Baseline flora and vegetation fauna surveys for the Parker Range Haul Road Project. Survey consisted of 74 quadrats and 16 relevés across the 1,499ha study area in an extrapolated area of 8,508 ha (refer to Phoenix 2022a Figure 4-1 for survey locations).	PRIOP Haul Road – southern 86 km (Southern Haul Road Study Area)
Phoenix (2022b)	Baseline flora and vegetation fauna surveys for the Parker Range Haul Road Project – northern (Phoenix 2022b), consisted of 40 quadrats and seven relevés across the 758 ha study area (refer to Phoenix 2022b for survey locations).	PRIOP Haul Road – northern 12 km (Northern Extension Study Area)

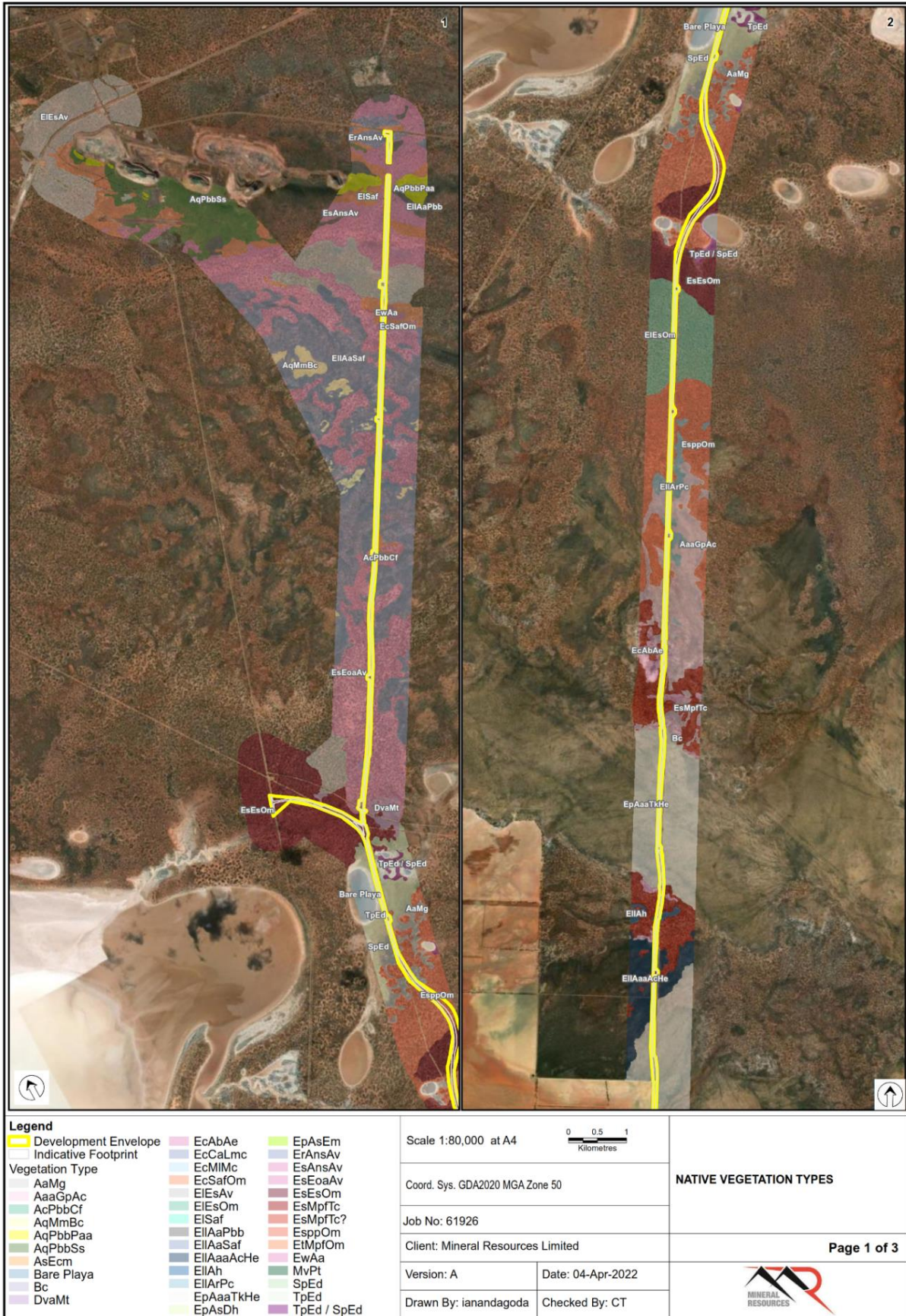


FIGURE 3 A: NATIVE VEGETATION TYPES (SECTION 1 OF HAUL ROAD)

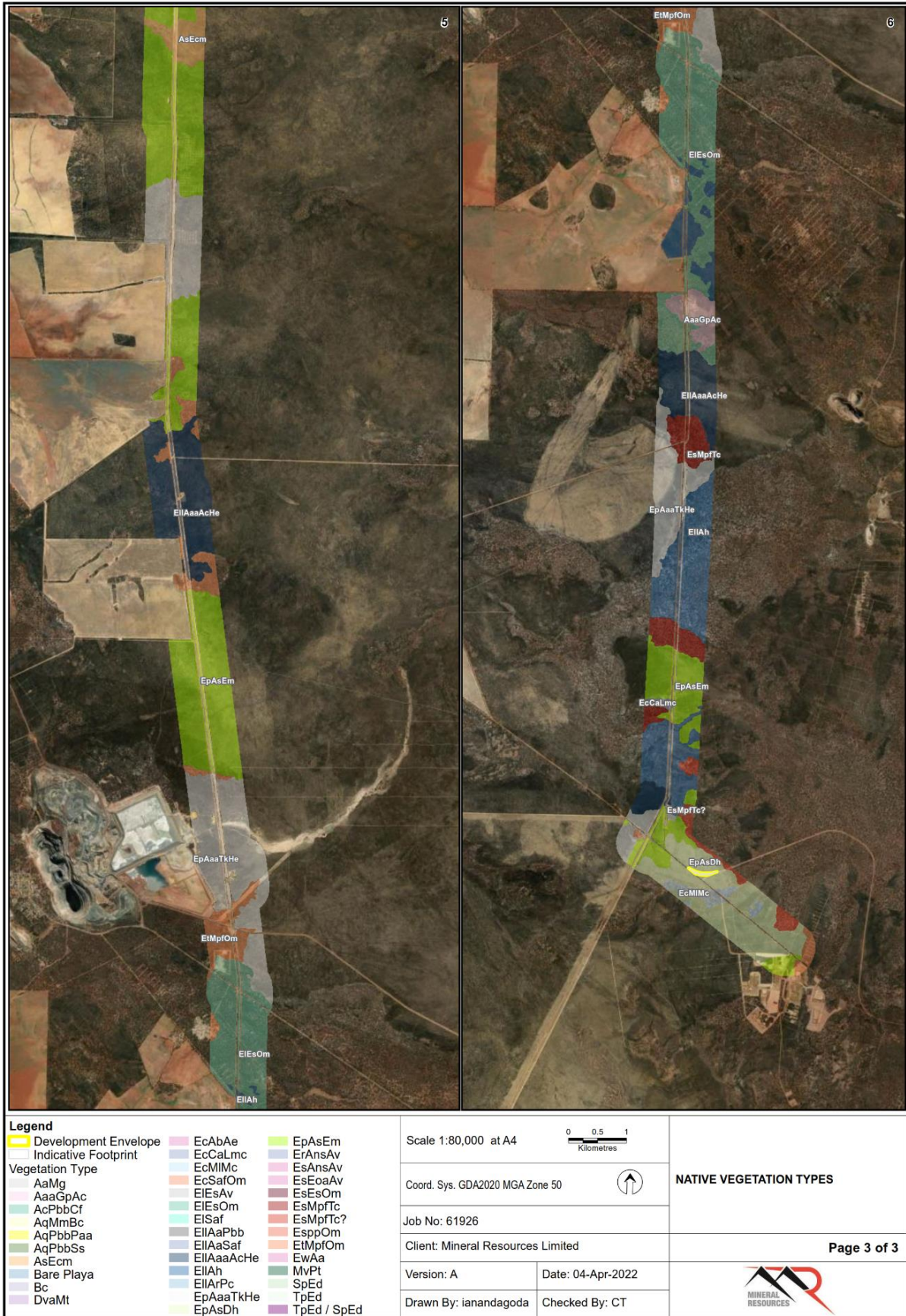
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**FIGURE 3 B: NATIVE VEGETATION TYPES (SECTION 2 OF HAUL ROAD)**

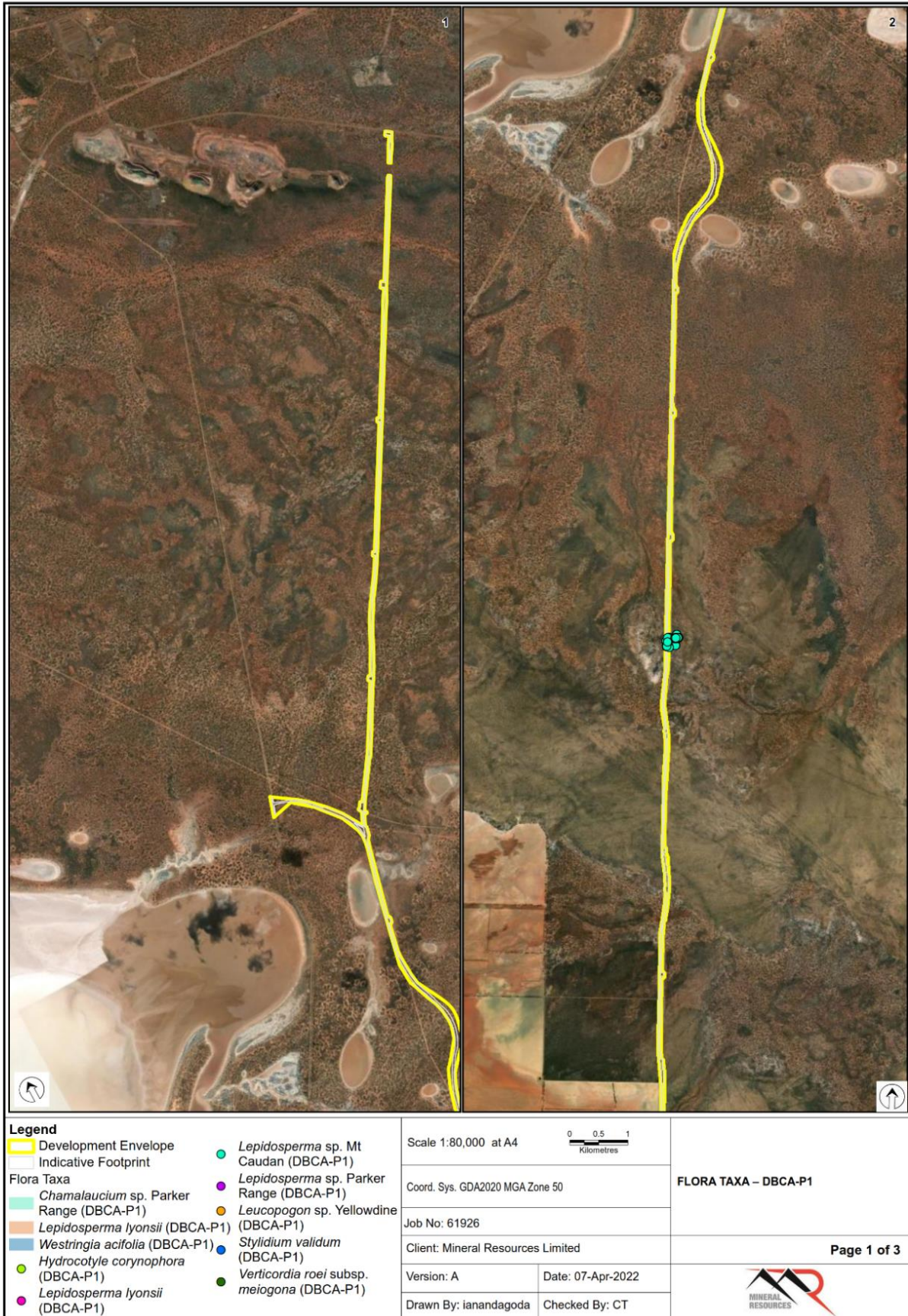
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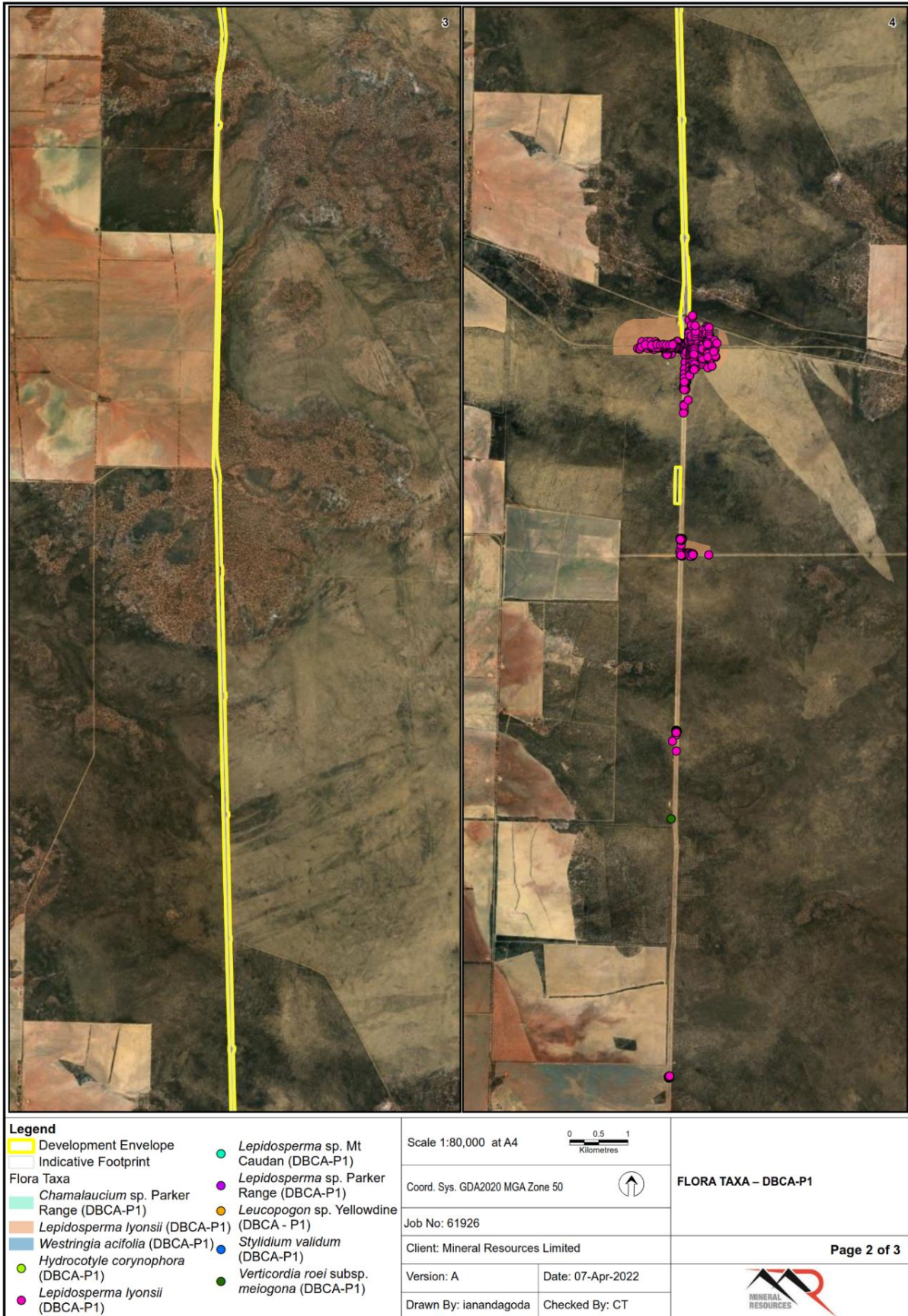
**FIGURE 3 C: NATIVE VEGETATION TYPES (SECTION 3 OF HAUL ROAD)**

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**FIGURE 4 A: FLORA TAXA – DBCA-P1 (SECTION 1 OF HAUL ROAD)**

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

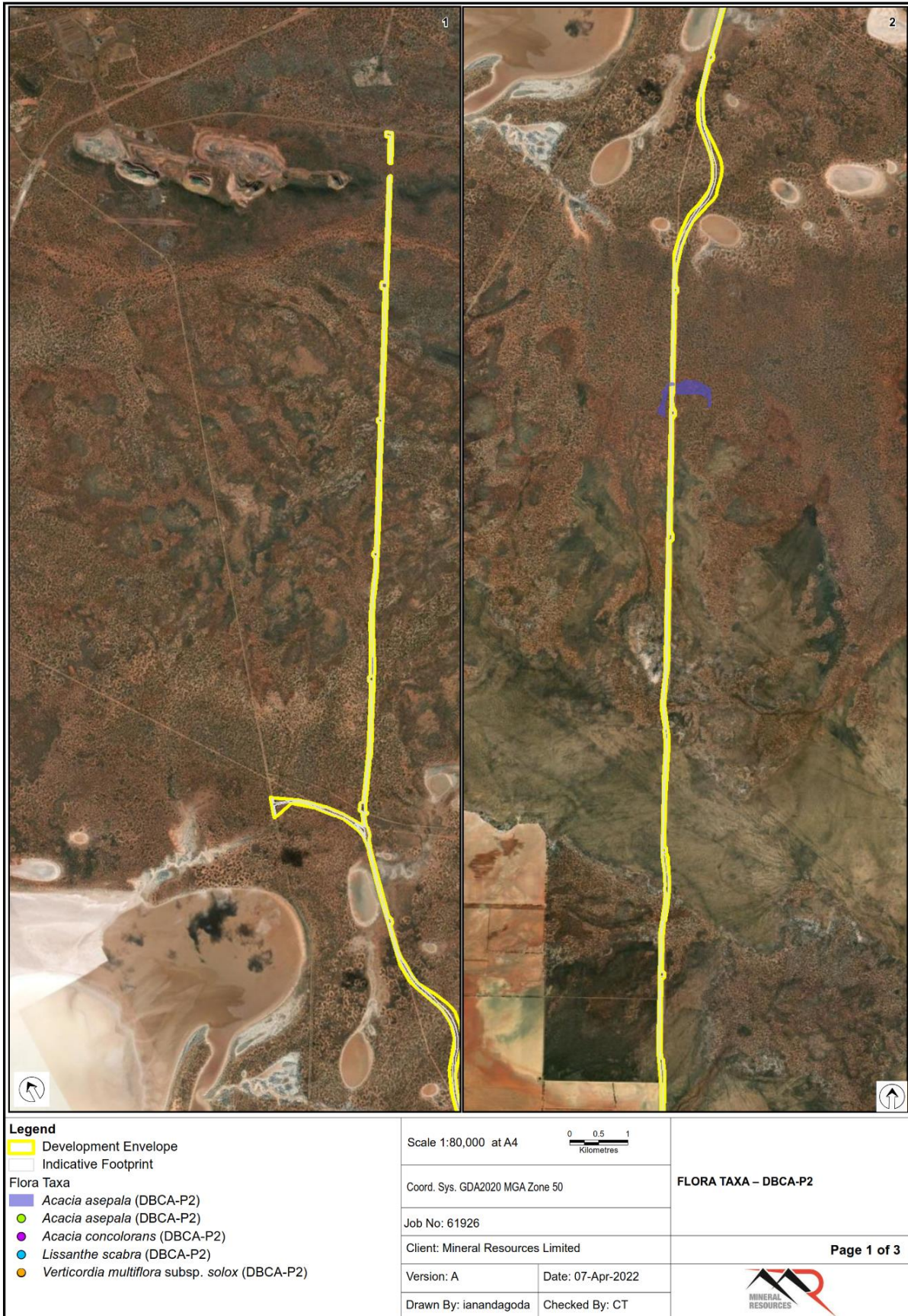
**FIGURE 4 B: FLORA TAXA – DBCA-P1 (SECTION 2 OF HAUL ROAD)**

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**FIGURE 4 C: FLORA TAXA – DBCA-P1 (SECTION 3 OF HAUL ROAD)**

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**FIGURE 5 A: FLORA TAXA – DBCA-P2 (SECTION 1 OF HAUL ROAD)**

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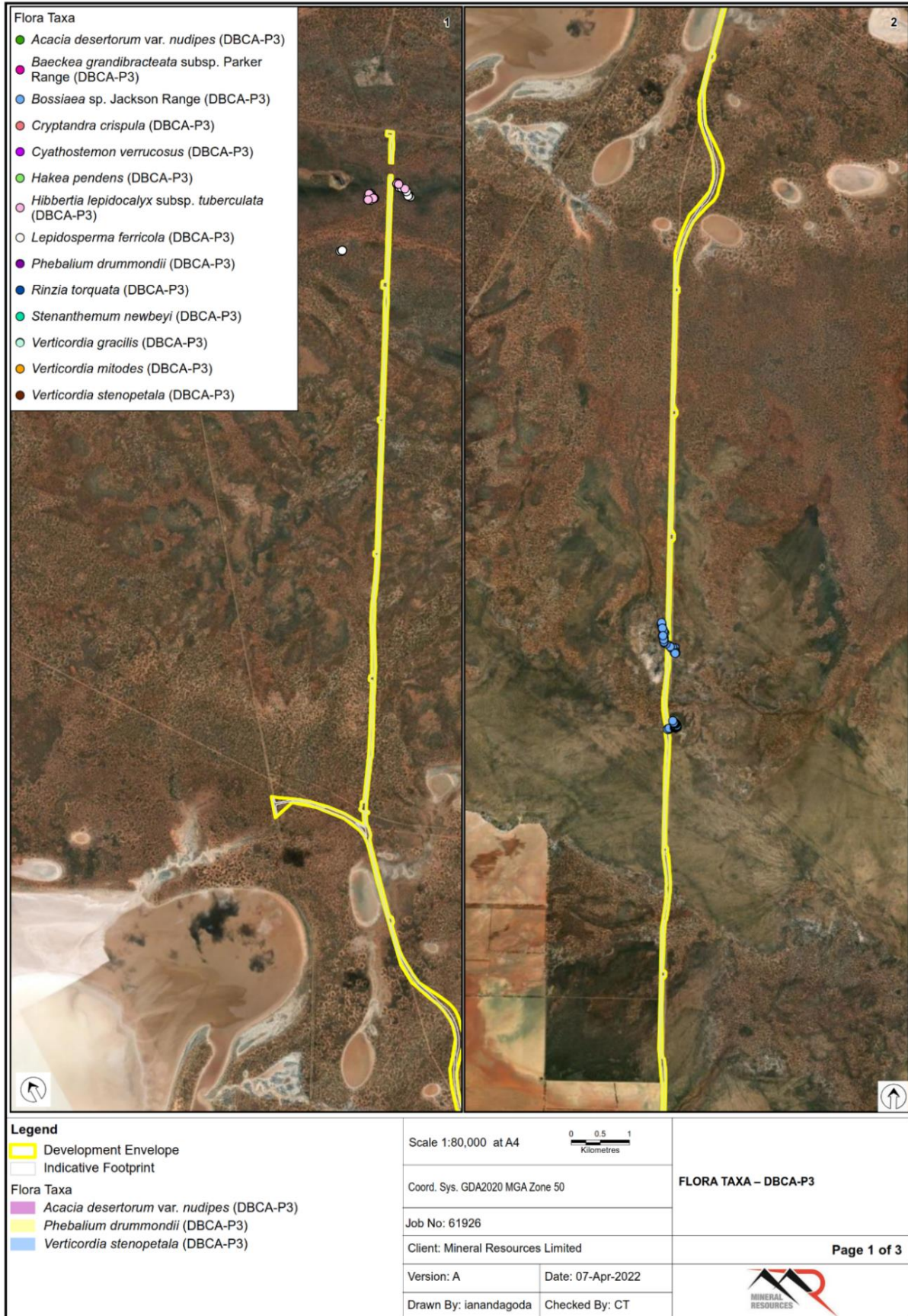
**FIGURE 5 B: FLORA TAXA – DBCA-P2 (SECTION 2 OF HAUL ROAD)**

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**FIGURE 5 C: FLORA TAXA – DBCA-P2 (SECTION 3 OF HAUL ROAD)**

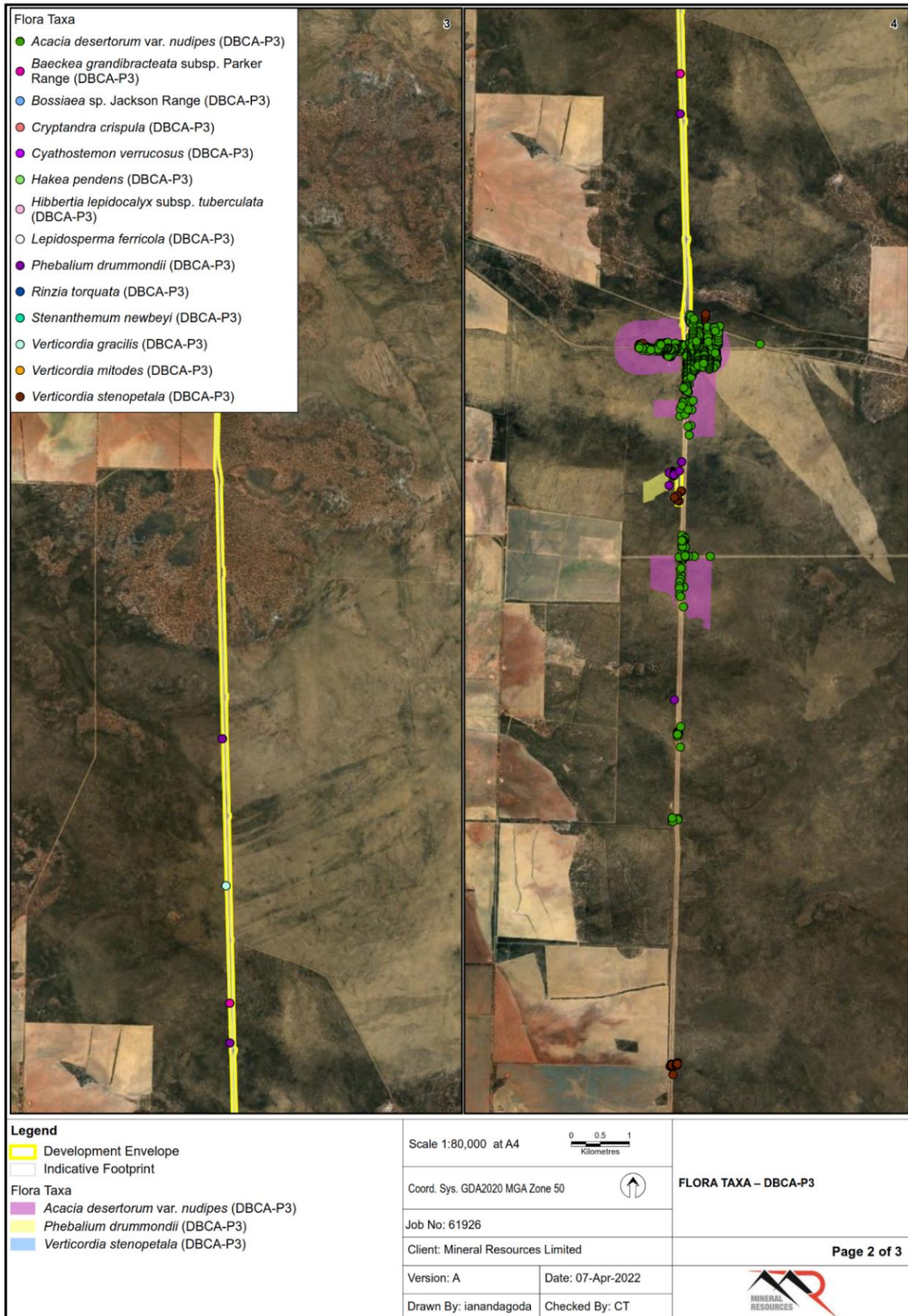
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**FIGURE 6 A: FLORA TAXA – DBCA-P3 (SECTION 1 OF HAUL ROAD)**

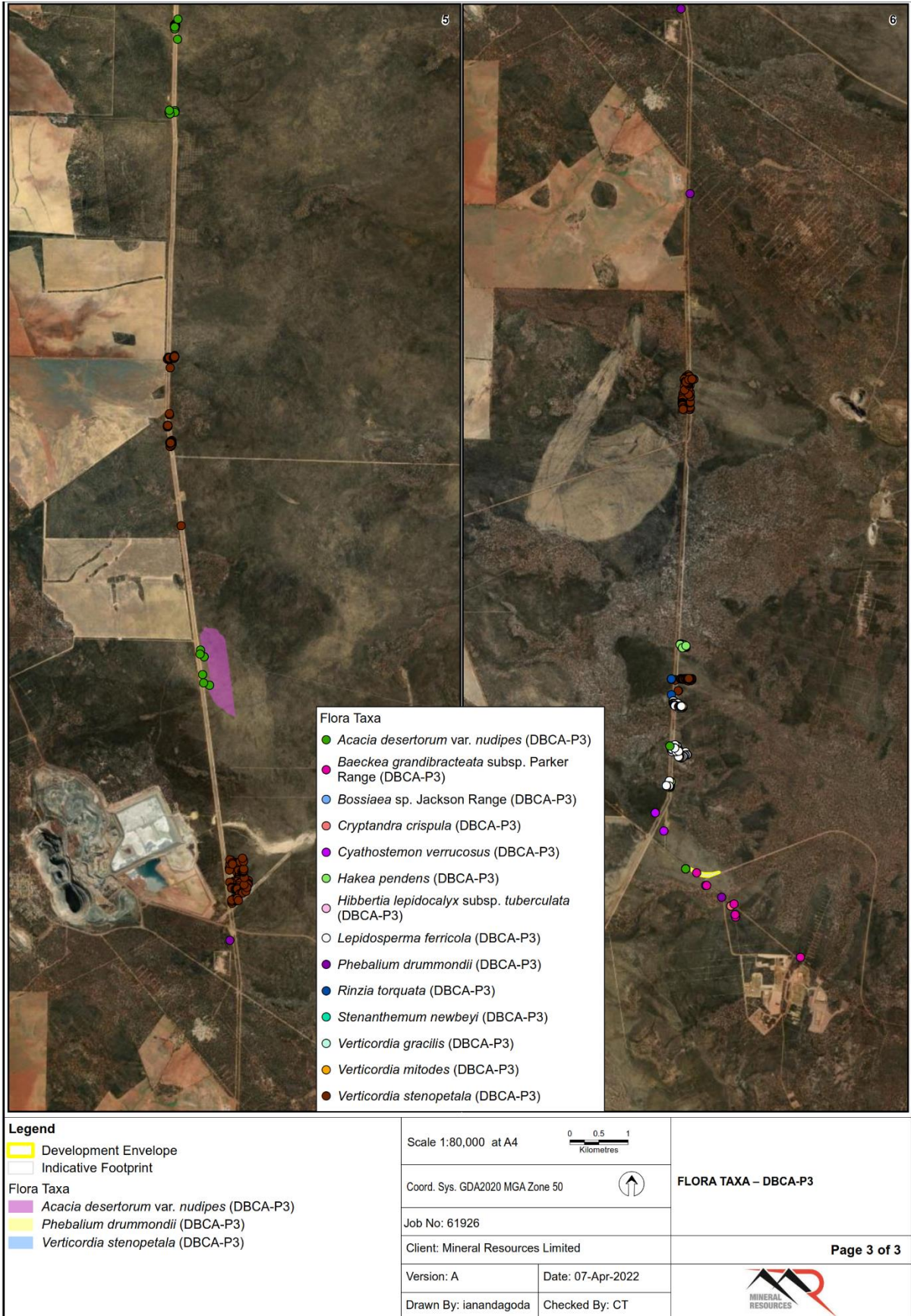
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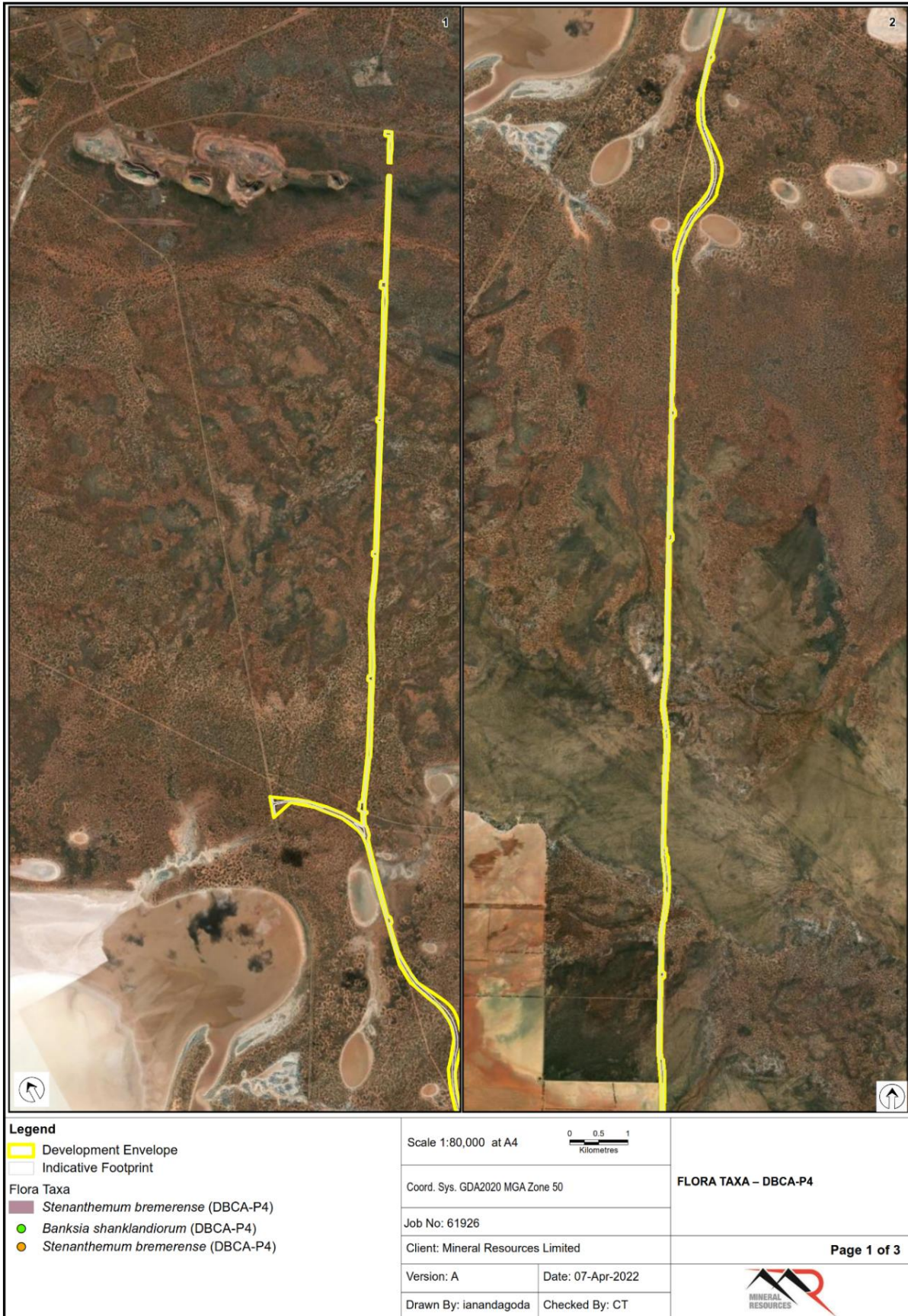
**FIGURE 6 B: FLORA TAXA – DBCA-P3 (SECTION 2 OF HAUL ROAD)**

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**FIGURE 6 C: FLORA TAXA – DBCA-P3 (SECTION 3 OF HAUL ROAD)**

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**FIGURE 7 A: FLORA TAXA – DBCA-P4 (SECTION 1 OF HAUL ROAD)**

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

**FIGURE 7 B: FLORA TAXA – DBCA-P4 (SECTION 2 OF HAUL ROAD)**

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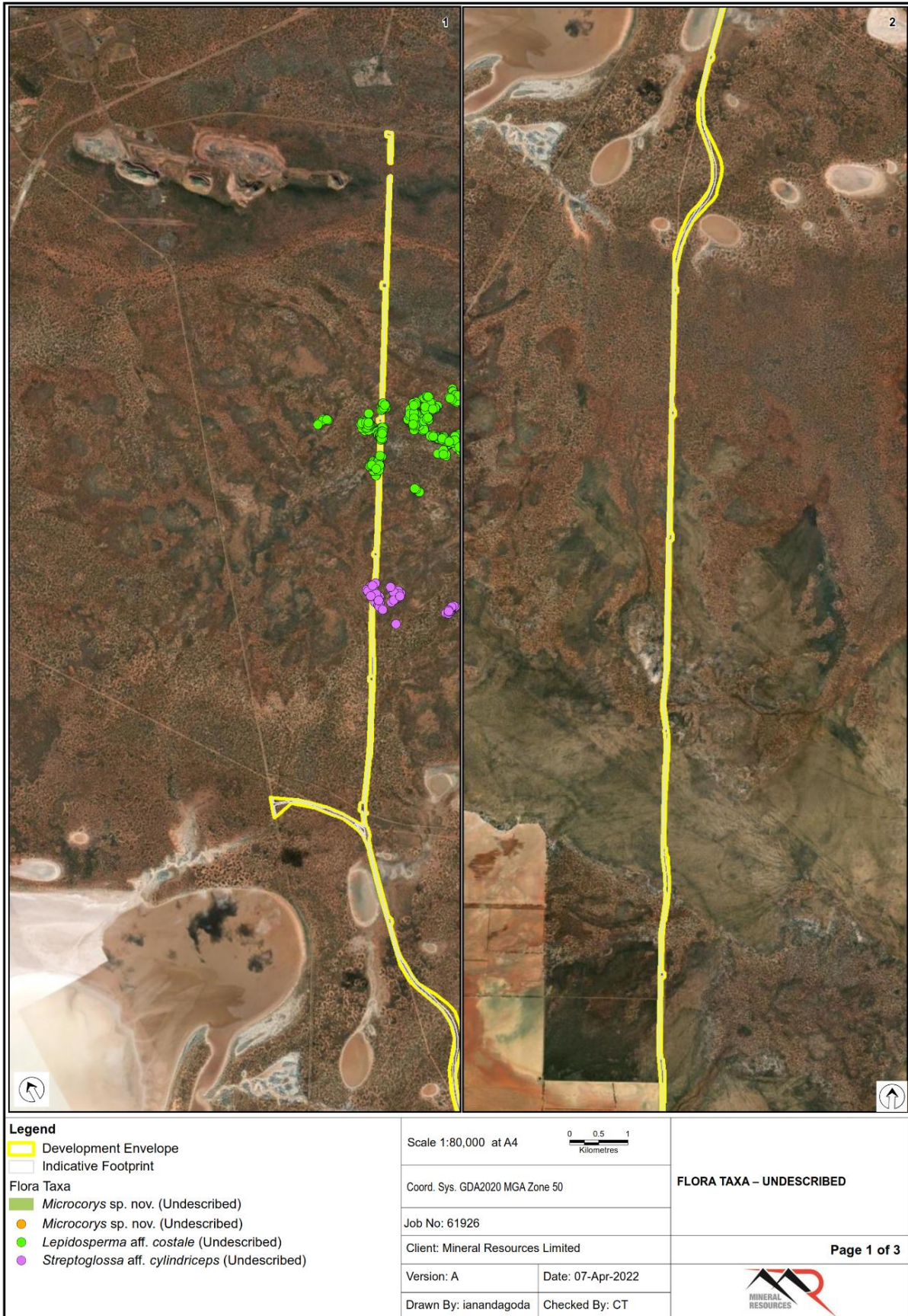


<b>Legend</b> Development Envelope Indicative Footprint <b>Flora Taxa</b> <i>Stenanthemum bremerense</i> (DBCA-P4) <i>Banksia shanklandiorum</i> (DBCA-P4) <i>Stenanthemum bremerense</i> (DBCA-P4)	Scale 1:80,000 at A4	<b>FLORA TAXA – DBCA-P4</b>
	Coord. Sys. GDA2020 MGA Zone 50	
	Job No: 61926 Client: Mineral Resources Limited	Page 3 of 3
	Version: A Drawn By: ianandagoda	Date: 07-Apr-2022 Checked By: CT

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

**FIGURE 7 C: FLORA TAXA – DBCA-P4 (SECTION 3 OF HAUL ROAD)**

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**FIGURE 8 A: FLORA TAXA – UNDESCRIBED (SECTION 1 OF HAUL ROAD)**

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<b>Legend</b> Development Envelope Indicative Footprint <b>Flora Taxa</b> <i>Microcorys</i> sp. nov. (Undescribed) <i>Microcorys</i> sp. nov. (Undescribed) <i>Lepidosperma</i> aff. <i>costale</i> (Undescribed) <i>Streptoglossa</i> aff. <i>cylindriceps</i> (Undescribed)	Scale 1:80,000 at A4 	<b>FLORA TAXA – UNDESCRIBED</b>  Page 2 of 3 
	Coord. Sys. GDA2020 MGA Zone 50 	
Job No: 61926 Client: Mineral Resources Limited	Version: A Date: 07-Apr-2022	
Drawn By: ianandagoda Checked By: CT		

File Name: \\008PMPMR004V001\jbsg\_aust\JBS Perth\Projects\1\Open\Mineral Resources\61926 MRL PRIOP Revised Referral Sup Doc\2022 02 17 MRL Revised Fauna Offsets Strategy\GIS\Maps\R01\_Rev\_A\61926\_0x ConSigFlora\_Unclassified\_Pg2.m  
 Image Reference: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

**FIGURE 8 B: FLORA TAXA – UNDESCRIBED (SECTION 2 OF HAUL ROAD)**

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<b>Legend</b> Development Envelope Indicative Footprint <b>Flora Taxa</b> <i>Microcorys</i> sp. nov. (Undescribed) <i>Microcorys</i> sp. nov. (Undescribed) <i>Lepidosperma</i> aff. <i>costale</i> (Undescribed) <i>Streptoglossa</i> aff. <i>cylindriceps</i> (Undescribed)	Scale 1:80,000 at A4	<b>FLORA TAXA – UNDESCRIBED</b>
	Coord. Sys. GDA2020 MGA Zone 50	
	Job No: 61926	Page 3 of 3
	Client: Mineral Resources Limited	
Version: A	Date: 07-Apr-2022	
Drawn By: ianandagoda	Checked By: CT	

File Name: \\008PMPMR004V001\jbsg.aust\JBS Perth\Projects\1\Open\Mineral Resources\61926 MRL PRIOP Revised Referral Sup Doc\2022 02 17 MRL Revised Fauna Offsets Strategy\GIS\Maps\R01\_Rev\_A\61926\_0x ConSigFlora\_Unclassified\_Pg3.m  
 Image Reference: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

**FIGURE 8 C: FLORA TAXA – UNDESCRIBED (SECTION 3 OF HAUL ROAD)**

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### 2.3.4 Key Assumptions and Uncertainties

The SFCMP and associated management actions have been based on survey and study findings and Revised Proposal specific impacts. The key assumptions include:

- The field surveys (Phoenix 2022a, 2022b), undertaken by suitably qualified individuals with experience in flora likely to be encountered, provide sufficient information to confirm the presence and abundance of significant flora with the potential to occur within the area of the Revised Proposal and surrounds;
- Flora surveys were completed in compliance with Environmental Protection Authority (EPA) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a);
- Dust deposition on plant foliage may impact on the health of priority species as a result of construction activities, and is unlikely to be an ongoing operational impact due to sealing of haul road; and
- Unauthorised access to areas of uncleared vegetation will be limited as sections of the haul road will be private.

### 2.3.5 Management Actions Approach

The Revised Proposal will have a mine life of approximately six years with priority use of existing disturbed areas with a short construction period. Management and mitigation measures have been designed for the proposed construction period of approximately six months and any future construction activities. Operation of the haul road is not expected to impact flora and vegetation due to design and sealing of the road with bitumen to minimise dust emissions.

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

The potential environmental effects of the Revised Proposal on significant flora and vegetation will be managed through implementation of the mitigation hierarchy:

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

#### 2.3.5.1 Avoid

As described above, flora surveys of the area of the Revised Proposal and surrounds were completed in March 2021. Based on data obtained from the surveys, the Proposal has undergone a number of design changes to avoid significant flora taxa. As a result, the direct impact to flora species is as low as reasonably practical.

### **2.3.5.2 Minimise**

Dust management measures will be implemented during construction, including appropriate application of water for dust suppression. Sealing the haul road with bitumen will minimise dust emissions following construction. The haul road has been appropriately designed to minimise impediments to surface water flow or erosion.

### **2.3.5.3 Remediate**

The post-closure land use of the Revised Proposal is to be confirmed, however if the haul road cannot be transferred to the local or state government for ongoing use, the area will be rehabilitated.

### **2.3.5.4 Offsets**

Given no significant residual impacts to Flora and Vegetation from implementation of the Revised Proposal are expected, no offsets are proposed.

## **2.3.6 Rationale for Choice of Provisions**

This SFCMP applies objective-based management actions rather than outcome-based provisions as significant flora taxa, as an ecological factor, can be difficult to objectively measure.

Objectives-based management actions will be implemented to prevent indirect impacts and to manage direct impacts from vegetation clearing. The management actions focus on all key project construction activities identified as potentially having a medium or higher risk on significant flora and vegetation (Appendix B).

To note, rehabilitation of the area of the Revised Proposal is outside of the scope of this SFCMP. The *Mining Act 1978 (WA)* is the primary legislation which controls rehabilitation activities for mining operations. Rehabilitation activities for the area of the Revised Proposal will be detailed in Mineral Resources' Mine Closure Plan.

### **3. SFCMP COMPONENTS**

This section identifies the objective-based management actions that Mineral Resources will implement to ensure protection of significant flora and vegetation. Objectives, management actions, targets and monitoring has been developed based on a risk-based approach as shown in Appendix B.

#### **3.1 ENVIRONMENTAL OBJECTIVE**

The objective of this SFCMP is to ensure the Revised Proposal construction actions are managed to minimise impacts to significant flora species and communities, such that the EPA objective for Flora and Vegetation is met.

#### **3.2 MANAGEMENT ACTIONS**

Revised Proposal specific management actions have been identified to address potential impacts identified for significant flora and vegetation. The management actions focus on all key project construction activities identified as having a medium or higher risk to significant vegetation and flora, as determined by the risk assessment included in Appendix B.

Potential impacts from altered fire and surface water regimes and spillage of hydrocarbons are considered low risk and are therefore not considered further in this SFCMP.

#### **3.3 MANAGEMENT TARGETS**

Measurable management targets have been developed to assess the success of implementation of the management actions once construction is completed. If management targets are met, then it is expected (based on key assumptions and uncertainties) that any impacts to significant flora have been minimised and the management objectives for Flora and Vegetation will be achieved.

#### **3.4 OBJECTIVE-BASED SFCMP**

The objective-based management actions and targets are outlined in Table 6.

**TABLE 6: FLORA AND VEGETATION OBJECTIVE-BASED SFCMP**

Purpose of SFCMP:

Provide monitoring and management actions for potential impacts on conservation significant flora taxa and vegetation within the Proposal DE and surrounds.

Rationale:

<b>EPA FACTOR AND OBJECTIVE:</b>
Flora and Vegetation - "To protect flora and vegetation so that biological diversity and ecological integrity are maintained."
<b>Management Objective:</b> To minimise the potential environmental effect of the Revised Proposal to conservation significant flora species and communities
<b>Key Environmental Values:</b> The following conservation significant flora and vegetation values have been recorded within the Revised Proposal DE and surrounds: <ul style="list-style-type: none"> <li>• DBCA-classified 'priority' flora taxa; and</li> <li>• DBCA-classified 'priority' ecological community</li> </ul>
<b>Key impacts and risks:</b> <ul style="list-style-type: none"> <li>• Clearing of native vegetation (including DBCA-classified 'priority' flora taxa and DBCA-classified 'priority' ecological community);</li> <li>• Potential for construction vehicles and associated earthworks to lead to the introduction and/or spread of introduced flora taxa (weeds); and</li> <li>• Potential for construction vehicles and associated earthworks to generate dust emissions that result in reduced vegetation health.</li> </ul>

NO.	MANAGEMENT TARGETS	MANAGEMENT ACTIONS	MONITORING	TIMING	REPORTING
1	All site personnel to complete a site induction which includes specific information on the conservation significant flora present, and avoidance/management actions.	Environmental induction of site personnel.	Environmental Compliance Inspections	Site induction prior to commencing works (first day) Environmental education ongoing (as required, e.g. toolbox meetings)	Compliance Annual Report (CAR)
2	Planning and construction of the Revised Proposal uses accurate flora and vegetation information during implementation of the Revised Proposal to minimize impacts.	Maintain accurate records of the locations of conservation significant flora taxa and vegetation to inform the planning and construction of the Revised Proposal.	Environmental Compliance Inspections	Planning and Construction	CAR

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NO.	MANAGEMENT TARGETS	MANAGEMENT ACTIONS	MONITORING	TIMING	REPORTING
3	<p>No native vegetation clearing beyond the approved clearing area.</p> <p>Demarcation of clearing areas.</p> <p>100% compliance with Site Disturbance Permit and Land Clearing Procedures</p>	<p>Native vegetation clearing to be limited to within the approved clearing areas through implementation of infrastructure field survey (including clearing demarcation) and adherence to Site Disturbance Permit and Land Clearing Procedures.</p> <p>Effective rehabilitation has also been achieved through topsoil and vegetation that has been comingled and stockpiled.</p> <p>Haul road to be appropriately designed to minimize ongoing erosion:</p> <ul style="list-style-type: none"> <li>• Re-profile ground with drains and culverts installed as required</li> <li>• Import, place and compact general fill material to sub-grade level</li> <li>• Import, place, compact and final trim of road base pavement material</li> <li>• Installation of bitumen seal</li> </ul>	<p>Environmental Compliance Inspections – Clearing</p> <p>Audit of approved Internal Clearing Permits granted against surveyed clearing area.</p> <p>Clearing inspection to ensure compliance against Internal Clearing Permit:</p> <ul style="list-style-type: none"> <li>• Demarcation of areas</li> <li>• Post-clearing survey pick up</li> <li>• Haul road construction is as per approved design</li> </ul>	<p>Construction (Land clearing)</p>	<p>CAR</p>
4	<p>Compliance with weed hygiene procedures including completion of a weed hygiene certificate for all vehicles/machinery</p> <p>No new weed species introduced through construction activities.</p> <p>No increase in introduced flora extent following construction activities</p>	<p>Control introduced flora taxa through:</p> <ul style="list-style-type: none"> <li>• Identify the extent and distribution of introduced flora taxa within the area of the Revised Proposal prior and post construction activities.</li> <li>• Maintain introduced flora taxa locations in GIS database</li> <li>• Control known locations of introduced flora taxa (e.g. chemical spray) to minimise potential spread.</li> <li>• Implement vehicle hygiene procedures for the inspection and cleaning of vehicles, machinery and equipment entering the area of the Revised Proposal.</li> <li>• Introduced flora inspections of imported fill material, which will be sourced from introduced flora-free locations</li> </ul>	<p>Environmental Compliance Inspections – Introduced Flora</p> <p>Inspection of construction area prior to construction to confirm introduced flora locations.</p> <p>Inspection of construction area to identify locations of introduced flora to inform control programs and measure control program outcomes</p>	<p>Construction</p>	<p>CAR</p>

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NO.	MANAGEMENT TARGETS	MANAGEMENT ACTIONS	MONITORING	TIMING	REPORTING
		<ul style="list-style-type: none"> <li>• Periodic inspection of areas susceptible to infestation by introduced flora (e.g. disturbed lands, topsoil/subsoil stockpiles)</li> <li>• Separately stockpiling topsoil/subsoil from areas known to contain introduced flora (from other topsoil/subsoil stockpiles).</li> <li>• Topsoil stockpiles to be managed to minimise weed infestations and maintain viability of seed stock</li> </ul>			
5	Emissions of dust are minimised and controlled to an acceptable level, without detrimental effects to native flora and vegetation adjacent to the Proposal.	Control emissions of dust through: <ul style="list-style-type: none"> <li>• Minimise the extent of open cleared areas prone to dust lift by wind, where practicable.</li> <li>• Installation of bitumen along haul road to minimise dust emissions</li> <li>• Minimise of land clearing activities during windy conditions.</li> <li>• Restrict vehicle speeds to 40 km/hr along gravel/unsealed roads to minimise dust generation, where practical.</li> <li>• Dampen open cleared areas using water carts (sprays) to minimise dust generation. A full time water cart will be used by construction team(s).</li> </ul>	Environmental Compliance Inspections – Dust  Inspection of construction area to visually observe dust emissions and undertake vegetation health inspections	Construction	CAR

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### 3.5 MONITORING

This section also identifies monitoring measures to be implemented to measure progress against management targets and relevant record keeping/reporting requirements for each management action.

Construction of the entire haul road will be completed within 6 months, with a duration of one week to complete approximately 3 km. As a result of the construction timeframe for each section of the road being limited, there is a low likelihood of indirect impacts to significant flora and vegetation during the construction phase. Mineral Resources will complete ongoing monitoring of clearing register for compliance to approvals, and subsequent direct impacts to priority flora from clearing activities. Additionally, the monitoring program will include ongoing monitoring for introduced flora to inform control programs and measure the success of the control programs. The monitoring required is summarised in Table 7.

**TABLE 7: FLORA MONITORING ACTION SUMMARY**

MANAGEMENT TARGET	MONITORING EVENT	MONITORING ACTION	FREQUENCY	RECORDS	RESPONSIBILITY
All site personnel to complete a site induction which includes specific information on the conservation significant flora present, and avoidance/management actions.	Environmental Compliance Inspections	Review of site induction records to confirm: <ul style="list-style-type: none"> <li>• all personnel have completed inductions</li> <li>• induction contains information on significant flora and vegetation values</li> </ul>	Monthly during construction.	Site induction records to be maintained by Mineral Resources.	Mineral Resources Environmental Advisor
Planning and construction of the Proposal uses accurate flora and vegetation information during implementation of the Revised Proposal.	Environmental Compliance Inspections	Monitoring of clearing register and internal clearing permits to confirm: <ul style="list-style-type: none"> <li>• Internal Clearing Permits review current flora and vegetation locations</li> </ul>	Monthly during construction.	Flora and vegetation survey results to be maintained by Mineral Resources Environmental Advisor.	Mineral Resources Environmental Advisor
No native vegetation clearing beyond the approved clearing area. Demarcation of clearing areas. 100% compliance with Site Disturbance Permit and Land Clearing Procedures	Environmental Compliance Inspections - Clearing	Audit of approved Internal Clearing Permits granted against surveyed clearing area. Clearing inspection to ensure compliance against Internal Clearing Permit: <ul style="list-style-type: none"> <li>• Demarcation of areas</li> <li>• Post-clearing survey pick up</li> <li>• Haul road construction is as per approved design</li> </ul>	One month following construction activities. Weekly during construction.	Approved Internal Clearing Permit authorisation records to be maintained by Mineral Resources Environmental Advisor.	Mineral Resources Environmental Advisor

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MANAGEMENT TARGET	MONITORING EVENT	MONITORING ACTION	FREQUENCY	RECORDS	RESPONSIBILITY
<p>Compliance with weed hygiene procedures including completion of a weed hygiene certificate for all vehicles/machinery</p> <p>No new weed species introduced through construction activities.</p> <p>No increase in introduced flora extent following construction activities</p>	<p>Environmental Compliance Inspections – Introduced Flora</p>	<p>Inspection of construction area prior to construction to confirm introduced flora locations.</p> <p>Inspection of construction area to identify locations of introduced flora to inform control programs and measure control program outcomes.</p>	<p>One month prior to construction.</p> <p>Weekly during construction then one month following construction (until Management Target met)</p>	<p>Introduced flora survey results to be maintained by Mineral Resources Environmental Advisor.</p> <p>Hygiene inspection documentation (for vehicles, machinery and equipment) to be maintained by Mineral Resources Environmental Advisor.</p>	<p>Mineral Resources Environmental Advisor</p>
<p>Emissions of dust are minimised and controlled to an acceptable level, without detrimental effects to native flora and vegetation adjacent to the Proposal.</p>	<p>Environmental Compliance Inspections - Dust</p>	<p>Inspection of construction area to visually observe dust emissions and undertake vegetation health inspections</p>	<p>Weekly during construction and one month prior and post construction activities</p>	<p>Visual observation inspection records to be maintained by Mineral Resources Environmental Advisor.</p>	<p>Mineral Resources Environmental Advisor</p>

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### **3.6 REPORTING**

Compliance with this SFCMP will be reported to the CEO of DWER in the annual Compliance Assessment Report (CAR) as conditioned in the Ministerial Approval Statement under s45(5) of EP Act.

Should Management Targets not be met within one month following cessation of construction activities, the CEO of DWER shall be notified within seven days. The report will include any impacts to significant flora and vegetation and an investigation will be undertaken.

## 4. ADAPTIVE MANAGEMENT AND REVIEW

### 4.1 REVIEW

Adaptive management practices based upon learnings gained from the Management Actions and Monitoring will be adopted where changed management practices may lead towards more effective environmental outcomes. The adaptive management approach may include:

- Annual evaluation against targets;
- Review of Management Actions as the Proposal implementation progresses and/or new measures/technologies become available; and
- Amendment to Monitoring programme.

This SFCMP will be reviewed and updated by Mineral Resources (if required) if additional construction activities are required. Any significant changes to this SFCMP will be referred to the CEO DWER for approval prior to implementation of such changes.

## 5. STAKEHOLDER CONSULTATION

Consultation has been undertaken with decision-making authorities including relevant non-government organisations during the preparation of the environmental impact assessment. A summary of the consultation is provided in Table 8.

Stakeholder consultation will be undertaken with DBCA as the SFCMP is implemented and it is therefore likely that revisions will be made to the SFCMP if further guidance is provided by these stakeholders.

**TABLE 8: STAKEHOLDER CONSULTATION**

DATE	TYPE	STAKEHOLDER	ATTENDEES	PURPOSE AND ITEMS DISCUSSED	MATTERS RAISED	PROPONENT RESPONSE / OUTCOME
28-10-2019	Email	DPIRD	DPIRD - Craig Robins	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys. Access to Emu Proof Fence Rd where access restricted.	No issues raised.	Permit granted for access 13-23 November. Further consent to extended field survey timeframes required.
29-10-2019	Email	Dusky Holdings & Lithos Exploration Services	Dusky Holdings & Lithos Exploration Services	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys.	No issues raised.	N/A
29-10-2019	Email	Tianye Sxo Gold Mining	Tianye Sxo Gold Mining	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys.	No issues raised.	Request for tenement expenditure.
29-10-2019	Email	Hurricane Prospecting	Vernon Strange	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys.	No issues raised.	N/A
29-10-2019	Email	Hurricane Prospecting	Vernon Strange	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys.	No issues raised.	N/A
22-11-2019	Email	DBCA	DBCA - Lindsay Bourke, Murray Baker, Michelle Corbellini, Nicholoas Woolfrey EPA - Robert Hughes Mineral Resources - Les Purves, Neil Smith	Response to email regarding potential land acquisition where DBCA have an interest in land for restoration and conservation.	No issues raised.	DBCA to provide list of potential freehold land parcels that have been identified through desktop assessment as having suitable characteristics (e.g. suitable area, proximity to other reserves, representation of poorly reserved vegetation types, or threatened flora and fauna) for addition to the conservation estate.
06-12-2019	Email	DBCA	DBCA - Lindsay Bourke, Nicholas Woolfrey EPA - Robert Hughes Mineral Resources - Neil Smith	Response to email regarding potential land acquisition where DBCA have an interest in land for restoration and conservation.	No issues raised.	DBCA to provided list of potential freehold land parcels that have been identified through desktop assessment as having suitable characteristics (e.g. suitable area, proximity to other reserves, representation of poorly reserved vegetation types, or threatened flora and fauna) for addition to the conservation estate.
07-07-2020	Various Emails	Tenement holders	Hurricane Prospecting Pty Ltd Vernon Strange Tianye Sxo Gold Mining Pty Ltd Barto Gold Mining Pty Ltd Black Dragon Energy (Aus) Pty Ltd Dusky Holdings Pty Ltd Thomas Corr	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys.	No issues raised.	Access granted by underlying tenement holders.

DATE	TYPE	STAKEHOLDER	ATTENDEES	PURPOSE AND ITEMS DISCUSSED	MATTERS RAISED	PROPONENT RESPONSE / OUTCOME
17/28-09-2020	Various Emails	Tenement holders	Aurenne Parker Range Pty Ltd Hurricane Prospecting Pty Ltd Vernon Strange Tianye Sxo Gold Mining Pty Ltd Barto Gold Mining Pty Ltd Black Dragon Energy (Aus) Pty Ltd Bullseye Mining Dusky Holdings Pty Ltd Thomas Corr	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys.	No issues raised.	Access granted by underlying tenement holders.
09-10-2020	Teams Meeting	Shire of Yilgarn	Shire - Peter Clarke, Rob Bosenberg	Parker Range road realignment Rodgers Road temporary road option Extent of disturbance to upgrade Emu Fence Road to proposed RAV rating	Shire confirmed that proposed upgrades to Emu Fence Road will require a NVCP to clear previously undisturbed vegetation. Shire has no capacity to clear to the extent required to complete all upgrades.	Shire supports Parker Range road realignment and Rodgers Road temporary road option NVCP will be progressed.
23-10-2020	Teams Meeting	EPA	EPA - Robert Hughes, Natalie McAlpine Various Mineral Resources representatives	Pre-referral meeting: Introduction of private haul road option. Upgrades to Emu Fence Rd (Sth of GE Hwy) still proposed - NVCP to be submitted by Shire. Provided indication of environmental impacts. Proposed changes to conditions: removal of original proposal upper haul rd; update of fauna conditions (species updates); PRCT removal; removal of trenching and air quality conditions	No major issues identified with proposed changes to conditions through re-referral process. Offset conditions likely to require review given the additional impacts of the proposal. Adequate stakeholder engagement will be required, particularly DAWE in relation to the EPBC statement and MNES. Flora/Fauna report & datasets to be referred to TEB who would provide advice on assessment level (i.e. Mineral Resources hopeful that ARI will be adequate). Referral form to be submitted with flora/fauna report and datasets. EPA highlighted resourcing issues in the department. Approval timeframes 6-8mths review and EPA report + 2 months for ministerial statement to be issued.	Mineral Resources to provide flora and fauna data for EPA/TEB review. Mineral Resources/EPA to investigate options to support resourcing deficiencies - EPA to report back whether Mineral Resources could support additional resources in the EPA to focus on Mineral Resources proposals.
10-11-2020	Teams Meeting	DWER-EPA	EPA - Anthony Sutton, Natalie McAlpine, Troy Sinclair JBS&G - Kane Moyle Various Mineral Resources representatives	Proposed haulage route to include upgrades to Emu Fence Rd. Studies completed and initial assessment of environmental values to be impacted. Approvals strategy.	EPA advised that NVCP will not be an acceptable approval process for associated clearing and impacts. MS 892 assessed a haul road so amendment under a new referral likely to be required for new alignment.	Update of approvals strategy to be determined and communicated to EPA for acceptance.
20-11-2020	Teams Meeting	Shire of Yilgarn	Shire - Peter Clarke, Rob Bosenberg Various Mineral Resources representatives	Negotiations with various tenement holders ongoing to enable construction of the Parker Range diversion rd. Introduction of private haul road option. Upgrades to Emu Fence Rd (Sth of GE Hwy) still proposed - NVCP to be submitted by Shire prepared by Mineral Resources Interim solution utilising GE Hwy & Mt Walton Rd to Carina presented. Rodgers Rd option lower priority.	No issues raised.	Mineral Resources to present NVCP application to Shire once drafted. Mineral Resources to present designs of private haul rd to Shire at next meeting.

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23-11-2020	Teams Meeting	EPA	EPA - Robert Hughes, Natalie McAlpine Various Mineral Resources representatives	Pre-referral meeting: Introduction of private haul road option. Upgrades to Emu Fence Rd (Sth of GE Hwy) still proposed - NVCP to be submitted by Shire. Provided indication of environmental impacts. Proposed changes to conditions: removal of original proposal upper haul rd; update of fauna conditions (species updates); PRCT removal; removal of trenching and air quality conditions	No major issues identified with proposed changes to conditions through re-referral process. Offset conditions likely to require review given the additional impacts of the proposal. Adequate stakeholder engagement will be required, particularly DAWE in relation to the EPBC statement and MNES. Flora/Fauna report & datasets to be referred to TEB who would provide advice on assessment level (i.e. Mineral Resources hopeful that ARI will be adequate). Referral form to be submitted with flora/fauna report and datasets. EPA highlighted resourcing issues in the department. Approval timeframes 6-8mths review and EPA report + 2 months for ministerial statement to be issued.	Mineral Resources to provide flora and fauna data for EPA/TEB review. Mineral Resources /EPA to investigate options to support resourcing deficiencies - EPA to report back whether Mineral Resources could support additional resources in the EPA to focus on Mineral Resources proposals.
23-11-2020	Teams Meeting	DPIRD	DPIRD - Craig Robbins Various Mineral Resources representatives	Introduction of private haul road option. Upgrades to Emu Fence Rd (Sth of GE Hwy) still proposed - NVCP to be submitted by Shire. Provided indication of environmental impacts. Provided context of proximity of fence to private road footprint.	Only concerns with proposed private option is the potential impacts of surface water on fence and the positioning of the fence in the longer term (i.e. post Mineral Resources use of road - closure assumptions). DPIRD may be able to provide some suggestions for fence crossings to reduce breaks in fence.	Mineral Resources to confirm private road designs and arrange face to face meeting with DPIRD to go through designs.
11-12-2020	Meeting (DPIRD Offices)	DPIRD	DPIRD - Craig Robbins Mineral Resources - Phil Slater	Provide DPIRD an opportunity to review the proposed haul road layout and provide comment.	Fence line alignment to ensure no corners are created which would impede animals easily following the fence line corridor. Adequate access track either side of the fence to be maintained for fence maintenance. Erosion of the fence from surface water flows is DPIRD's main concern. DPIRD identified that there may be alternatives to cattle grid crossings that DPIRD would like MRL to look at trialling	Design will include appropriate access tracks either side of fence (ideally 10m either side of fence) where possible. Enlarged table drains will be utilised to limit the need for run off (swale) drains - designs will be revised accordingly. Further information on cattle grid alternatives to be provided by DPIRD.
18-01-2021	Meeting - EPA Office	EPA	EPA - Robert Hughes, Natalie McAlpine Various Mineral Resources representatives	Private Haul Road project definition Approval pathway - revised proposal where existing minesite impacts do not form part of the referral - assessed as ARI Confirmation of expected impacts of revised proposal and their significance. Requirement for Offsets and strategy. Deferral of implementation of offsets for original proposal in light of new offset requirements - potential removal of PRCT conditions from MS892. Greenhouse Gas Assessment	EPA confirmed s38 referral and mine does not form part of the assessment. 4 week TEB review to confirm adequacy of survey effort as per EPA guidance. 12 week EPA assessment period following public consultation period and advice from other DMA's Mineral Resources to meet with EPA Chair/Dept Chair to present approvals strategy, significance assessment and offsets. Requirement for at least two weeks public comment for ARI if being assessed under EPBC Act bilateral agreement Mineral Resources encouraged to demonstrate in ERD how impacts are avoided and minimised for priority species. New species ( <i>Microcorys</i> ) impacts need to be mitigated as much as possible. EPA tends to treat impacts like Threatened	Mineral Resources to arrange meeting with EPA Chair/Dept Chair

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					<p>species until information is known about extent of population. DAWE will be most interested in impacts to breeding and foraging habitat and not just potential impacts to individuals. EPA confirmed that an offset based on habitat was simpler than justifying impact to individuals. Consider the potential for fauna crossings in critical habitat areas Approach for dealing with PRCT separate to the revised proposal was supported. Robert recommended Mineral Resources write to the Department at the time of the revised proposal submission to request an extension from the CEO to constitute the PRCT in-light of the revised proposal and opportunity to align offsets at the completion of this assessment. Section 46 the right approach to amend offset conditions to make consistent between both proposals. Assessment approach on GHG emissions was confirmed. Not a key environmental factor, but will need to be considered in ERD. Mineral Resources to provide advice on any temporal change in emissions</p>	
10-02-2021	Teams Meeting	DAWE	DAWE - Leo Pure, Matthew Kuntsi, Rebecca Baumgartner Mineral Resources- Les Purves, Neil Smith, Adam Parker Strategen - Kane Moyle (Strategen)	<p>Private Haul Road project definition Approval pathway - revised proposal where existing minesite impacts do not form part of the referral - assessed as ARI Confirmation of expected impacts of revised proposal and their significance. Requirement for Offsets and strategy.</p>	<p>Confirmation that SBF is not causing an impediment to movement of Chuditch and Malleefowl with records found on both sides of SBF. MK - potential for the requirement for speed restrictions for areas where active Malleefowl mounds or Chuditch dens are identified. MK – confirmed that DAWE would be looking for the block to be vested and managed by DBCA, rather than any clear guidance on the level of conservation status, i.e. requirement for Class A reserve or the like. MK – Assessment timeframes appeared tight but achievable provided the supporting information was adequate for assessment.</p>	DAWE to review the details of the Covalent Lithium Edna May operation that had similar MNES identified to provide detail on the use of the habitat scoring methodology used in the offsets calculations.
16-04-2021	Meeting	DBCA	DBCA - Lindsay Bourke, Cassyanna Gray, David Jolliffe Mineral Resources - Neil Smith, Susanna Beech, Andy Williams	<p>Provide update to DBCA of extension of haul road (12kms) to Koolyanobbing Implications of identification of ABAB host ant colony</p>	<p>1. AW – confirmed that the host ant surveys completed to date are expected to be adequate based on previous experience of Rod Eastwood. 2. AW – confirmed that the survey methodology proposed for detecting the ABAB in Sept-Oct was appropriate. While the ABAB could be detected year round, the primary flight period is Spring, secondary in Autumn, and that warm weather generally triggers ABAB flight. 3. AW - confirmed that any host ant colony should be considered significant due to the low number of known sites. 4. AW – absence of the ABAB at a host ant colony does not discount the significance of the colony. ABAB are transient and may not</p>	Mineral Resources to arrange separate meeting to discuss the process of transfer of proposed offset site to DBCA (conservation mechanism, management liabilities etc.

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					<p>lay eggs at a particular colony every year but may in the future. 'No ant colony, no ABAB'.</p> <p>5. AW – advised that it may be possible to find the larvae prior to the flight period (Sept-Oct). Noted that larvae have been found previously with a preference to the eastern facing slopes of the ant mound (morning sun).</p> <p>6. AW – did not confirm what percentage loss of an identified host ant colony/ABAB population would be considered acceptable within a single population but confirmed that habitat fragmentation and increased risk of vehicle strike depending on the positioning of the haul road would need to be taken into consideration.</p> <p>7. AW – Requested further time to review technical information related to the Barbalin site and the potential expansion of the host ant population to expand over time at this site to determine what an appropriate buffer distance would be. Suggested ~200m. Confirmed that the approximate territorial distance of the male ABAB was ~25m and that female ABAB tend to lay the majority of their eggs within the extent of the ant colony but may keep a smaller amount of eggs and search for new ant colonies for egg laying. AW did confirm however that it was likely that most females would die without reaching a different colony and laying eggs. Main ABAB flying period was 9:30am – 3:30pm.</p> <p>8. AW- suggested that the short mine life (5 years) would allow the proponent to be less cautious about project impacts. Consideration would need to be given to post mining land use for the road, i.e. remain a regional asset managed by the Shire or rehabilitated. SB noted that vehicle frequency would be greatly reduced following the cessation of mining operations.</p> <p>9. LB – suggested a separate meeting/discussion related to the offset site, conservation mechanism/transfer to DBCA, management liabilities etc.</p> <p>10. LB – advised that DBCA would like to inspect Lot 1416 to confirm ongoing management liabilities prior to transfer.</p> <p>11. LB - subdivision of the arable farmland from Lot 1416 should consider provision of a firebreak, 5m from the vegetation, and appropriate fencing should the arable section be utilised for grazing.</p>	

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DATE	TYPE	STAKEHOLDER	ATTENDEES	PURPOSE AND ITEMS DISCUSSED	MATTERS RAISED	PROPONENT RESPONSE / OUTCOME
21-04-2021	Meeting	NGO's 1. National Malleefowl Recovery Team 2. Wildflower Society 3. Wilderness Society 4. Birdlife WA	Mineral Resources - Neil Smith, Dan Baker, Adam Parker NMFRT - Liz Kington Wildflower Society - Brian Moyle Birdlife WA - Alasdair Bulloch, Mark Henryon Wilderness Society - Pat Gardner	Stakeholder update on the proposed PRIOP Private Haul Road to Koolyanobbing.	<p>General objection expressed to any further development in the Temperate Forrest (supports 30% of all Australian birdlife, 214 species)</p> <p>Interested in the actual consultants Mineral Resources used for baseline studies.</p> <p>A lot of interest around offsets. Very sceptical on the preservation of blocks for direct offset. Mineral Resources were only complying with the directions / policies of Federal &amp; State Governments. Their view was disturbance in these blocks was unlikely to be approved by regulators anyway. Requested the name of the Farmer for lot 1416. Mention of Helena Aurora and the land vesting around offsets. Mineral Resources confirmed they are working with DMIRS and DCBA in regard the appropriate vesting to manage the offset. Clear preference raised by NGO's for rehabilitation over offset, cynicism over DCBA ability to manage offset blocks due to variability in funding.</p> <p>They requested an update on the <i>Isopogon Robustus</i> at Parker Range mine. This was responded to at the meeting.</p> <p>Concern was expressed over the need for duplication of roads and the life of the asset (~5years) - equating to further removal of native vegetation. Safety issues around transport were explained.</p> <p>They questioned Mineral Resources decision for transporting ROM rather than processed product expressing ~20% reduction in transport efficiency between the two products.</p> <p>There was disappointment that the mining of Parker Range was approved and stating this range will now be lost forever.</p> <p>Discussion on the Azure Butterfly potential habitat and Mineral Resources avoiding this by diverting the haul road. The suggestion that a 200m buffer may not be enough due to vibration impacts. Mineral Resources had taken advice on this from experts.</p> <p>Issue of special deal Mineral Resources were given in regard to concession on Royalties and they hoped this ore would attract the full Tax and royalty rates. Indicated this wasn't something we could comment on.</p>	Mineral Resources to provide update on status of the previous Community Consultative Group as haven't met for some time. Mineral Resources to provide copies of the presentation to attendees.

DATE	TYPE	STAKEHOLDER	ATTENDEES	PURPOSE AND ITEMS DISCUSSED	MATTERS RAISED	PROPONENT RESPONSE / OUTCOME
25/26-05-2021	On site meeting	DAWE	DAWE - Vaughn Cox, Kara De Fey, Hannah Mineral Resources - Neil Smith, Adam Parker	Field visit to Lot 451 and Lot 1416 offset locations	<p>Lot 1416 DAWE will complete an assessment of the habitat scoring methodology and the offset calculator to determine suitability of the direct offset requirements. This should be provided as soon as possible to enable discussions/negotiation on calculations etc. Lot appears to provide suitable habitat for both Malleefowl and Chuditch. It will be important to define what management actions will be implemented improve the habitat quality of the lot. Monitoring programs (camera trapping etc.) will be crucial to determining the presence of species. Not concerned about access track running down the centre of the lot. Could act as an important fire break/access track for management activities. The issue raised about requirement for uplift (encouraging the habitation of MNES and achieving the offset objective. What would happen in the event of fire within the timeframes associated with the offset?</p> <p>Lot 451 Detail will need to be provided in the OMP as to restoration/rehabilitation activities to be completed between the vegetated areas of the lot. Time to reach completion criteria will need consideration. Unlikely that it will be possible to fully rehab are return arable farming land to representative vegetation within the life of the approval - need to be careful about the selection of completion criteria/timeframes. Consideration should be given to linking Lot 451 to the GWW to the south (further rehabilitation) to encourage fauna movement to lot 451 from the surrounding areas. Further Malleefowl surveys in the adjacent GWW could be beneficial to determining their presence within the surrounding area and potential for return into Lot 451.</p>	N/A

DATE	TYPE	STAKEHOLDER	ATTENDEES	PURPOSE AND ITEMS DISCUSSED	MATTERS RAISED	PROPONENT RESPONSE / OUTCOME
02-06-2021	Teams Meeting	DBCA	DBCA - David Jolliffe, Lindsay Bourke Mineral Resources - Adam Parker, Neil Smith, Les Purves	Update on lot 1416 and the flora / fauna values and the meeting with DAWE	No issues raised.	DBCA to visit the lot on 16 June and provide a response to Mineral Resources a few weeks later - formal response through their DG DBCA confirmed the requirement for fire breaks and would provide further advice as it relates to subdivision following the June inspection. DBCA will investigate requirements for an easement or agreement with neighbouring pastoralist regarding maintaining access through Lot 1416 along existing track. DBCA will allow access for monitoring and controls once land transferred. DBCA confirmed that there are currently no feral animal baiting programs over lot 1416 or the adjoining reserves. Given the fauna values that have now been identified (evidence of Malleefowl and Chuditch) there may be potential for this area to be included in regional baiting programs - DBCA to investigate. If Mineral Resources push for lot1416 to be classified as Class A reserve - DBCA preferred position. Lindsay Bourke (DBCA) to provide advice on an option to do a direct transfer to DBCA at time titles created rather than Mineral Resources hold then transfer after the reserve created. Mineral Resources to provide shapefiles from the Phoenix surveys to DBCA ahead of the site visit 16 June.
23-06-2021	Face to face meeting	Wheatbelt Development Commission	Mineral Resources - Glenn Dovaston, Daniel Barker WDC - Grant Arthur	Update on Yilgarn Operations.	A possible 'native seed harvesting' program to help bolster the availability of seedlings to meet the future needs of mining rehabilitation.	Not overly interested in seeking Mineral Resources commitment to anything - main focus remains on agriculture.
07-10-2021	Email	EPA	Mineral Resources - Adam Parker, Neil Smith EPA - Natalie McAlpine, Robert Hughes	Update on Mineral Resources actions in response to the RFI associated with assessment 2297 and seek advice on how Mineral Resources would progress this in relation to proposed changes. After this formal RFI, Mineral Resources have reviewed the scope of the Parker Range Haul Road based on continuing discussion with Shire of Yilgarn and use of the existing Emu Fence Road, south of Great Eastern Highway, with vehicle rating concession. As a result, Mineral Resources would be looking to lodge a formal request to change the proposal, during assessment. Given feedback from the RFI's requesting a revised supporting document to include the supplementary information, it would be our intent to further revise the s38 supporting document to incorporate the revised proposal. We have discussed the change process with DAWE in respect to the EPBC referral and bi-lateral assessment and they have indicated they would reach out to you independently before confirming a process. Mineral Resources would appreciate a discussion about the process ahead of actions to provide an	No issues raised.	Natalie McAlpine responded on 28/10/21. As the EP Act amendments have now been proclaimed (22 October 2021) the transitional arrangements for s. 43A changes to proposal will apply. Please read through the interim and new guidance applying to s.43A prior to submitting the application. The procedures manual has also been updated, which provides further detail on the s.43A process. The s.43A will need to be assessed and approved, prior to continuing with the assessment of the revised proposal. I am happy to have a chat to discuss next steps after the s.43A process.

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				appropriate document to progress assessment of this revised proposal as this has the potential to significantly change some aspects of the proposal specifically around clearing and offsets. Mineral Resources would welcome any opportunity to discuss, including the status of the current assessment and what these proposed changes would mean.		
22-10-2021	Teams Meeting	DAWE	DAWE - Arwen Tilney Mineral Resources - Adam Parker, Neil Smith	Advise DAWE of the proposed changes to the referral, i.e. reduced extent of haul road and utilisation of public roads for a component of the haulage solution	DAWE confirmed application under s.156A would be required. DAWE would communicate with DWER-EPAS to confirm the requirements under the accredited assessment process.	Application under s. 156A of EPBC Act to be submitted to DAWE
28-10-2021	Email	DWER	DWER - Natalie McAlpine, Robert Hughes	Advise DWER of the proposed changes to the referral, i.e. reduced extent of haul road and utilisation of public roads for a component of the haulage solution	DWER confirmed s. 43A changes to proposal will apply. The s.43A will need to be assessed and approved, prior to continuing with the assessment of the revised proposal.	Mineral Resources to submit a s. 43A application in accordance with updated guidance.
01-11-2021	Face to face meeting	DPIRD	Mineral Resources- Daniel Barker, Peter Anderton, Matt Devlin DPIRD - Craig Robins	Meeting to progress the revised Parker Range Haulage Solution.	Craig stressed the importance of retaining enough space for an access track on the East side of the fence (preferably 6m, but could work with 4m in the tight spots).	Craig remains supportive of the proposal, and in particular the revised plan that reduces the impact on the fence to the South of GEH. When sending through our draft agreement, we just need to supply detailed maps/designs that show the locations where the fence will be moved or broken, including detail showing the space allowed for between our road/the fence/the DPIRD reserve boundary. Craig will be recommending that squawker boxes be installed at each location where we are breaking the fence (x3) at an estimated additional cost of \$500 per unit.
26-11-2021	Email	Water Corporation	Mineral Resources - Phil Slater, Silvia Casquillo Water Corp - Perry Beor	Water Corp access track - decommission	Water have a registered maintenance track which was once used to from GEH. Vegetation has built up over the track indicating that the track is no longer used. Mineral Resources have queried if the track can be closed off from GEH where Mineral Resources propose to construct the acceleration lane from Emu Fence Rd.	Water Corp have confirmed the track is no longer required and the acceleration lane can progress as planned.
09-08-2022	Report	DCCEEW EPA DBCA Public	-	Significant Flora Construction Management Plan released with Environmental Review Document for Government and public consultation.	Minor changes required to Significant Flora Construction Management Plan	Mineral Resources has amended the Significant Flora Construction Management Plan to address matters raised in the submissions.

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## **7. APPENDICES**

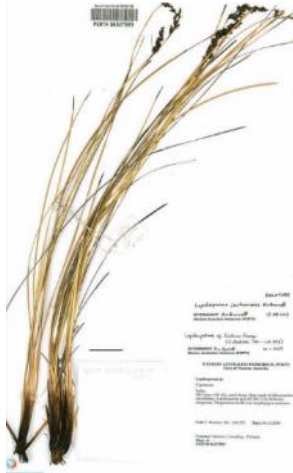

### **Appendix A**

Flora Taxa




### **Appendix B**

Risk Assessment




**APPENDIX A – FLORA TAXA**

FLORA SPECIES	DISTRIBUTION AND ECOLOGY	IMAGE
<p><i>Chamelaucium</i> sp. Parker Range (DBCA-P1)</p>	<p>Known in WA from 12 records. Described as occurring in small numbers or as locally common (WA Herbarium 1998).</p> <p>Within the study area, recorded occurring within vegetation type EpAsEm.</p>	
<p><i>Lepidosperma lyonsii</i> (DBCA-P1)</p>	<p>Known in WA from 48 records (WA Herbarium 1998).</p> <p>Previously recorded in the Eastern Goldfield and Southern Cross subregions in low <i>Eucalyptus</i> woodlands and tall shrublands in pale orange skeletal sandy loam with banded ironstone gravel &amp; rock, well-drained shallow stony loamy with quartz on gentle hill slopes and upper slopes of large hill (WA Herbarium 1998).</p> <p>The species was recorded from within the study area primarily occurring in vegetation type EIIAaaAcHe and occasionally in AsEcm and EpAsEm.</p>	 <p>(Barrett 2007)</p>
<p><i>Lepidosperma</i> sp. Mt Caudan (DBCA-P1)</p>	<p>Known in WA from 5 records (WA Herbarium 1998).</p> <p>Previously recorded in the Avon Wheatbelt P1 subregion in <i>Eucalyptus</i> woodlands in grey/brown sandy loam, with ironstone gravel, on slopes, uplands and breakaways (WA Herbarium 1998).</p> <p>Within the study area, was recorded occurring in vegetation types EcCaLmc and EpAsEm.</p>	 <p>(Botanica Consulting 2010)</p>




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<p><i>Lepidosperma</i> sp. Parker Range (DBCA-P1)</p>	<p>Known in WA from 8 records (WA Herbarium 1998).                  Previously recorded in the Avon Wheatbelt P1, Eastern Goldfield and Southern Cross subregions in Mallee shrublands in brown clay loam on undulating broad rocky hills with banded ironstone formation outcropping (WA Herbarium 1998).                  Within the study area, recorded occurring in vegetation type EIIAh.</p>	 <p>(Botanica Consulting 2010)</p>
<p><i>Stylidium validum</i> (DBCA-P1)</p>	<p>Known in WA from 12 records (WA Herbarium 1998).                  Previously recorded in the Eastern Goldfields and Southern Cross subregions in open <i>Eucalyptus</i> woodlands and shrublands in red-brown sandy loam, red-brown gravelly loam on undulating plains and outcrops (WA Herbarium 1998).                  Species recorded within vegetation type EpAaaTkHe in the study aea.</p>	 <p>(WA Herbarium 1998)</p>
<p><i>Verticordia roei</i> ssp. <i>meiogona</i> (DBCA-P1)</p>	<p>Known in WA from 17 records (WA Herbarium 1998).                  Previously recorded in the Avon Wheatbelt P1 and Southern Cross subregions in low shrublands on yellow sand and sandy loam with gravel on undulating plains and roadside verges (WA Herbarium 1998).                  Species recorded within vegetation type EpAsEm within study area.</p>	 <p>(WA Herbarium 1998)</p>


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<p><i>Westringia acifolia</i> (DBCA-P1)</p>	<p>Known in WA from one record 29 km southwest of Bodallin. Species recorded within vegetation type EpAsDh in the study area.</p>	 <p>(Guerin 2009)</p>
<p><i>Acacia asepala</i> (DBCA-P2)</p>	<p>Known in WA from 17 records (Phoenix 2022a). Described as abundant for a few records (WA Herbarium 1998). Previously recorded in the Southern Cross and Western Mallee subregions in <i>Eucalyptus</i> woodlands on undulating plains, along drainage lines (WA Herbarium 1998). Species recorded within vegetation type EspOm in the study area.</p>	 <p>(WA Herbarium 1998)</p>
<p><i>Acacia concolorans</i> (DBCA-P2)</p>	<p>Known in WA from 18 records. Described as fairly common for a few records (WA Herbarium 1998). Previously recorded in the Avon Wheatbelt P1, Southern Cross and Western Mallee subregions in <i>Eucalyptus</i> woodlands and disturbed areas, in red/brown/grey loam, clay, on Low lateritic hills and flats (WA Herbarium 1998). Species recorded primarily within vegetation types EIIAh, EpAaaTkHe and EtMpfOm in the study area.</p>	



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<p><i>Lissanthe scabra</i> (DBCA-P2)</p>	<p>Known in WA from 12 records (WA Herbarium 1998).</p> <p>Previously recorded in the Avon Wheatbelt P1 and Southern Cross subregions in open <i>Eucalyptus</i> woodlands and open shrublands in dry, white to orange-brown clay, sandy gravel loams and granite on breakaways and uplands (WA Herbarium 1998).</p> <p>Within the study area, recorded primarily occurring in vegetation types Bc and EcAbAe.</p>	 <p><i>Lissanthe scabra</i> Photo: M. Hilgert</p> <p>(WA Herbarium 1998)</p>
<p><i>Verticordia multiflora</i> ssp. <i>solox</i> (DBCA-P2)</p>	<p>Known in WA from 31 records (WA Herbarium 1998).</p> <p>Previously recorded in the Avon Wheatbelt P1, Southern Cross and Western Mallee subregions in mixed low shrublands and heath in yellow sand over gravel and sand over granite on undulating plains hill slopes (WA Herbarium 1998).</p> <p>Species recorded within vegetation type EllAaaAcHe in the study area.</p>	 <p><i>Verticordia multiflora</i> subsp. <i>solox</i> Photos: H. Adamson</p> <p>(WA Herbarium 1998)</p>
<p><i>Acacia desertorum</i> var. <i>nudipes</i> (DBCA-P3)</p>	<p>Known in WA from 18 records.</p> <p>Previously recorded in the Southern Cross subregion in tall shrublands and sandplains on yellow sand and lateritic gravel (WA Herbarium 1998).</p> <p>Within the study area was identified from four locations, occurring primarily in vegetation type AsEcm.</p>	 <p><i>Acacia desertorum</i> var. <i>nudipes</i> Photos: W. Johnston</p> <p>(WA Herbarium 1998)</p>



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<p><i>Balaustion grandibracteatum</i> ssp. <i>grandibracteatum</i> (formerly <i>Baeckea grandibracteata</i> ssp. Parker Range) (DBCA-P3)</p>	<p>Known in WA from 13 records (WA Herbarium 1998).</p> <p>Previously recorded in the Avon Wheatbelt P1 and Southern Cross subregions in open <i>Eucalyptus</i> woodlands, <i>Allocasuarina</i> shrublands and sandplains on yellow sand and occasionally lateritic gravel (WA Herbarium 1998).</p> <p>Within the study area was identified in vegetation type EpAsDh</p>	
<p><i>Bossiaea</i> sp. Jackson Range (DBCA-P3)</p>	<p>Known in WA from 18 records. Described as common for most records (WA Herbarium 1998).</p> <p>Previously recorded in the Avon Wheatbelt P1, Southern Cross and Talling subregions in tall shrublands on granite breakaway, drainage lines in sandy loam over (WA Herbarium 1998).</p> <p>Within the study area, recorded primarily in vegetation type EcAbAe.</p>	
<p><i>Cryptandra crispula</i> (DBCA-P3)</p>	<p>Known in WA from 15 records (WA Herbarium 1998).</p> <p>Previously recorded in the eastern Goldfield and Southern Cross subregions in low <i>Eucalyptus</i> woodlands and tall open shrublands in brown sandy clay, yellow loamy sand, red soil, pebbles on dune ridges, hills and near salt lakes (WA Herbarium 1998).</p> <p>Within the study area, recorded in vegetation type EpAsDh.</p>	

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<p><i>Cyathostemon verrucosus</i> (DBCA-P3)</p>	<p>Known in WA from 22 records. Described as locally common for most records (WA Herbarium 1998).</p> <p>Previously recorded in the eastern Goldfield and Southern Cross subregions in shrublands on yellow sandplains (WA Herbarium 1998).</p> <p>Within the study area, recorded in vegetation types EpAsDh and EpAsEm.</p>	 <p>(Royal Botanic Gardens Kew 2020)</p>
<p><i>Hakea pendens</i> (DBCA-P3)</p>	<p>Known in WA from 23 records (WA Herbarium 1998).</p> <p>Previously recorded in the Avon Wheatbelt P1 and Southern Cross subregions in <i>Allocasuarina</i> thickets and <i>Eucalyptus</i> woodlands in stony loam soil on ironstone ridges and rocky outcrops (WA Herbarium 1998).</p> <p>Species found within the study area, primarily in vegetation types EIIAh and EsMpfTc.</p>	 <p>(WA Herbarium 1998)</p>

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<p><i>Hibbertia lepidocalyx</i> ssp. <i>tuberculata</i> (DBCA-P3)</p>	<p>Known in WA from 11 records (WA Herbarium 1998). Previously recorded in the Southern Cross subregion the largest population (~1200 plants) with <i>Eucalyptus ebbanoensis</i> subsp. <i>ebbanoensis</i>, <i>Acacia quadrimarginea</i>, <i>Philotheca brucei</i> ssp. <i>brucei</i>, <i>Olearia humilis</i>, <i>Neurachne annularis</i>, on a ridge top (WA Herbarium 1998). Other smaller populations (&lt; 150 plants) in sand, loam or banded ironstone gravel (WA Herbarium 1998).</p> <p>The WA Herbarium (1998-) identifies <i>Hibbertia lepidocalyx</i> ssp. <i>tuberculata</i> as having a linear distribution of approximately 180km, extending from south of Southern Cross to towards the Mt Manning Range. <i>Hibbertia lepidocalyx</i> ssp. <i>tuberculata</i> has also been recorded in the areas of the Helena and Aurora Range, Mt Jackson Range, Perrinvale Range and the Mt Finnerty Range (Western Botanical 2012; Ecologia 2013; WA Herbarium 1998).</p> <p>More than 90,000 individuals of <i>Hibbertia lepidocalyx</i> subsp. <i>tuberculata</i> have been recorded regionally with the recorded population of <i>Hibbertia lepidocalyx</i> subsp. <i>tuberculata</i> at the southern Koolyanobbing Range is approximately 44,100 individuals (Cliffs 2015).</p>	 <p>(Woodman 2014)</p>
<p><i>Lepidosperma ferricola</i> (DBCA-P3)</p>	<p>Known in WA from 34 records (WA Herbarium 1998).</p> <p>Previously recorded in the Southern Cross subregion in open Eucalyptus and Acacia woodlands and tall shrublands in well-drained stony loam, silty clay and banded ironstone on rocky ledges, scree slopes, crevices and ravines (WA Herbarium 1998).</p> <p>Species found within the study area, primarily in vegetation types EcCaLmc and EIIAh. Species were also recorded by Phoenix (2022a, 2022b) in the Southern Haul Road Study Area.</p> <p><i>Lepidosperma ferricola</i> has also been recorded at the Helena and Aurora Range, Mt Jackson Range and the Die Hardy Range, as well as from the northern Koolyanobbing Range. Records indicate more than 100,000 individuals of <i>Lepidosperma ferricola</i> have been recorded regionally (Cliffs 2015).</p>	 <p>(Barrett 2007)</p>

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<p><i>Phebalium drummondii</i> (DBCA-P3)</p>	<p>Known in WA from 22 records (WA Herbarium 1998).</p> <p>Previously recorded in the Avon Wheatbelt P1, Avon Wheatbelt P2, Southern Cross and Western Mallee subregions on flats and roadsides in Mallee woodlands and low shrublands on gravelly sandy or clayey soils (WA Herbarium 1998).</p> <p>Within the study area, recorded from four locations in the study area, primarily within vegetation type EpAaaTkHe.</p>	 <p><i>Phebalium drummondii</i> Photos: S.J. Patrick (WA Herbarium 1998)</p>
<p><i>Rinzia torquata</i> (DBCA-P3)</p>	<p>Known in WA from 18 records.</p> <p>Previously recorded in the Avon Wheatbelt P1, Southern Cross and Western Mallee subregions in low <i>Eucalyptus</i> open woodlands and <i>Acacia</i> shrublands on yellow-brown gravelly sandy or clayey soils (WA Herbarium 1998).</p> <p>Within the study area, recorded within vegetation type EpAsEm</p>	
<p><i>Stenanthemum newbeyi</i> (DBCA-P3)</p>	<p>Known in WA from 34 records (WA Herbarium 1998). Previously recorded in the Southern Cross subregion; the largest population (~1,000 plants) in <i>Acacia</i> sp. Mt Jackson shrubland with emergent <i>Dryandra arborea</i>, over <i>Allocasuarina acutivalvis</i> ssp. <i>acutivalvis</i>, <i>Eremophila clarkei</i>, <i>Leucopogon</i> sp. Clyde Hill and <i>Hibbertia eatoniae</i>, predominantly on lag gravel on upper slope of banded ironstone hill (WA Herbarium 1998). Other smaller populations recorded on loam, silt and clay soils (WA Herbarium 1998).</p> <p>The WA Herbarium (1998) identifies <i>Stenanthemum newbeyi</i> as having a linear distribution of approximately 100 km, extending from the Koolyanobbing Range in the south to the Die Hardy Range in the north. <i>Stenanthemum newbeyi</i> has also been recorded at the Mt Jackson Range, Helena and Aurora Range and the Mt Manning Range, as well as from the northern Koolyanobbing Range. Records identify &gt; 120,000 records of <i>Stenanthemum newbeyi</i> within the broader region, of which approximately 3,100 individuals have previously been removed from the regional population (Cliffs 2015).</p>	


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<p><i>Verticordia gracilis</i> (DBCA-P3)</p>	<p>Known in WA from 13 records (WA Herbarium 1998).</p> <p>Previously recorded in the Avon Wheatbelt P1, Southern Cross and Western Mallee subregions in white, yellow sand, gravelly sand and sandy loam on road verges, undulating plains and upper slopes (WA Herbarium 1998).</p>	 <p><i>Verticordia gracilis</i> Photos: E.A. George</p> <p>(WA Herbarium 1998)</p>
<p><i>Verticordia stenopetala</i> (DBCA-P3)</p>	<p>Known in WA from 25 records (WA Herbarium 1998).</p> <p>Previously recorded in the Avon Wheatbelt P1, Southern Cross and Western Mallee subregions in open <i>Casuarina/Eucalyptus</i> woodlands and shrublands in yellow sand, sometimes with gravel on hills slopes, road verges and undulating plains (WA Herbarium 1998).</p> <p>Species recorded within study area, primarily within vegetation types EIIAaaAcHe, EpAaaTkHe and EpAsEm</p>	 <p><i>Verticordia stenopetala</i> Photos: E.A. Berndt</p> <p>(WA Herbarium 1998)</p>
<p><i>Stenanthemum bremerense</i> (DBCA-P4)</p>	<p>Known in WA from 33 records, locally abundant for most records.</p> <p>Previously recorded in the Southern Cross subregion in low woodlands and <i>Allocasuarina/Acacia</i> shrublands in orange-brown sandy loam, orange-red gravelly loam, skeletal red loam, laterite and ironstone on top or sides of outcrops and breakaways (WA Herbarium 1998).</p> <p>Species recorded within the study area, primarily in vegetation type EIIAaaAcHe.</p>	 <p><i>Stenanthemum bremerense</i> Photos: G.F. Craig</p> <p>(WA Herbarium 1998)</p>

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<p><i>Microcorys</i> sp. nov. (Parker Range) (Undescribed)</p>	<p>No known WA records (WA Herbarium 1998). Phoenix (2021a) recorded the plant in open <i>Eucalyptus</i> woodlands, tall <i>Allocasuarina</i> shrublands and recently disturbed yellow sandplains (WA Herbarium 1998). Species recorded in the study area, primarily in EpAsDh vegetation type.</p>	
<p><i>Lepidosperma</i> aff. <i>costale</i> (Undescribed)</p>	<p><i>Lepidosperma</i> aff. <i>costale</i> were collected from the Study Area. These specimens and field records may represent a potential new taxon within a genus known for unresolved taxonomy. A review of other well-studied taxa of the <i>Lepidosperma costale</i> Complex indicates the <i>Lepidosperma</i> aff. <i>costale</i> recorded is likely to have a greater distribution and population size than indicated by the current Study Area records demonstrate. <i>Lepidosperma gibsonii</i> has a distribution range of approximately 8 km with a known population of &gt; 45,000 individuals (DBCA 2008), with <i>Lepidosperma</i> sp. Blue Hills having a broader distribution range of &gt;200km with population records for &gt; 80,000 individuals (Woodman 2008, 2009, 2017). Based on the distribution and population records for these well-studied taxa within the <i>Lepidosperma costale</i> Complex, the limited records for <i>Lepidosperma</i> aff. <i>costale</i> (&lt; 2,500 individuals, 1 km radius) are likely an artefact of the restricted area of survey (Study Area) rather than a restriction in the population and distribution of this taxon.</p>	

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<p>Streptoglossa aff. <i>cylindriceps</i> (Undescribed)</p>	<p><i>Streptoglossa</i> aff. <i>cylindriceps</i> were collected from the Study Area. These specimens and field records potentially represent a new taxon. They differ from the known <i>Streptoglossa cylindriceps</i> taxon due to their larger and hairier achenes.</p> <p>The records of <i>Streptoglossa</i> aff. <i>cylindriceps</i> from within the Study Area represent a range extension of <i>Streptoglossa cylindriceps</i>, which is not of listed conservation significance. <i>Streptoglossa cylindriceps</i> has a recorded distribution of &gt; 1,100 km, with &gt; 80 record locations extending between Kalgoorlie (south), Geraldton and Carnarvon (west) and Port Headland (north). Range extensions are not an uncommon occurrence for field surveys undertaken in areas that have not been previously surveyed. To note, three additional locations of <i>Streptoglossa</i> aff. <i>cylindriceps</i> are known to occur approximately 200 km east-southeast of the Study Area (Phoenix 2022a, 2022b); which would represent a further range extension (beyond the Study Area).</p>	
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**APPENDIX B – RISK ASSESSMENT**

**Risk Assessment Methodology**

Consequence Rating						
Insignificant (1)	Minor (2)	Moderate (3)	Major (4)	Severe (5)		
Minor environmental impacts contained within site	Contamination or damage sufficiently large to impact the environment but without permanent impacts	Limited but non-permanent damage to environment, recoverable within 1 year Repeated or significant breach of regulatory compliance limits	Severe damage requiring extensive measures to restore polluted or damaged environment Repeated significant or a single major breach of regulatory compliance limits	Persistent severe environmental damage extending over a large area. Damage cannot be fully rehabilitated/ remediated. Duration of harm >5yrs		
Risk Rating					Likelihood of Occurrence	
H-15	H-10	E-6	E-3	E-1	May occur frequently at site Expect to occur >2 times per year	<b>Almost Certain (A)</b>
M-19	H-14	H-9	E-5	E-2	May occur frequently within the sector Expect to occur 1-2 times/year	<b>Likely (B)</b>
L-22	M-18	H-13	E-8	E-4	May have occurred several times in the past the sector 50% chance of occurring in one year (occurs in 1-10 years)	<b>Possible (C)</b>
L-24	L-21	M-17	H-12	E-7	May have happened before within the sector but only on rare occasions 25% chance of occurring in one year (occurs in 25-100 years)	<b>Unlikely (D)</b>
L-25	L-23	M-20	H-16	H-11	May occur in exceptional circumstances. 5% chance of occurring in one year (occurs >every 100 years)	<b>Rare (E)</b>

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**Risk Assessment**

Activity	Impact	Inherent Risk			Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Clearing of native vegetation	Direct loss of flora and native vegetation	3	B	H9	All site personnel to complete a site induction which includes specific information on the conservation significant flora present, and avoidance/management actions.	Environmental induction of site personnel.	3	D	M17
					Planning and construction of the Proposal uses accurate flora and vegetation information during implementation of the Proposal.	Maintain accurate records of the locations of conservation significant flora taxa and vegetation to inform the planning and construction of the Proposal.			
					No native vegetation clearing beyond the approved clearing area.  Demarcation of clearing areas.  100% compliance with Site Disturbance Permit and Land Clearing Procedures	Native vegetation clearing to be limited to within the approved clearing areas through implementation of infrastructure field survey (including clearing demarcation) and adherence to Site Disturbance Permit and Land Clearing Procedures.  Effective rehabilitation has also been achieved through topsoil and vegetation that has been comingled and stockpiled.  Haul road to be appropriately designed to minimize ongoing erosion: <ul style="list-style-type: none"> <li>• Re-profile ground with drains and culverts installed as required</li> <li>• Import, place and compact general fill material to sub-grade level</li> <li>• Import, place, compact and final trim of road base pavement material</li> <li>• Installation of bitumen seal</li> </ul>			

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Activity	Impact	Inherent Risk			Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Clearing of native vegetation  Construction vehicle movement	Potential increased spread or introduction of new weeds	2	B	H14	Compliance with weed hygiene procedures including completion of a weed hygiene certificate for all vehicles/machinery  No new weed species introduced through construction activities.  No increase in introduced flora extent following construction activities	Control introduced flora taxa through: <ul style="list-style-type: none"> <li>Identify the extent and distribution of introduced flora taxa within the area of the Proposal prior and post construction activities.</li> <li>Maintain introduced flora taxa locations in GIS database</li> <li>Control known locations of introduced flora taxa (e.g. chemical spray) to minimise potential spread.</li> <li>Implement vehicle hygiene procedures for the inspection and cleaning of vehicles, machinery and equipment entering the area of the Proposal.</li> <li>Introduced flora inspections of imported fill material, which will be sourced from introduced flora-free locations</li> <li>Periodic inspection of areas susceptible to infestation by introduced flora (e.g. disturbed lands, topsoil/subsoil stockpiles)</li> <li>Separately stockpiling topsoil/subsoil from areas known to contain introduced flora (from other topsoil/subsoil stockpiles).</li> <li>Topsoil stockpiles to be managed to minimise weed infestations and maintain viability of seed stock</li> </ul>	2	D	L21

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Activity	Impact	Inherent Risk			Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Clearing of native vegetation  Construction vehicle movement	Dust deposition	2	B	H14	Emissions of dust are minimised and controlled to an acceptable level, without detrimental effects to native flora and vegetation adjacent to the Proposal.	Control emissions of dust through: <ul style="list-style-type: none"> <li>Minimise the extent of open cleared areas prone to dust lift by wind, where practicable.</li> <li>Installation of bitumen along haul road to minimise dust emissions</li> <li>Avoidance of land clearing activities during windy conditions.</li> <li>Restrict vehicle speeds to 40 km/hr along gravel/unsealed roads to minimise dust generation.</li> <li>Dampen open cleared areas using water carts (sprays) to minimise dust generation. A full time water cart will be utilised by each construction team.</li> </ul>	2	D	L21
Construction vehicle movement	Spillage of hydrocarbons	1	C	L22	Not required – Low risk				
Clearing of native vegetation	Altered surface drainage flow patterns	2	D	L21	Not required – Low risk				
Construction vehicle movement	Alteration of fire regimes	1	D	L21	Not required – Low risk				

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**APPENDIX 4**

**SIGNIFICANT FAUNA MANAGEMENT PLAN  
(REVISION 2, NOVEMBER 2022)**

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# Parker Range Iron Ore Project Haul Road


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## SIGNIFICANT FAUNA MANAGEMENT PLAN

*Environmental Protection Act 1986 (WA)*



Proponent: Polaris Metals Pty Ltd  
Address: 20 Walters Drive, Osborne Park, WA 6017  
Postal Address: Locked Bag 13, Osborne Park DC, WA 6916  
Corporate contact: Adam Parker  
Phone: +61 8 9315 8788  
Email: adam.parker@mrl.com.au

DOCUMENT CONTROL					
REV	DATE	PREPARED BY	REVIEWED BY	APPROVED BY	DOCUMENT PURPOSE
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2	18.11.2022	S Hawkins, Globe Environments for JBS&G	N Smith, Mineral Resources	Les Purves – General Manager Environment, Approvals, Land Access Mineral Resources  	Revised submission to Environmental Protection Authority (WA) and Department of Climate Change, Energy, the Environment and Water (C'th)

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APPENDIX A – RISK ASSESSMENT

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## 1. SUMMARY

This Significant Fauna Management Plan (SFMP) is prepared for the Parker Range Iron Ore Project (PRIOP) Haul Road (the Revised Proposal) to link the Parker Range surface mining operation with the Koolyanobbing Operations. Table 1 presents the environmental objectives to be met through implementation of this SFMP.

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

**TABLE 1: PURPOSE OF THE SFMP**

<b>PROPOSAL NAME</b>	Parker Range (Mt Caudan) Iron Ore Project Haul Road Revised Proposal
<b>PROPONENT NAME</b>	Polaris Metals Pty Ltd
<b>PURPOSE OF THE SFMP</b>	Provide monitoring and management actions for potential impacts on conservation significant fauna within the development envelope and surrounds
<b>KEY ENVIRONMENTAL FACTOR/S, OUTCOME/S AND OBJECTIVE/S</b>	<p>Terrestrial Fauna</p> <p><i>“To protect terrestrial fauna so that biological diversity and ecological integrity are maintained”</i></p> <p>To avoid and/or minimise the potential environmental effect of the Proposal to conservation significant fauna, including:</p> <ul style="list-style-type: none"> <li>• Malleefowl (<i>Leipoa ocellata</i>)</li> <li>• Western Quoll (<i>Dasyurus geoffroi</i>)</li> <li>• Arid Bronze Azure Butterfly (ABAB) (<i>Ogyris subterrestris petrina</i>) host ant (<i>Camponotus nr. terebrans</i>) colonies</li> <li>• Bandicoot (<i>Isoodon</i> sp.)</li> </ul> <p>The following objectives have been established:</p> <ul style="list-style-type: none"> <li>• Avoid, where possible, otherwise minimise mortality of fauna from clearing activity, entrapment or vehicle strike</li> <li>• Avoid removal or disturbance to active Malleefowl mounds or Chuditch dens</li> <li>• Minimise indirect effects to fauna habitat through dust, introduced fauna, vibration and/or displacement.</li> </ul>
<b>KEY COMPONENTS IN THE EMP (IF APPLICABLE)</b>	Not applicable – refer to Table 8
<b>EMP REQUIRED PRE-CONSTRUCTION?</b>	Yes

## 2. CONTEXT, SCOPE AND RATIONALE

### 2.1 PROJECT DESCRIPTION

The Parker Range (Mt Caudan) Iron Ore Project (PRIOP) is located approximately 15 km southeast of Marvel Loch, within the Yilgarn Shire, in the Eastern Wheatbelt Region of Western Australia (Figure 1). The existing PRIOP consisted of a mining area and haul road area, Mineral Resources Limited (Mineral Resources) now propose to construct and operate a mining haul road of approximately 52 km in length from the PRIOP to Koolyanobbing Operations as shown in Figure 1 and Figure 2, adjacent to the Department of Primary Industries and Regional Development (DPIRD) State Barrier Fence.

The PRIOP Haul Road (the Revised Proposal) will involve the clearing of 173 ha of native vegetation and in addition to the use of up to 37 ha of existing disturbed land within a 339 ha development envelope (DE). This will result in a 210 ha Indicative Footprint. The proposed extent of the physical and operational elements of the proposal are outlined in Table 2 and Table 3.

This SFMP applies to the construction and operation of the PRIOP Haul Road Project only. An existing Significant Fauna Management Plan (MRL 2020), outlining management and monitoring actions, has been developed to minimise impacts to significant fauna, within the PRIOP mining area for mine activities.

**TABLE 2: SUMMARY OF THE REVISED PROPOSAL**

SUMMARY OF PROJECT	
Proposal Title	Parker Range (Mt Caudan) Iron Ore Proposal Haul Road Revised Proposal
Proponent Name	Polaris Metals Pty Ltd
Short Description	The Revised Proposal involves the development of a haul road to transport Iron Ore to Mineral Resource Limited’s Koolyanobbing Operations for processing.

**TABLE 3: LOCATION AND PROPOSED EXTENT OF PHYSICAL AND OPERATIONAL ELEMENTS**

ELEMENT	LOCATION	PROPOSED EXTENT (REVISED PROPOSAL)
Physical Elements		
Haul Road	Figure 1	Clearing of up to 173 hectares (ha) of native vegetation and use of existing disturbed land within a 339 ha Development Envelope.
Operational Elements		
Haul Road	Figure 1	Construction and operation of approximately 52 kilometres of bitumen seal road with operation 24 hours per day, 365 days per year, with nominally between 110 to 160 of ore haulage vehicle movement per day.

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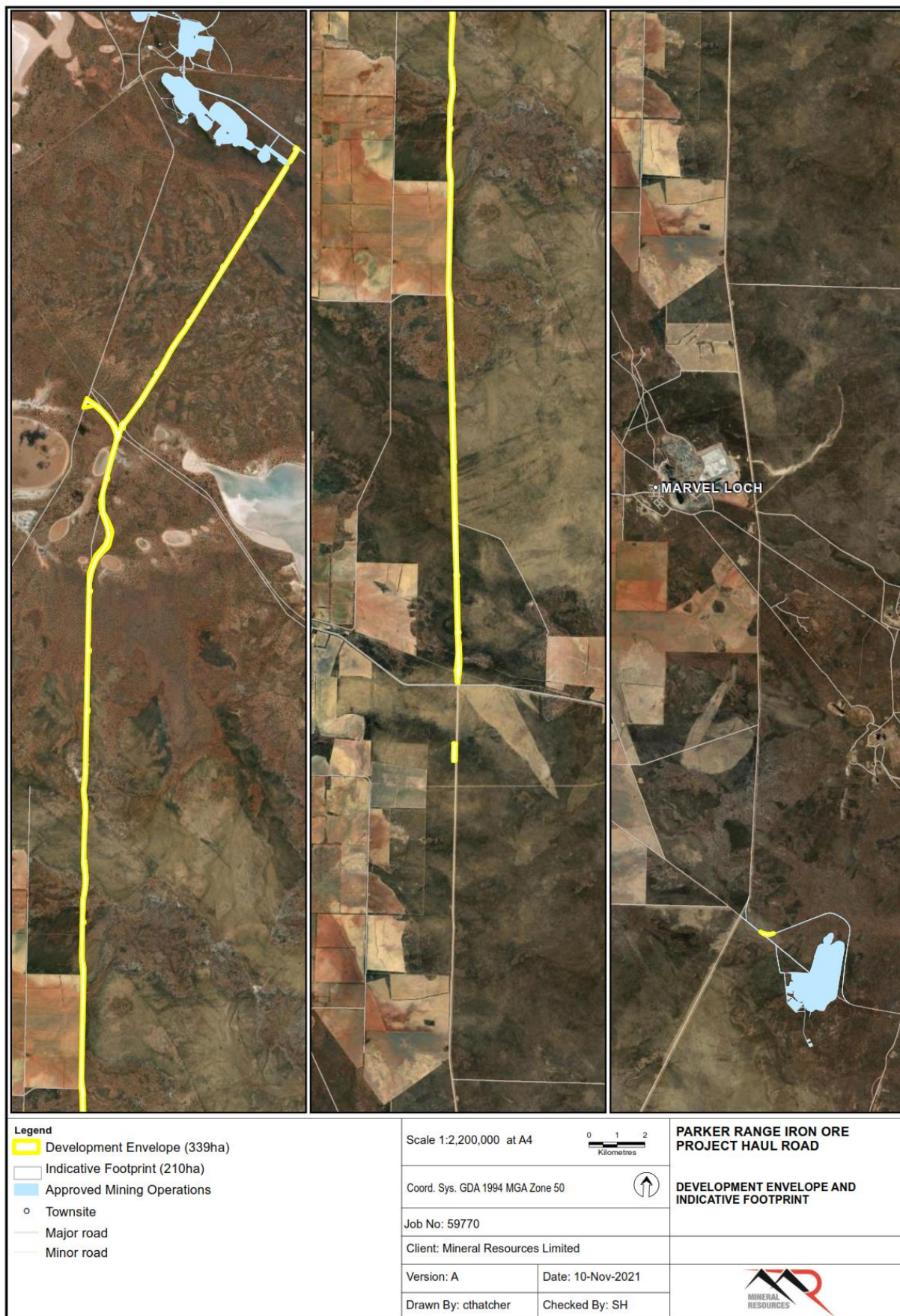




File Name: \\008pmp\004\001\jbsg.aust\JBS Perth\Projects\1\Open\Mineral Resources\59770 Parker Range Haul Road\GIS\Maps\R10\_Rev\_A\59770\_03\_IndicativeFootprint.mxd  
 Image Reference: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

**FIGURE 1: PRIOP HAUL ROAD REVISED PROPOSAL REGIONAL LOCATION**

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**FIGURE 2: PRIOP HAUL ROAD REVISED PROPOSAL DEVELOPMENT ENVELOPE AND INDICATIVE FOOTPRINT**

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## 2.2 KEY ENVIRONMENTAL FACTOR: TERRESTRIAL FAUNA

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

*“Protect terrestrial fauna so that biological diversity and ecological integrity are maintained”* (EPA 2016).

Fauna is a key environmental factor for the Revised Proposal because:

- Construction of the haul road will result in the direct loss of terrestrial fauna habitat through vegetation clearing
- There is the potential for the vegetation clearing to result in habitat fragmentation
- Operation of the haul road has the potential to result in mortality (death) or injury to fauna from vehicle strikes, and a potential for displacement from vehicle noise, light or vibration.

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

The key environmental factor, risk activities, botanical values and potential impacts are summarised in Table 4. Biological surveys conducted for the Revised Proposal have shown Malleefowl, Chuditch, an undescribed Bandicoot species and potentially the Arid Bronze Azure Butterfly (ABAB) are present in the development envelope and surrounds.

**TABLE 4: KEY ENVIRONMENTAL FACTORS, ACTIVITIES, VALUES AND ASSOCIATED IMPACTS**

KEY ENVIRONMENTAL FACTOR	ACTIVITIES	SIGNIFICANT FAUNA VALUES	IMPACTS
Terrestrial Fauna	Clearing of native vegetation Vehicle movement (construction and operations)	The following significant species are potentially present in the DE: <ul style="list-style-type: none"> <li>• Malleefowl (<i>Leipoa ocellata</i>) listed as Threatened under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) and <i>Biodiversity Conservation Act 2016</i> (BC Act)</li> <li>• Chuditch (<i>Dasyurus geoffroii</i>) listed as Threatened under the EPBC Act) and BC Act</li> <li>• Arid Bronze Azure Butterfly (ABAB) (<i>Ogyris subterrestris petrina</i>) listed as Critically Endangered under the EPBC Act and BC Act. The ABAB occurs in association with a host ant species (<i>Camponotus</i> nr. <i>terebrans</i>), which was identified in the surrounding area, however the host ant colony exists outside of the DE.</li> <li>• an undescribed Bandicoot species (<i>Isoodon</i> sp.)</li> </ul>	<ul style="list-style-type: none"> <li>• Direct impact from loss of fauna habitat due to vegetation clearing</li> <li>• Direct impact from individual death or injury due to construction and operations vehicle strikes or entrapment</li> <li>• Indirect impacts on conservation significant fauna species from construction and operation of haul road which includes:                             <ul style="list-style-type: none"> <li>○ increased predation and competition due to introduced fauna species</li> <li>○ individual displacement due to dust, light, noise and vibration</li> <li>○ impacts to fauna habitat due to altered fire regimes and fragmentation</li> </ul> </li> </ul>

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## 2.3 RATIONALE AND APPROACH

This SFMP identifies management and monitoring measures to minimise the loss of conservation significant fauna (i.e. Malleefowl, Chuditch, ABAB and Bandicoot) identified as occurring or potentially occurring within the DE and surrounds.

The SFMP has been prepared to align with the *Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans* (EPA 2020) and current approved PRIOP Significant Fauna Management Plan (MRL 2021).

### 2.3.1 Environmental Management Objectives

This objective based SFMP has been developed to ensure the Revised Proposal activities are managed to minimise impacts to significant fauna. The SFMP also includes monitoring indicators to evaluate the effectiveness of management measures for direct and indirect impacts on significant fauna.

This SFMP has been targeted towards management actions applicable to conservation significant fauna. However, many of the management actions in this SFMP will be applied to minimise the potential effect of implementation of the Revised Proposal to other fauna taxa which are not of listed conservation significance.

### 2.3.2 Surveys and Study Findings

Numerous fauna surveys/assessments have been conducted for the Revised Proposal. The results of the following surveys undertaken between 2008 – 2021 (Table 5) form the basis for this SFMP. Results of the surveys for the locations of conservation significant fauna (and their habitats) are shown in Figure 3, Figure 4 and Figure 5. The surveys were undertaken in accordance with *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA 2020f), *Technical Guidance – Sampling of Short Range Endemic Invertebrate Fauna* (EPA 2016g) and *Environmental Factor Guideline: Terrestrial Fauna* (EPA 2016b).

For the purposes of this SFMP ‘significant fauna’ are defined as:

- ‘*Threatened Fauna*’ under the EPBC Act and or BC Act within the categories of ‘*Critically Endangered*’, ‘*Endangered*’, ‘*Vulnerable*’ or ‘*Conservation Dependent*’
- ‘*Migratory Species*’ listed under the EPBC Act or BC Act
- Species listed under the BC Act as otherwise in need of special protection
- Species listed on DBCA’s non-statutory ‘*Priority*’ fauna list (Categories 1 – 4)
- New or undescribed fauna species determined to be of conservation significance.

Significant fauna reported as occurring within the DE and surrounds are each identified and discussed separately below. Species listed under the EPBC Act and/or BC Act are considered of higher conservation significance than Priority fauna and therefore warrant greater management focus in this SFMP, in addition to undescribed species.

**TABLE 5: FAUNA SURVEY EFFORT**

REPORT AUTHOR	SURVEY DESCRIPTION	PROJECT
Bamford Consulting Ecologists (2007)	Desktop Review	Kooyanobbing Range
Bamford Consulting Ecologists (2009)	Targeted Tree-Stem Trapdoor Spider surveys	Kooyanobbing Operations
Keith Lindbeck & Associates (2010)	Level 2 fauna survey	Mt Caudan – Parker Range Iron Ore Project
Biota (2012)	SRE invertebrate survey	Southern Kooyanobbing Range
Biota (2014)	Level 2 fauna survey	Southern Kooyanobbing Range
Western Wildlife (2017)	Level 2 fauna survey	Mt Holland Project
Phoenix (2020b)	Baseline Malleefowl mound survey	PRIOP
Phoenix (2022a)	Level 2 fauna survey consisted of 77 hours of active searches, five camera traps across the 1,499 ha study area in an extrapolated area of 8,508 ha	Southern Haul Road – Parker Range Haul Road
Phoenix (2022b)	Level 2 fauna survey, consisting of 820 camera nights, 22 hours of active searches across the 758 ha study area.  Included targeted surveys for ABAB across the Northern Extension and Southern Haul Road study areas.	Northern Extension – Parker Range Haul Road
Phoenix (2022c)	Targeted survey for the Arid Bronze Azure Butterfly	Parker Range Iron Ore Project Haul Road

### 2.3.2.1 Malleefowl (EPBC-V, BC-V)

Extensive information on the Malleefowl is provided in the National Recovery Plan for Malleefowl (*Leipoa ocellata*) (Benshemesh 2007). Malleefowl are known as mound builders belonging to the Megapodiidae who incubate their eggs in a nest (mound) constructed of sand and leaves. Mound construction occurs between autumn and spring intermittently by a pair of fowls (Garnett & Crowley 2000). The female lays 15 to 25 eggs between early spring and mid to late summer, while the male tends the mound. Chicks emerge between November and January, but can emerge as late as March. The chicks receive no parental care and mortality can be high. Malleefowl will breed in the same area each year. New mounds may be constructed, or old mounds reused. Home ranges for adult birds are one to many square kilometers and overlap with other Malleefowl (Benshemesh 2007).

The distribution area of the Malleefowl has been much reduced, particularly in arid zones and along the periphery, resulting in a contraction of their former range. Malleefowl population densities are now highest in the semi-arid zone (Benshemesh 2007). Malleefowl inhabit dense shrublands, mulga woodlands and mallee woodlands (Johnstone & Storr 1998). They forage in a diversity of habitats particularly those dominated by mallee and/or acacia and include recently burnt habitats. However, they require unburnt areas of shrublands or woodlands on gravelly sands for mound construction (Benshemesh 2007).

Mounds identified in the surveys for the Revised Proposal have been classified as active, inactive or long unused as per the National Malleefowl Monitoring Manual (Table 6) (National Malleefowl Recovery Team 2019). The inactive classification was divided into two sub-classes (sub-class 1 and 2) to provide a more precise description of the level of Malleefowl activity dataset. Inactive sub-class 1 and 2 were defined by Phoenix.

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Malleefowl were recorded from direct sightings, tracks, foraging debris, and recently active and degraded mounds, occurring in mallee over shrubland and mid-tall shrubland habitats throughout the survey area; 15 records were located within the survey area comprising 8 records of tracks, 1 record of foraging evidence and 6 direct sightings.

No active, inactive or dormant mounds were identified within the DE. The only active mound found was 300 m to the east near the southern extent of the Proposal. Seven inactive (sub-class 1) mounds were identified, with the closest 40 m from the DE. There is limited information on the potential population size of the species, although due to the occurrence of an active mound in January 2020 and an additional active mound in November 2019 associated with the PRIOP mine, at least two breeding pairs (four individuals) exist on the southern portion of the Revised Proposal. Based on timing of direct sighting evidence, at least two individuals would have been recorded. Due to the continuity of records throughout the Revised Proposal area, additional individuals would be expected, given the home range of the species is at least 1 km<sup>2</sup> (Phoenix 2022a).

**TABLE 6: MALLEEFOWL MOUND STATUS CLASSIFICATION**

MOUND STATUS	DEFINITION
Active	Currently being used by Malleefowl as an incubator for their eggs and are likely to contain eggs.
Inactive (sub-class 1)*	Mound shows signs of recent Malleefowl activity, such as scats, tracks, or fresh scrapings.
Inactive (sub-class 2)*	No evidence of recent activity but mound remains well formed and in good condition for future use.
Long unused	Evidence of an extended period of inactivity such as dense shrubs or trees growing from hollow, or mound very degraded/poorly formed. Highly unlikely to become active in the future.

\* Sub-class 1 & 2 have been defined by Phoenix to allow for a monitorable Malleefowl mound dataset.

### 2.3.2.2 Chuditch (EPBC-V, BC-V)

The Chuditch are the largest carnivorous marsupial in Western Australia, with adult males weighing about 1.3 kg and females 0.9 kg (DBCA 2017). This solitary species has relatively large home ranges and high dispersal rates (Serena & Soderquist 1989). Male Chuditch have large home ranges of 15 km<sup>2</sup>, with much smaller home ranges for females (3-4 km<sup>2</sup>); smaller core areas are defined by den locations of 4 km<sup>2</sup> (males) and 0.9 km<sup>2</sup> (females) (DBCA 2017; Van Dyck & Strahan 2008). Core areas usually contain numerous den sites, with dens located in hollow logs, tree limbs, rocky outcrops and burrows (DBCA 2017).

Chuditch are primarily nocturnal but can be active during the day for breeding or if weather restricts nocturnal foraging. They are opportunistic feeders, foraging primarily on the ground but will climb trees to feed or for safety (DBCA 2017). Their food source includes large invertebrates (scorpions, crickets, spiders), mammals, birds, lizards, frogs, fruits, seeds (*Zamia*) and flowers (DBCA 2017). They have been known to scavenge for food scraps around campsites and on carrion (roadkill).

Once widely distributed across Australia, this species is now largely confined to the south-west of Western Australia found in varying densities throughout the jarrah forest and south coast, specifically in woodlands, mallee shrublands and heaths along the south coast to the Ravensthorpe area and drier woodland and mallee shrubland in the Wheatbelt and Goldfield regions (DBCA 2017; Department of Environment and

Conservation 2012; Van Dyck & Strahan 2008). Threats to this species include land clearing, removal of suitable den logs and den sites, and predation by, and competition from, foxes and cats (DBCA 2017).

Chuditch was recorded from scats and from camera trap images, mostly in Open woodland and at breakaways, with few records in mallee over shrubland. Four records of Chuditch foraging were within the DE and all photo records occurred at one location 40 m west of the DE. The Chuditch records extend the current known distribution of the species 37 km to the north from the previously known population (associated with the Mt Holland mine).

The size of the Chuditch population includes unknown, however, numerous individuals are expected. Based on photo evidence, at least one individual is known. Given there is a gap of 45 km between records, this indicates at least two individuals are present in the region and potentially two sub-populations (Phoenix 2022a). Chuditch have a larger home range than Malleefowl, therefore a smaller population within the local area would be expected. In addition, the species are known to be solitary animals for the majority of their lives.

### 2.3.2.3 Bandicoot

Phoenix (2022a) identified conical diggings in shrubland habitats on sandy soils which resembled distinctive foraging signs of a bandicoot (*Isododon* sp.). No *Isododon* species have previously been recorded in the area; the study area lies well outside the recognised range of Quenda (*Isododon fusciventer*) the closest record is near Hyden (approximately 110 km SW of the study area). Staff from the Western Australian Museum (WAM) (Travouillon, *pers. comm.* 2019) indicate that a potentially new, small Quenda-like species from inland southern WA is under investigation, but has not been recorded near Southern Cross. These records are therefore considered significant both as a range extension, and as representing a poorly known taxon likely to merit listing in a conservation category equivalent to Quenda (P4) or higher. Sites with bandicoot diggings were targeted in searches and camera trapping during the main survey, but no sightings or scats were recorded. A possible bandicoot track in sand was poorly preserved and could not be positively identified. Four records of foraging evidence occur within the DE.

### 2.3.2.4 Arid Bronze Azure Butterfly (EPBC-CE, BC-CE)

The Arid Bronze Azure Butterfly (ABAB) (*Ogyris subterrestris petrina*) is classified as Critically Endangered under the EPBC Act and BC Act. The ABAB occurs in association with a host ant species (*Camponotus* sp. nr. *terebrans*). The host ant is sporadically distributed across southern Australia and requires floristically diverse habitats to sustain high densities. It is noted that an undescribed *Camponotus* has also been recorded to interact with the ABAB.

The ABAB is also restricted to mallee vegetation on sandy soil, often near flood plains, in which nests of the associated host ant are established at the base of eucalypts. The host ant nest may extend up to 50 cm below ground level, and it is most likely that both larval and pupal stages of the ABAB are completed underground. Eggs are laid on the bark near ground level, and newly hatched larvae either crawl or are carried into the ant nest (DoE 2015). As the ABAB has an obligate dependence on *C. terebrans*, their distribution and abundance of this ant is the primary determinants of potential habitat on a local scale.

The ABAB food sources includes *Eucalyptus*, *Acacia*, *Grevillea*, and *Hakea* species. Annual plants within the woodland vegetation types with peak nectar availability from September to October are also an important source (DBCA 2020d).

The ABAB is known only from two localities in Western Australia (DoE 2015):

- Barbalin Nature Reserve located approximately 18 km west of Mukinbudin, consisting of a host ant colony with a known ABAB population which covers approximately 40 ha. This population was discovered in 2006.
- At Lake Douglas reserve located approximately 12 km south-west of Kalgoorlie, however this population was reported as extinct in 1993.

The habitat at both known ABAB sites is dominated by eucalypt woodland. Nests of the host ant *C. terebrans* are only found at the base of eucalypts: at Barbalin predominantly gimlet (*Eucalyptus salubris*) and Lake Grace gum (*Eucalyptus loxophleba* ssp. *gratae*), but also wheatbelt wandoos (*E. capillosa capillosa*) and salmon gum (*E. salmonophloia*). At Lake Douglas the host tree was *Eucalyptus concinna* (DoE 2015).

A host ant colony site located approximately 20 km south of the PRIOP and covers approximately 20 ha (Williams et al 2018). No targeted ABAB surveys have been undertaken at this location. However, it is considered a large (mega) colony of the host ant *C. terebrans*. Preliminary surveys of this location identified very good habitat and confirmed host ant presence in abundance.

Ants of the genus *Camponotus* were collected opportunistically in the field and from wet pit traps, with 707 sites assessed. The findings are summarised in Table 7 with 129 sites recording the host ant, as shown in Table 7. Further surveys of the Northern Extension study area and the identified host ant population area were conducted in April 2021. No further host ant colonies were identified within the DE (Phoenix 2022b, 2022c).

The identified host ant colony, as shown in Figure 6 is located on a WSW-ENE sandy ridge with mainly *Eucalyptus salubris* woodland (Phoenix 2022b, 2022c). The colony covers at least 20 ha with prospective habitat appearing to continue to the west. The boundary of the ant colony has been mapped, noting that four sites where the host ant colonies were found are considered outliers and excluded from the host ant colony. Host ants were sparse and patchy on the eastern side with habitat changing to mostly rough-barked tress and grasses or shrubs towards the east. It is expected the eastern extent of the colony does not extend further.

Due to the significant size of the host ant colony, it is considered a mega colony. Targeted surveys for ABAB have been undertaken as per DBCA guidance (DBCA 2020c; Phoenix 2022c). Given the significant size of the host ant colony, the importance of the population as potential ABAB habitat is still considered significant. ABAB can disperse across a broad landscape searching for additional host ant colonies. In addition, the absence of ABAB in one sampling year does not exclude its presence, with many environmental factors determining their presence.

**TABLE 7: HOST ANT SURVEY RESULTS**

ABAB HOST ANT RESULT	NUMBER OF SITES
<i>Camponotus consecrator</i> present	1
<i>Camponotus nigriceps</i> present	16
<i>Camponotus</i> nr <i>terebrans</i> (host ant) absent	311
<i>Camponotus</i> nr <i>terebrans</i> (host ant) present	129
Habitat unsuitable	250

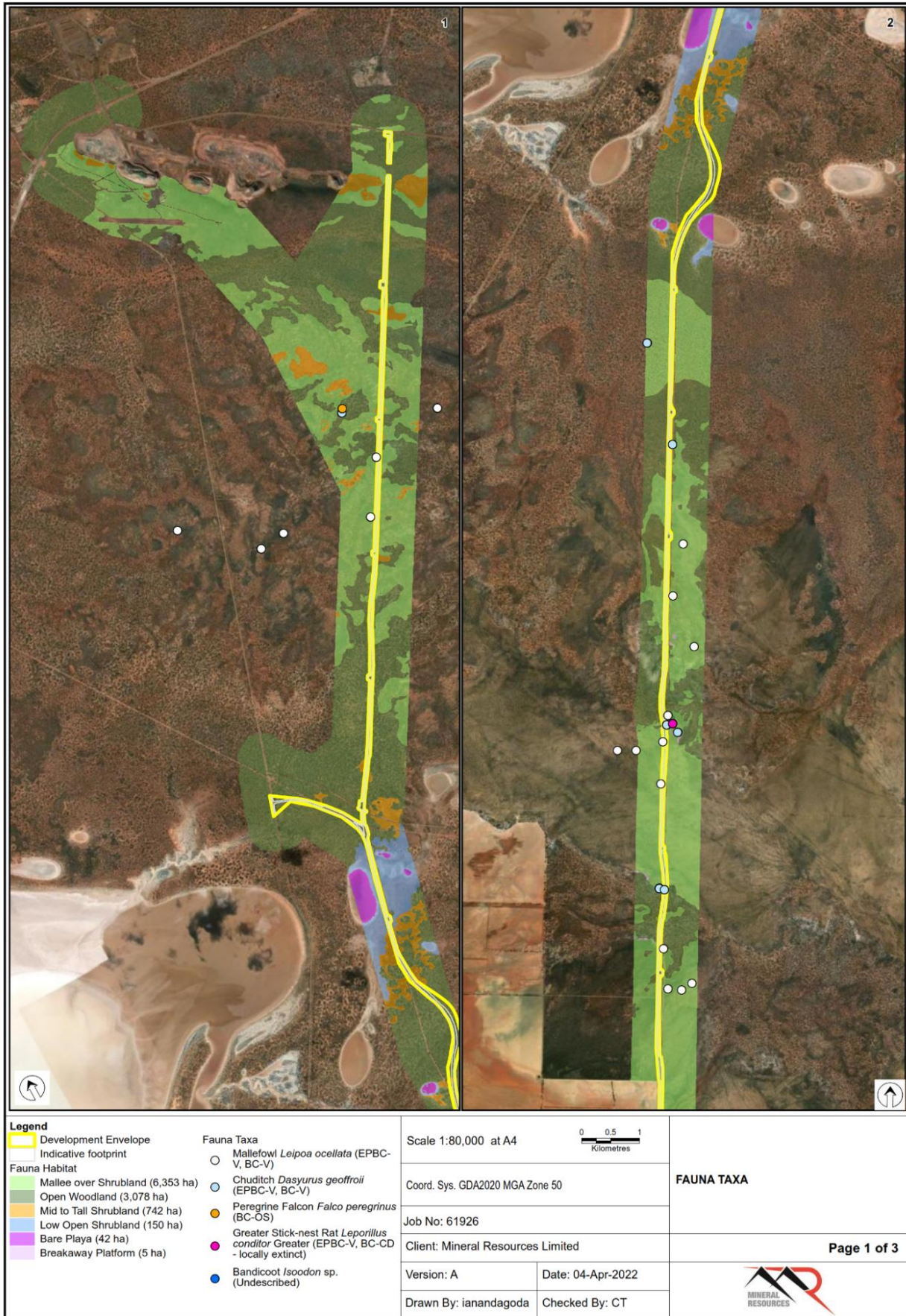


The key threats to the ABAB are (DoE 2015):

- Vehicle strikes (mortalities recorded at the Barbalin Nature Reserve population (Williams et al. 2008))
- Clearing of host ant for agriculture, mining and linear infrastructure
- Disturbance from off-road vehicles
- Introduction of *Iridomyrmex purpureus* (meat ant) (a competitor to the host ant) and spreading via off-road vehicles
- Dust deposition on vegetation (food source)
- Overspray from agricultural practises onto remnant vegetation
- Grazing of necessary food resources
- Over-collection of adults
- Illegal collection of firewood
- Inappropriate fire regimes
- Maintenance of existing tracks, as larvae and pupae may be located in soil disturbed by track grading.

At present, there is no clear guidance on buffer distances. However, for the Revised Proposal, 100 m is considered an appropriate buffer based on the buffer distances used for Barbalin Nature Reserve road re-alignment. The Barbalin population is located within close proximity to the existing and revised road, with evidence that the ABAB use existing roads. Foraging habitat is not considered as important as breeding habitat (i.e. host ant colonies).

Dispersing male ABABs may have a 25 m flight distance. Female ABABs may disperse further. It is expected that these individuals would typically have lower egg counts; the egg laying is primarily within the extent of the existing host ant colony. ABAB flight occurs on the upper slopes of ridges and along ridge tops. The ABAB typically fly uphill to higher locations as a reproductive strategy. The ant colony identified by Phoenix (2022c) is located along a ridgeline with the DE at a lower elevation.



**FIGURE 3: RECORDS OF SIGNIFICANT FAUNA (SECTION 1 OF HAUL ROAD)**

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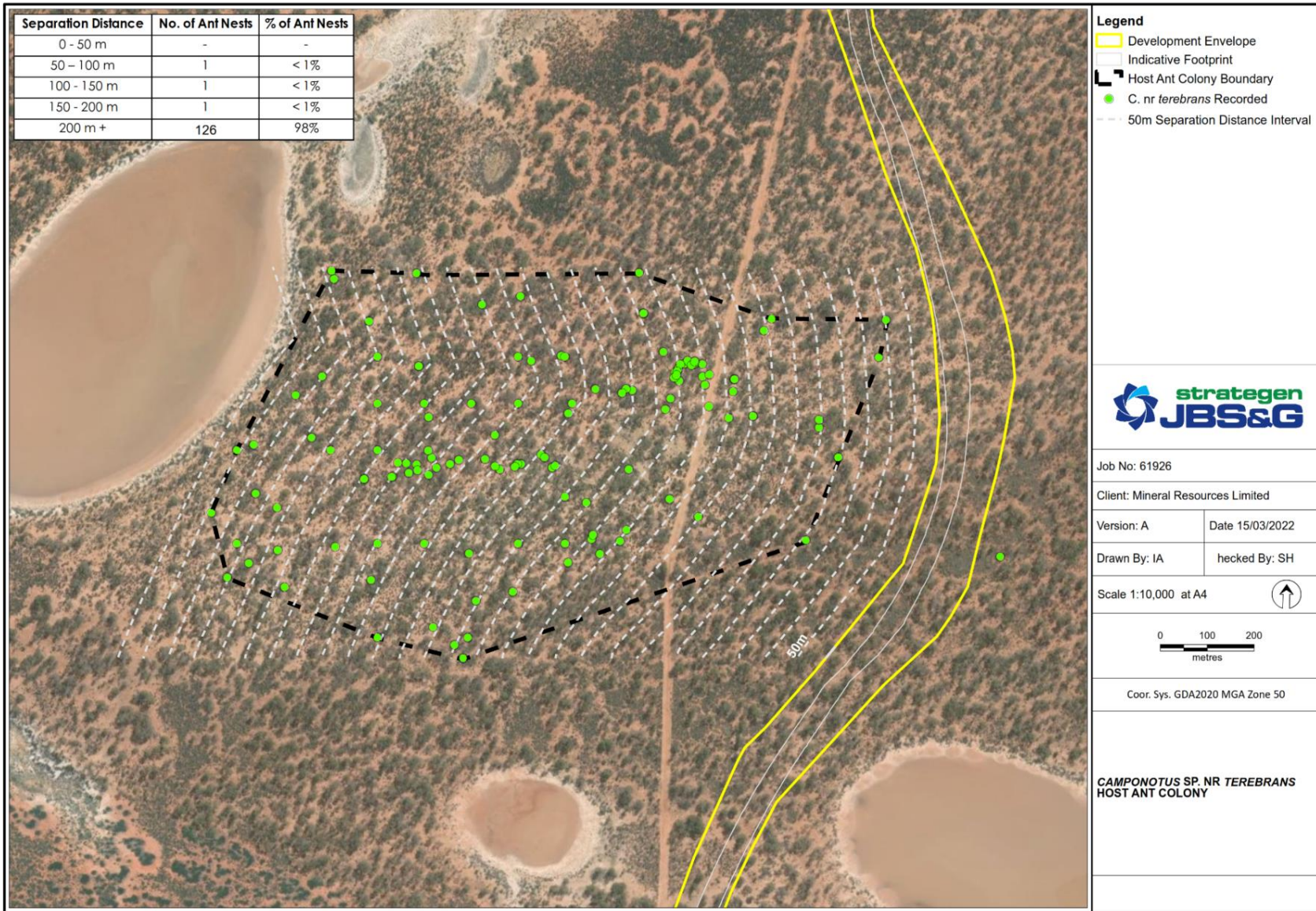
**FIGURE 4: RECORDS OF SIGNIFICANT FAUNA (SECTION 2 OF HAUL ROAD)**

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**FIGURE 5: RECORDS OF SIGNIFICANT FAUNA (SECTION 3 OF HAUL ROAD)**

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**FIGURE 6: RECORDS OF SIGNIFICANT FAUNA – ARID BRONZE AZURE BUTTERFLY HOST ANT COLONIES**

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### 2.3.3 Key Assumptions and Uncertainties

The SFMP and associated management actions have been based on survey and study findings and Revised Proposal impacts. The key assumptions include:

- The field surveys, undertaken by suitably qualified scientists, provide sufficient information to confirm the presence and abundance of significant fauna with the potential to occur within the Revised Proposal and surrounds
- The conservation significant fauna species identified (i.e. Malleefowl, Chuditch and Bandicoot) are highly mobile with notably large home ranges, such that point location records for individuals represent the usage of available foraging/breeding habitat (rather than fixed permanent locations of individuals)
- Point locations for nesting represent the current/historical usage of the available breeding habitat, rather than fixed permanent locations of breeding (as specific nesting locations may change from year to year)
- Based upon local and regional records of the conservation significant fauna species identified, the extent of potentially suitable breeding/foraging habitat is expected to extend beyond the fixed area of the field surveys
- As the general breeding season for Bandicoots is similar to that of Malleefowl and Chuditch, if during the pre-clearance surveys for Malleefowl and Chuditch the undescribed Bandicoot is identified then similar avoidance mechanisms can readily be implemented (i.e. clearing buffer established, consultation with DBCA).

The key uncertainties include the following:

- The absence or presence of ABAB at the identified host ant colony is unknown and may be confirmed by further surveys
- The size, extent, and structure of Malleefowl and Chuditch populations is uncertain.

### 2.3.4 Management Actions Approach

The Revised Proposal will have a life of approximately six years with priority use of existing disturbed areas with a short construction period (six months). Management and mitigation measures have been designed for the proposed six-year Revised Proposal life, and as such, may require adaptive solutions in subsequent revisions.

The management approach of this SFMP is based on relevant Government policy, in particular for Malleefowl, including the National Recovery Plan for Malleefowl (*Leipoa ocellata*) (Benshemesh 2007) and National Malleefowl Monitoring Manual (National Malleefowl Recovery Team 2019), Chuditch (*Dasyurus geoffroi*) National Recovery Plan (DEC 2012) and ABAB Conservation Advice (DoE 2015).

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

The potential effects of the Revised Proposal on significant fauna will be managed through implementing the EPA Mitigation Hierarchy of:

- Avoid
- Minimise

- Rehabilitate (or Remediate)
- Offset.

#### **2.3.4.1 Avoid**

As described above, fauna surveys of the area of the Revised Proposal and surrounds have been completed with no active Malleefowl mounds or active Chuditch dens identified in the DE. Based on the current design and available survey information, the Revised Proposal will not result in any direct loss of active Malleefowl nest mounds or active Chuditch dens. Pre-clearance surveys will ensure active mounds or dens are identified and avoided.

The identified ABAB host ant colony has been avoided with a 100 m avoidance buffer implemented. Any additional ABAB host ant colonies identified are intended to be avoided.

#### **2.3.4.2 Minimise**

While active Malleefowl nest mounds will be avoided, Malleefowl, Chuditch and Bandicoot use habitat across the entire Revised Proposal area. All species could potentially be susceptible to injury/mortality from vehicle strikes and/or indirect effects including habitat degradation through dust, displacement through light, noise and vibration. Sealing the haul road will minimise dust emissions following construction, with dust management measures to be implemented during construction.

#### **2.3.4.3 Remediate**

If during operation of the Revised Proposal fauna death from vehicle strike is consistent, the Proponent will consult with DBCA and address adaptive management measures and controls to be implemented to reduce the effect of vehicle strike on fauna.

#### **2.3.4.4 Offsets**

Offsets for the potential significant residual impact of the Revised Proposal to conservation significant fauna were described within the assessment documentation for the Revised Proposal (MRL 2021).

If the effect of the Revised Proposal to conservation significant fauna is greater than predicted within the assessment documentation, additional offsets may be considered to counterbalance any additional significant residual effects as part of the periodic review and revision of this SFMP.

### **2.3.5 Rationale for Choice of Provisions**

This SFMP implements objective-based management actions to prevent indirect impacts and to manage direct impacts from vegetation clearing and vehicle movement. The management actions focus on all key Revised Proposal activities identified as potentially having a medium or higher risk on significant fauna (Appendix A).

The provisions within this SFMP have been informed by results of baseline surveys as detailed in Table 5, the characteristics of the Revised Proposal, government guidelines (Benshemesh 2007; DEC 2012; National Malleefowl Recovery Team 2019; DoE 2015) and the management plans previously approved by the Department of Water and Environmental Regulation (DWER) for the associated Parker Range Iron Ore Proposal.

To note, rehabilitation of the area of the Revised Proposal is outside of the scope of this SFMP. The *Mining Act 1978 (WA)* is the primary legislation which controls rehabilitation activities for mining operations. Rehabilitation activities for the area of the Revised Proposal will be detailed in Mineral Resources' Mine Closure Plan.

### 3. SFMP COMPONENTS

This section identifies the objective-based management actions that Mineral Resources will implement to ensure protection of significant fauna. Objectives, management actions, targets and monitoring has been developed based on a risk-based approach as shown in Appendix A.

#### 3.1 ENVIRONMENTAL OBJECTIVE

The objective of this SFMP is to ensure the Revised Proposal construction actions are managed to avoid and/or minimise impacts to significant fauna species, such that the EPA objective for terrestrial fauna is met.

The primary objective of terrestrial fauna management is to avoid and minimise direct and indirect effects to individuals and their habitat where practicable. The following objectives have been established:

- Avoid where possible, otherwise minimise mortality of fauna individuals from clearing activity, entrapment or vehicle strike
- Avoid removal or disturbance to active Malleefowl mounds, Chuditch dens or ABAB host ant colonies
- Minimise indirect effects to fauna habitat through dust, introduced fauna, vibration and/or displacement.

#### 3.2 MANAGEMENT ACTIONS

Revised Proposal specific management actions have been identified to address potential impacts identified for significant fauna. The management actions focus on all key Revised Proposal activities identified as having a medium or higher risk to significant fauna by the risk assessment included in Appendix A.

Management Actions can be summarized as:

- Clearing management
- Malleefowl mound management
- Chuditch den management
- ABAB host ant colony management
- Traffic management
- Introduced fauna management
- Fauna entrapment management
- Noise and vibration management
- Dust management.

To note, potential impacts from fire and vehicle noise are not considered to be potentially significant effects of the Revised Proposal and are therefore not considered further in this SFMP.

Additionally to note, as the fauna habitats for potential short-range endemic (SRE) invertebrate fauna are not restricted and a significant effect to SRE invertebrate fauna is not expected, no specific management actions for SRE invertebrate fauna are proposed.



### **3.3 MANAGEMENT TARGETS**

Measurable management targets have been developed to assess the success of implementation of the management actions. If management targets are met, then it is expected (based on key assumptions and uncertainties) effects to significant fauna will be minimised and the management objective for fauna will be achieved.

### **3.4 OBJECTIVE-BASED SFMP**

The objective-based management actions and targets are outlined in Table 8. Management actions specified in the provisions tables for each fauna species are commensurate with their conservation significance and the potential impact(s) of the Revised Proposal.

Mineral Resources' Environmental Advisor role will be responsible for implementation of all management and monitoring actions, as identified by Table 8. No third-party (external) responsibilities apply to implementation of this SFMP.

**TABLE 8: SIGNIFICANT FAUNA OBJECTIVE-BASED PROVISIONS**

Purpose of SFMP: Provide monitoring and management actions for potential impacts on conservation significant fauna within the DE and surrounds

NO.	MANAGEMENT TARGETS	MANAGEMENT ACTIONS	MONITORING	TIMING	REPORTING	RESPONSIBILITY
1	All site personnel to complete a site induction which includes specific information on the conservation significant fauna present, and avoidance/management actions (e.g. haul road speed limit of 80 km/hr).	Environmental induction of site personnel.	Environmental Compliance Inspections	Site induction prior to commencing works  Environmental education ongoing	CAR	Mineral Resources Environmental Advisor
2	No native vegetation clearing beyond the approved clearing area.  Demarcation of clearing areas.  100% compliance with Site Disturbance Permit and Land Clearing Procedures	Native vegetation clearing to be limited to within the approved clearing areas through implementation of infrastructure field survey (including clearing demarcation) and adherence to Site Disturbance Permit and Land Clearing Procedures.	Environmental Compliance Inspections - Clearing	Construction	CAR	Mineral Resources Environmental Advisor
3	Avoid where possible otherwise minimise the risk of injury/mortality of Malleefowl, Chuditch or ABAB from clearing activities	<p>Establish and maintain a 'Significant Fauna Register' to record all observations of conservation significant fauna (e.g. sightings of individuals [including mortalities/injury], nests/dens, host ant colony, etc) to inform the construction and operation of the Revised Proposal.</p> <p>Spatial data associated with Significant Fauna Register is used in Site Disturbance Permit and Land Clearing Procedures to avoid active Malleefowl mounds, Chuditch dens and ABAB host ant colony.</p> <p>A fauna spotter to be present during native vegetation clearing to handle/move conservation significant fauna, if present.</p> <p>Significant fauna handled/moved to be recorded through the Significant Fauna Register.</p> <p>Any injured significant fauna to be taken to a local wildlife carer or vet, or as otherwise advised by the CEO of DBCA.</p> <p>In the event that a mortality is recorded of Malleefowl or Chuditch or Bandicoot, the specimen will be vouchered with the WA Museum or DBCA for taxonomic purposes.</p> <p>(Notes: (1) The Fauna Spotter will have appropriate experience in the handling of fauna. (2) Fauna will be shepherded into adjacent native vegetation where possible to avoid physical handling/moving. (3) If required by DBCA, the fauna spotter will hold a Licence for fauna taking (relocation) under r28 of the Biodiversity Conservation Regulations 2018 (WA) for the capture, transport and release of conservation significant fauna and a Licence for fauna taking (dangerous fauna) under r26 for the relocation of any dangerous fauna. (4) The fauna spotter will have suitable equipment to administer emergency care to any injured/displaced fauna and have access to a care facility to rehabilitate injured fauna).</p>	Clearing monitoring  Mortality monitoring	Construction (Land clearing)	<p>Notification to CEO DBCA under r124 of the <i>Biodiversity Conservation Regulations 2018 (WA)</i> within 24 hours after taking possession of the fauna.</p> <p>Where mortality or injury of conservation significant fauna is reported, notification to the DWER CEO and DBCA CEO within 7 days of any injury or death being reported. The notification will include the location, cause (if known), species type and any actions taken/proposed in response to the injury or mortality.</p> <p>CAR</p>	Mineral Resources Environmental Advisor
4	Avoid clearing of 'active' Malleefowl mounds during the breeding season.	<p>Clearing that will impact on Malleefowl habitat or inactive mounds will be undertaken outside the mound building, breeding, and egg incubation period (i.e. between September to January) to the maximum extent practicable.</p> <p>Pre-clearance surveys for Malleefowl are generally only undertaken within the breeding season. This is when Malleefowl are restricted to their nest mound tending their eggs. Outside this period Malleefowl are highly mobile and have wide home ranges such that pre-clearance surveys are not considered necessary.</p> <p>Undertake 'pre-clearance' field survey for Malleefowl within 30 days prior to the clearing of native vegetation, if the clearing is to occur during the breeding</p>	Pre-clearance survey - Malleefowl	Pre-construction during breeding season (September to January).	CAR	Mineral Resources Environmental Advisor

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NO.	MANAGEMENT TARGETS	MANAGEMENT ACTIONS	MONITORING	TIMING	REPORTING	RESPONSIBILITY
		<p>season (September to January inclusive, annually). The field survey will cover the area proposed to be cleared.</p> <p>If active mounds are identified within the clearing area, a separation distance (avoidance buffer) of 50 m will be established, unless otherwise agreed by the CEO. The buffer and controls to minimise impacts to breeding activities will be determined through consultation with technical experts (DBCA). The following will be considered:</p> <ul style="list-style-type: none"> <li>• Revise construction methodology to minimise clearing within 50 m of the active mound. This may include installation of a single lane access road to allow vehicle movement</li> <li>• As per Internal Clearing Permit Procedure, clearing boundaries will be clearly marked</li> <li>• Any clearing within 50 m of the active mound will be designed to minimise habitat fragmentation, with the retention of continuous habitat considered a priority</li> <li>• A decrease in speed limits to 40km/hr to minimise potential vehicle interactions, noise and vibration</li> <li>• Camera monitoring of active site until status is classified as inactive</li> </ul> <p>Malleefowl habitat containing an 'active' mound to be demarcated to inform site personnel, as necessary. All active and inactive Malleefowl mounds will be recorded in a "Threatened Fauna Register" which will include date, observer, status of mound/Malleefowl and a GPS/location description.</p> <p>Clearing of the active mound can be undertaken once it has been confirmed as inactive by a fauna specialist as per National Malleefowl Monitoring Procedure (NMRT 2016).</p> <p>Further details on pre-clearance survey methodology is provided in Section 0.</p>				
5	<p>Avoid clearing of 'active' Chuditch dens during the breeding season.</p>	<p>Undertake 'pre-clearance' field survey for Chuditch within 30 days prior to the clearing of native vegetation within identified breeding habitat (Open Woodland), if the clearing is to occur during the breeding season (September to November inclusive, annually). The field survey will cover the area proposed to be cleared.</p> <p>Pre-clearance surveys for Chuditch are generally only undertaken within the breeding season. This is when the Chuditch are restricted to their den for the purpose of rearing their young. Outside this period Chuditch are highly mobile and have wide home ranges such that pre-clearance surveys are not considered necessary.</p> <p>If an active den is identified within the clearing area, an avoidance buffer of 50 m will be established, unless otherwise agreed by the CEO. The buffer and controls to minimise impacts to breeding activities will be determined through consultation with technical experts (DBCA). The following will be considered:</p> <ul style="list-style-type: none"> <li>• Revise construction methodology to minimise clearing within 50 m of the active den. This may include installation of a single lane access road to allow vehicle movement</li> <li>• As per Internal Clearing Permit Procedure, clearing boundaries will be clearly marked</li> <li>• Any clearing within 50 m of the active den will be designed to avoid where possible, otherwise minimise, habitat fragmentation, with the retention of continuous habitat considered a priority</li> <li>• A decrease in speed limits to 40 km/hr to minimise potential vehicle interactions, noise and vibration</li> <li>• Avoidance of activities at night (i.e. activities to be undertaken during daylight hours) to minimise potential vehicle interactions</li> <li>• Camera monitoring of active den until status is classified as inactive</li> </ul>	<p>Pre-clearance survey - Chuditch</p>	<p>Pre-construction during breeding season (September to November).</p>	<p>CAR</p>	<p>Mineral Resources Environmental Advisor</p>

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NO.	MANAGEMENT TARGETS	MANAGEMENT ACTIONS	MONITORING	TIMING	REPORTING	RESPONSIBILITY
		<p>Chuditch habitat containing an 'active' den to be demarcated to inform site personnel, as necessary.</p> <p>Once the breeding/denning season is completed (when dependent young are considered unlikely in approximately November), any relocation activities that may be required will be completed, then clearing can commence.</p> <p>Further details on pre-clearance survey methodology is provided in Section 0.</p>				
6	Avoid clearing of ABAB host ant colonies	<p>If new host ant colonies are identified, a 100 m avoidance buffer will be implemented with no Revised Proposal related disturbance to occur.</p> <p>Clearing within 15 km of identified host ant colony will preferentially occur outside of the main ABAB flight period (September to October) to minimize interactions.</p> <p>To protect host ant colonies, existing access roads near these colonies will be fenced preventing access during Revised Proposal related activities. Areas which are already disturbed will be rehabilitated.</p>	<p>Host ant colony construction monitoring.</p> <p>Host ant colony operations monitoring.</p>	Construction and Operations	CAR	Mineral Resources Environmental Advisor
7	Avoid where possible, otherwise minimise the risk of injury/mortality of Malleefowl, Chuditch or ABAB from vehicle strike on the haul road.	<p>No exceedance of speed limits (80 km/hr).</p> <p>Ensure personnel drive to road and weather conditions.</p> <p>Install and maintain speed limit signage to minimise the risk of vehicle-fauna collision.</p> <p>Install and maintain fauna signage (e.g. with pictures of fauna) at the boundaries to identified significant habitat areas (ie active mounds or den and host ant colonies) to inform site personnel.</p> <p>Minimise the risk of vehicle strike to Chuditch by removing any visible fauna carcass from the haul road area (move to outside of road surface and adjacent batters/drains) to confine/direct scavenging away from the road.</p>	Environmental Compliance Inspections. Monitoring of incident reports for conservation significant fauna species vehicle strike.	Construction and Operations	CAR	Mineral Resources Environmental Advisor
8	Avoid the risk of injury/mortality of conservation significant fauna within water storage containers; and avoid where possible, otherwise minimise the risk of injury/mortality of conservation significant fauna within ground excavations (> 2 m depth).	<p>Install egress points and/or fauna ladders in water storage containers and ground excavations (&gt; 1 m depth) to assist fauna with escape in the event of inadvertent access or secured against animal entry at the close of each day, where possible.</p> <p>Water containers to be secured when not in use.</p> <p>All construction pipes, culverts, or similar structures, greater than 0.5 m in diameter, stored on-site overnight, will be inspected thoroughly for wildlife by a qualified biologist or properly trained on-site personnel before the pipe is buried, capped, used, or moved. If inspection indicates presence of conservation significant species inside stored materials or equipment, work on those materials will cease until a suitably qualified environmental professional determines the appropriate course of action.</p>	Environmental Compliance Inspections	Construction and Operations	CAR	Mineral Resources Environmental Advisor
9	<p>Compliance with weed hygiene procedures including completion of a weed hygiene certificate for all vehicles/machinery</p> <p>No introduction of meat ants into the ABAB host ant colony.</p> <p>No increase in feral animal populations within the Development Envelope.</p>	<p>Implement vehicle hygiene procedures for the inspection and cleaning of vehicles, machinery and equipment entering the area of the Revised Proposal to minimise meat ant introduction.</p> <p>Introduced species identified will be reported to the relevant Department and recorded to monitor occurrences.</p> <p>Monitoring of host ant colony during construction and for the one month following construction completion will occur, to identify any signs of decline, including surveillance for meat ants and any conflict between the host ant and the meat ants.</p> <p>Implementation of internal clearing permit system to prevent off-road vehicle movement to minimise meat ant introduction.</p> <p>Avoid attracting feral species to the Development Envelope by implementing domestic waste management procedures (e.g. secure lids on bins).</p> <p>Feral species control will be undertaken along the haul road in cooperation with regional control programs, if required.</p>	<p>Environmental Compliance Inspections</p> <p>Host ant colony construction monitoring</p> <p>Host ant colony operations monitoring</p>	Construction and Operations	CAR	Mineral Resources Environmental Advisor

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NO.	MANAGEMENT TARGETS	MANAGEMENT ACTIONS	MONITORING	TIMING	REPORTING	RESPONSIBILITY
10	<p>Minimise the risk of change in behaviour of Malleefowl, Chuditch or ABAB during increase in dust, light, noise or vibration. Emissions of dust are minimised and controlled to an acceptable level, without detrimental effects to fauna habitats adjacent to the Revised Proposal.</p>	<p>Subject to safe operating procedures, lighting (where installed) will not be directed towards retained native vegetation to minimise light emissions (light spill) into adjacent fauna habitats.</p> <p>Where applicable, vehicles will comply with relevant Australian Standards for noise emissions.</p> <p>Control emissions of dust through:</p> <ul style="list-style-type: none"> <li>• Minimise the extent of open cleared areas prone to dust lift by wind, where practicable.</li> <li>• Installation of bitumen along haul road to minimise dust emissions</li> <li>• Minimise of land clearing activities during windy conditions.</li> <li>• Restrict vehicle speeds to 40 km/hr along gravel/unsealed roads to minimise dust generation, where practical.</li> <li>• Dampen open cleared areas using water carts (sprays) to minimise dust generation. A full time water cart will be utilised by each construction team.</li> <li>• Potential dust sources, such as crushers, will not be located within proximity to the ABAB ant host colony</li> </ul>	<p>Environmental Compliance Inspections</p> <p>Inspection of construction area to visually observe dust emissions and undertake vegetation health inspections</p>	<p>Construction and Operation</p>	<p>CAR</p>	<p>Mineral Resources Environmental Advisor</p>

### **3.5 MONITORING**

This section also identifies monitoring measures to be implemented to measure progress against management targets and relevant record keeping/reporting requirements for each management action. The monitoring required for the significant fauna is summarised in Table 9.

**TABLE 9: FAUNA MONITORING ACTION SUMMARY**

MANAGEMENT TARGETS	MONITORING EVENT	MONITORING ACTION	FREQUENCY	RECORDS
All site personnel to complete a site induction which includes specific information on the conservation significant fauna present, and avoidance/management actions.	Environmental Compliance Inspections	Review of site induction records	Ongoing and annual review	Site induction records
No native vegetation clearing beyond the approved clearing area.  Demarcation of clearing areas.  100% compliance with Site Disturbance Permit and Land Clearing Procedures	Environmental Compliance Inspections - Clearing	Clearing inspection to ensure compliance against Internal Clearing Permit:  <ul style="list-style-type: none"> <li>• Demarcation of areas</li> <li>• Post-clearing survey pick up</li> <li>• Avoidance of active Malleefowl mounds, Chuditch dens and ABAB host ant colony</li> </ul>	One month following construction activities.  Weekly during construction.  Annually during operations	Approved Internal Clearing Permit authorisation records
Avoid where possible, otherwise minimise, the risk of injury/mortality of Malleefowl, Chuditch, ABAB or undescribed Bandicoot from clearing activities	Clearing monitoring	Fauna spotter during clearing to handle and move Chuditch or displace Malleefowl.  Review of Significant Fauna Register and fauna incident reports	Ongoing and annual review	Approved Internal Clearing Permit authorisation records
	Mortality monitoring	Undertake incident reporting for Malleefowl or Chuditch predation, any conservation significant species and vehicle strike.  In the event that a mortality is recorded of Malleefowl or Chuditch or Bandicoot, the specimen will be vouchered with the WA Museum or DBCA for taxonomic purposes.	Ongoing and annual review	Records of notifications to CEO DBCA (under r124 of the BC Act) and DWER CEO
Avoid clearing of 'active' Malleefowl mounds during the breeding season.	Pre-clearance survey - Malleefowl	Malleefowl pre-clearance surveys undertaken if clearing occurs during breeding period of September to January.  Field survey to be undertaken generally consistent with the methodology outlined by the National Malleefowl Recovery Team.	Pre-construction during breeding season (September to January).	Monitoring reports of 'pre-clearance' field surveys for Malleefowl

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MANAGEMENT TARGETS	MONITORING EVENT	MONITORING ACTION	FREQUENCY	RECORDS
Avoid clearing of 'active' Chuditch dens during the breeding season.	Pre-clearance survey - Chuditch	Chuditch pre-clearance surveys undertaken if clearing occurs during breeding period of September to November.  Field survey to be undertaken consistent with the methodology detailed in Section 3.5.	Pre-construction during breeding season (September to November).	Monitoring reports of 'pre-clearance' field surveys for Chuditch
Avoid clearing of ABAB host ant colonies	Host ant colony construction monitoring  Host ant colony operations monitoring	Monitoring of host ant colony to identify any signs of decline, including surveillance for meat ants  Monitoring of host ant colony during operations to confirm ABAB absence or presence and adequacy of management measures.  Field survey to be undertaken consistent with the methodology detailed in Section 3.5.	During construction and one month following.  Annually	Monitoring reports of ABAB field surveys
Avoid where possible, otherwise minimise the risk of injury/mortality of Malleefowl, Chuditch, ABAB or undescribed Bandicoot from vehicle strike on the haul road.	Environmental Compliance Inspections	Monitoring of incident reports for conservation significant fauna species from vehicle strike.  In the event that a mortality is recorded of Malleefowl or Chuditch or Bandicoot, the specimen will be vouchered with the WA Museum or DBCA for taxonomic purposes.	Ongoing and annual review	Incident reports  Inspection records
Avoid the risk of injury/mortality of conservation significant fauna within water storage containers and ground excavations (> 2 m depth).	Environmental Compliance Inspections	Haul road construction area inspection	Weekly during construction then one month following construction	Inspection records
Compliance with weed hygiene procedures including completion of a weed hygiene certificate for all vehicles/machinery	Environmental Compliance Inspections	Review of vehicle hygiene inspection forms and records of Introduced Fauna	Ongoing and annual review	Vehicle hygiene inspection documentation

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MANAGEMENT TARGETS	MONITORING EVENT	MONITORING ACTION	FREQUENCY	RECORDS
<p>No introduction of meat ants into the ABAB host ant colony.</p> <p>No increase in feral animal populations within the Development Envelope.</p>	<p>Host ant colony construction monitoring</p> <p>Host ant colony operations monitoring</p>	<p>Monitoring of host ant colony to identify any signs of decline, including surveillance for meat ants (<i>Iridomyrmex purpureus</i>).</p> <p>Monitor the condition of the <i>Camponotus nest</i>, note any interactions or evidence of <i>Iridomyrmex</i> and <i>Camponotus</i> conflict at each recorded location.</p> <p>Monitoring of host ant colony during operations to confirm ABAB absence or presence and adequacy of management measures.</p> <p>Field survey to be undertaken consistent with the methodology detailed in Section 3.5</p>	<p>During construction and one month following.</p> <p>Annually</p>	<p>Monitoring reports of ABAB field surveys</p>
<p>Minimise the risk of change in behaviour of Malleefowl, Chuditch or ABAB due to dust, light, noise or vibration.</p> <p>Emissions of dust are minimised and controlled to an acceptable level, without detrimental effects to fauna habitats adjacent to the Project.</p>	<p>Environmental Compliance Inspections</p> <p>Inspection of construction area to visually observe dust emissions and undertake vegetation health inspections</p>	<p>Inspection of construction area to visually observe dust emissions and undertake vegetation health inspections</p>	<p>Weekly during construction then one month following construction</p>	<p>Visual observation inspection records</p>

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### 3.5.1 Pre-Clearance Survey Methodology

An internal clearing permit system will be implemented to ensure clearing only occurs within the Development Envelope and in accordance with all approvals obtained.

A suitably qualified environmental professional (fauna spotter) will be present during all land clearing to ensure timely identification and avoidance of bandicoot, ABAB, Chuditch and Malleefowl. The fauna specialist will identify any Malleefowl mounds and potential Chuditch dens and undertake relocation activities. The person will hold a permit to handle and move conservation significant fauna under Regulation 28 of the *Biodiversity Conservation Regulations 2018* and have access to a care facility that can be used to rehabilitate injured fauna.

Pre-clearance walk throughs to identify and displace fauna prior to clearing will be undertaken. Pre-clearance walk throughs will be undertaken the morning before clearing / disturbance to displace individuals and will include searching and checking refugia sites.

Pre-clearance surveys for Malleefowl and Chuditch will be undertaken during the breeding season; being a time when Malleefowl (including eggs) and Chuditch (including young) are less mobile and therefore susceptible to impact from clearing activities. Although the baseline environmental surveys recorded nil active Malleefowl nest mounds and nil Chuditch dens within the area of the Revised Proposal, pre-clearance surveys have been proposed to cater for a low-risk potential that nest mounds / dens have been established within the area of the Revised Proposal since the baseline surveys were completed. Outside of the relevant breeding seasons, Malleefowl and Chuditch are highly mobile and can readily move away from clearing disturbance into the adjacent retained fauna habitat. As pre-clearance surveys outside of the breeding season would not serve a functional purpose given Malleefowl and Chuditch will naturally move away from any approaching disturbance, pre-clearance surveys outside of the relevant breeding seasons are not considered to be necessary.

It is noted that any impact to individuals of listed ‘*Threatened*’ fauna is defined as ‘*taking*’ under the State *Biodiversity Conservation Act 2016* (WA). The Revised Proposal is expected to remove habitat which may be used by the listed ‘*Threatened*’ fauna Malleefowl *Leipoa ocellata* (EPBC-V, BC-V) and Chuditch *Dasyurus geoffroii* (EPBC-V, BC-V), however, with nil impact to individuals of these taxa. If an impact to individuals of these taxa is anticipated then Mineral Resource will seek the necessary Licence under Section 40 of the *Biodiversity Conservation Act 2016* (WA) prior to an impact to individuals.

#### Malleefowl

Pre-clearance surveys for Malleefowl are generally only undertaken within the breeding season. This is when Malleefowl are restricted to their nest mound tending their eggs. Outside this period Malleefowl are highly mobile and have wide home ranges such that pre-clearance surveys are not considered necessary. If clearing occurs during the breeding season (when mounds are likely to be active from September to January (NMRT 2019)), Malleefowl pre-clearance surveys will be undertaken. These surveys will be undertaken up to 30 days prior to clearing, to identify any Malleefowl mounds and their status in the area to be cleared.

Pre-clearance surveys will consist of either of the following methodology:

- LiDAR surveys to identify potential mounds and in field investigations to confirm status
- or
- If it is more practical and effective to search an area on foot as opposed to LiDAR, 10 m wide transects across the entire area will be employed to determine the presence of mounds and their status.

NMRT (2016) provides some guidance as to the use of LiDAR for surveys. The National Malleefowl Recovery Group (NMRG) or an appropriate fauna specialist may be consulted for technical guidance as required for implementation of the surveys. Where LiDAR is used, the intensity of the LiDAR survey will be consistent with that previously undertaken by AAM Pty Ltd to support the biological surveys by Phoenix (2022a, 2022b). This methodology will comprise acquisition of LiDAR data with a planned vertical accuracy of 0.1m (RMS) over the DE to produce a spatially accurate point cloud and a 1 m resolution bare earth Digital Elevation Model (DEM) at 1 m resolution, and a contour model at 0.5 m interval derived from a 0.1 m LiDAR ground surface, to achieve the following accuracy specifications:

- LiDAR Vertical Accuracy  $\pm 0.1\text{m}$
- LiDAR Horizontal Accuracy  $\pm 0.15\text{m}$

All potential Malleefowl nest mounds identified by LiDAR will subsequently be ground-searched to verify if the potential locations are Malleefowl nest mounds or other landform features (e.g. spoil heaps). Monitoring will be undertaken consistent with the National Malleefowl Monitoring Procedure (NMRT 2016).

If a mound is present, a record of that mound will be made. If the mound is active (i.e. eggs present), an avoidance buffer will be implemented and disturbance avoided, unless otherwise agreed by the CEO. The buffer and controls to minimise impacts to breeding activities will be determined through consultation with technical experts (DBCA). The following will be considered:

- Revise construction methodology to minimise clearing within 50 m of the active mound. This may include installation of a single lane access road to allow vehicle movement
- As per Internal Clearing Permit Procedure, clearing boundaries will be clearly marked
- Any clearing within 50 m of the active mound will be designed to minimise habitat fragmentation; with the retention of continuous habitat considered a priority
- A decrease in speed limits to 40 km/hr to minimise potential vehicle interactions, noise and vibration
- Camera monitoring of active site until status is classified as inactive.

If, following investigation, the mound is found to no longer be active by NMRG or an appropriate fauna specialist, the 50 m buffer will be removed, and the area cleared of vegetation (if still required).

### **Chuditch**

If clearing is undertaken during the months of September, October and November in Chuditch breeding and foraging habitat (Open Woodland), pre-clearances surveys will be undertaken to mitigate any potential risk to breeding and denning females. Pre-clearances surveys will consist of 10 m wide transects across the area proposed to be cleared to determine the presence of active dens.

If an active den is identified, an avoidance buffer will be implemented, and disturbance avoided, unless otherwise agreed by the CEO. The buffer and controls to minimise impacts to breeding activities will be determined through consultation with technical experts (DBCA). The following will be considered:

- Revise construction methodology to minimise clearing within 50 m of the active mound. This may include installation of a single lane access road to allow vehicle movement
- As per Internal Clearing Permit Procedure, clearing boundaries will be clearly marked
- Any clearing within 50 m of the active den will be designed to minimise habitat fragmentation, with the retention of continuous habitat considered a priority

- A decrease in speed limits to 40 km/hr to minimise potential vehicle interactions, noise and vibration
- Avoidance of activities at night to minimise potential vehicle interactions
- Camera monitoring of active den until status is classified as inactive.

Prior to clearing of the den (outside of breeding/denning period), the following will be implemented:

- Camera established to confirm den is used by individuals
- If individuals are identified through cameras or secondary evidence, the individual will be displaced prior to clearing
- Displacement will be the preferred methodology and will be performed in consultation with DBCA and by a suitability qualified fauna specialist with BC Act approvals
- If required, trapping will be undertaken:
  - Captured Chuditch will have the following recorded; sex, weight, hind foot length (between base of toe to end of heel), head length and pouch status for females will all be recorded
  - Chuditch will be held in captivity for no more than one night and released at dusk into nearby habitat from which it was caught, once vegetation clearing activities for the designated area are complete.

### 3.5.2 Arid Bronze Azure Butterfly Survey Methodology

The following surveys for ABAB and the *Camponotus* host ant colony will be undertaken as per Table 10.

Monitoring for the ABAB includes:

- Monitoring for the presence/absence of the ABAB within the identified *Camponotus* host ant colony, to occur during construction and 1 month following construction, and then annually during operation (during the main flight period of September to October).
- Monitoring of the *Camponotus* host any colony (i.e. the habitat) during operation of the Haul Road to ensure the environmental management measures implemented for the Haul Road are adequate to protect the *Camponotus* host any colony (and the Arid Bronze Azure Butterfly, if present)

**TABLE 10: ARID BRONZE AZURE BUTTERFLY SURVEYS**

SURVEY TYPE	FREQUENCY	PURPOSE OF SURVEY	METHODOLOGY
Construction Phase Monitoring of host ant colony	During construction on a monthly basis and for one month following construction completion	Identify any Revised Proposal construction related impacts, including surveillance for meat ants	<p>Reconnaissance of existing host ant colony to identify any potential disturbance (unauthorised clearing or off-road vehicles, dust emissions impacting vegetation).</p> <p>Confirm host ant presence at sites within proximity to Revised Proposal impacts (i.e. closest to Indicative Footprint).</p> <p>Reconnaissance of existing disturbance for meat ant presence.</p> <p>At each recorded location, an observation on the condition of the nest and if <i>Iridomyrmex purpureus</i> interactions are occurring will be made. Where a <i>Camponotus sp. nr. Terebrans</i> nest has become defunct, it shall be inferred that a disturbance has occurred. Visual observations shall be made at these locations to identify any disturbance and the cause of such disturbance (e.g. disturbance from vehicle movements).</p>
Operation Phase Monitoring of host ant colony	Annually (September – October) during operations	Identify any Revised Proposal operation related impacts, including surveillance for meat ants and presence of ABAB at host ant colony.	<p>Reconnaissance inspection of existing host ant colony to identify any potential disturbance (unauthorised clearing or off-road vehicles, dust emissions impacting vegetation).</p> <p>Confirm host ant presence at sites within proximity to Revised Proposal impacts (i.e. closest to Indicative Footprint).</p> <p>At each recorded location, an observation on the condition of the nest and if <i>Iridomyrmex purpureus</i> interactions are occurring will be made. Where a <i>Camponotus sp. nr. Terebrans</i> nest has become defunct, it shall be inferred that a disturbance has occurred. Visual observations shall be made at these locations to identify any disturbance and the cause of such disturbance (e.g. disturbance from vehicle movements).</p> <p>Reconnaissance of existing disturbance for meat ant presence.</p> <p>Reconnaissance inspection of haul road within proximity to host ant colony to identify any ABAB mortalities.</p> <p>Presence of ABAB as per DBCA Guidelines (DBCA 2020, DBCA 2021). However, only one survey is required as ABAB presence is assumed and the purpose of survey is to confirm presence and potential Revised Proposal impacts.</p> <p>Should the Arid Bronze Azure Butterfly be identified in future surveys, then subsequent annual monitoring of the Arid Bronze Azure Butterfly will be undertaken during construction and operation of the Haul Road in accordance with the relevant</p>

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			<p>survey guidelines.</p> <p>Annual monitoring of <i>Camponotus</i> host ant colony during operations will be undertaken to ensure the adequacy of the management measures being implemented and if present to opportunistically identify the ABAB.</p> <p>In the event that the total number of recorded locations (129) has declined <math>\geq 10\%</math> (i.e. total reduced by 13 or more attributable to <i>Iridomyrmex purpureus</i>), Mineral Resources will seek the advice of a professional entomologist (with expertise in ants) to independently assess the locations to:</p> <ol style="list-style-type: none"> <li>a) Determine if a decline in the recorded locations of <i>Camponotus sp. nr. terebrans</i> has occurred as a result of the <i>Iridomyrmex purpureus</i> meat ant</li> <li>b) Determine the cause of any disturbance, and specifically, whether the cause of the decline can be attributed to the Haul Road</li> <li>c) Provide recommendations identifying management actions which may be implemented to allow for the recovery of <i>Camponotus sp. nr. terebrans</i></li> <li>d) Prepare an independent report addressing items a) to c) above</li> </ol> <p>Mineral Resources will advise DBCA as soon as reasonably practicable if a <math>\geq 10\%</math> decline in <i>Camponotus sp. nr. terebrans</i> is recorded by the annual monitoring</p> <p>Mineral Resources will provide to DBCA a copy of the independent report of the Entomologist, and seek agreement with DBCA on any management actions to be implemented (including responsibility for such actions).</p>
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### 3.6 REPORTING

Compliance with this SFCMP will be reported to the CEO of DWER in the annual Compliance Assessment Report (CAR) as conditioned in the Ministerial Approval Statement s45(5) of EP Act.

As identified by Table 10, additional reporting will be provided to the CEO of DWER and the CEO of DBCA in the event of mortality or injury to conservation significant fauna.

In the event that a mortality is recorded of Malleefowl or Chuditch or Bandicoot, the specimen will be vouchered with the WA Museum or DBCA for taxonomic purposes (consistent with the approach applied by Mineral Resources for at the Parker Range mine operations).

If Management Targets are not met, the CEO of DWER shall be notified within seven days. The report will include any impacts to significant fauna and vegetation and an investigation will be undertaken.

The results of the Malleefowl pre-clearance surveys will be submitted to the National Malleefowl Recovery Team.

## **4. ADAPTIVE MANAGEMENT AND REVIEW**

### **4.1 REVIEW**

Adaptive management practices based upon learnings gained from the Management Actions and Monitoring will be adopted where changed management practices may lead towards more effective environmental outcomes. The adaptive management approach may include:

- Annual evaluation against targets
- Amendment to Monitoring programme
- Review of Management Actions as the Revised Proposal implementation progresses and/or new measures/technologies become available
- Implementation of 'Contingency Actions' (refer below) in the event management targets indicate the environmental objective is not being achieved.

This SFMP will be reviewed by Mineral Resources annually and updated (if required) based upon the review outcomes. Any significant changes to this SFMP will be referred to the CEO of DWER and DCCEE for approval prior to implementation of such changes.

### **4.2 CONTINGENCY ACTIONS**

Contingency Actions are identified below (Table 11) for potential key impacts to significant fauna. Additional Contingency Actions may be identified following investigation into any incidents relating to significant fauna.



**TABLE 11: EARLY RESPONSE TRIGGERS AND ACTIONS**

MANAGEMENT TARGETS	EARLY RESPONSE TRIGGER	EARLY RESPONSE ACTION	EARLY RESPONSE TRIGGER JUSTIFICATION
<p>Avoid where possible, otherwise minimise the risk of injury/mortality of Malleefowl, Chuditch or ABAB from clearing activities</p> <p>Avoid where possible, otherwise minimise Malleefowl, Chuditch or ABAB from vehicle strike on the haul road.</p>	<p>Recorded vehicle strike of Malleefowl, Chuditch or ABAB within haul road.</p>	<p>Undertake investigation into the cause of the vehicle strike. The investigation will consider the location, cause (if known), species type, and any actions taken/proposed in response to the injury/mortality.</p> <p>Induction refresher course for site personnel on fauna controls (including management of injured fauna, reporting through the Conservation Significant Fauna Register).</p>	<p>The presence of Malleefowl and Chuditch have been confirmed within the area of the Revised Proposal and surrounds. Areas of habitat for Malleefowl and Chuditch have been mapped and occur directly adjacent to the Proposal. Due to the mobility of Malleefowl and Chuditch, and their proximity, a risk of mortality/injury from vehicle strike exists where individuals may seek to cross the haul road.</p> <p>The risk of vehicle strike to these species is not able to be quantified, however, is expected to be infrequent due to naturally low population densities, and with individuals typically seeking refuge within vegetated habitat areas (individuals generally not occupying cleared open areas for long periods of time).</p> <p>The presence of ABAB has not been confirmed, however a host ant colony has been identified (although avoided with a 100 m buffer), therefore its presence is conservatively assumed.</p> <p>Where a vehicle strike to these species is recorded, it is appropriate to consider the circumstances and outcomes of the vehicle strike, and to identify any actions taken/proposed in response to the injury/mortality.</p>
<p>Avoid where possible, otherwise minimise Malleefowl, Chuditch or ABAB from clearing activities</p> <p>Avoid where possible, otherwise minimise Malleefowl, Chuditch or ABAB from vehicle strike on the haul road.</p> <p>Minimise the risk of change in behaviour of Malleefowl, Chuditch or ABAB due to dust, light, noise or vibration.</p>	<p>Observed increase/decrease in Malleefowl, Chuditch or ABAB sightings within or adjacent to haul road.</p> <p>Observe a decline in ABAB host ant colonies</p>	<p>Review the Conservation Significant Fauna Register to determine any increase in observations, and any increase in recorded injury/mortality. Assess if species monitoring is required.</p> <p>Review of traffic management controls, determine if additional/amended controls are necessary (e.g. speed limits, fencing). Where appropriate, Mineral Resources will seek the advice of the CEO of DWER and/or CEO of DBCA on the population monitoring results and any proposed changes in the traffic management controls.</p> <p>Induction refresher course for site personnel on fauna controls (including management of injured fauna, reporting through the Conservation Significant Fauna Register).</p>	<p>Due to high mobility and naturally low population densities, the observed number of Malleefowl and Chuditch within the area of the Proposal may be observed/perceived to change over time. Observations should be reviewed against previous observation, with monitoring data obtained where necessary.</p> <p>Where there is an observed change in species' sightings within or adjacent to the haul road (which is verified by ABAB monitoring or records of the Conservation Significant Fauna Register), an increased presence may be considered a potential increased risk of injury/mortality. A decreased presence may be considered a result of changed behaviour from dust, light, noise and/or vibration caused by the Proposal. In this event, it is appropriate to consider if additional/amended traffic or dust management controls are necessary (e.g. change to speed limits, fencing of habitat areas, further dust suppression), and for site personnel to undertake a refresher environmental induction on the fauna controls.</p> <p>Mineral Resources will seek the professional advice of an entomologist in the event of a decline in the <i>Camponotus</i> host ant colony. It is noted that a decline is detected across the whole <i>Camponotus</i> host ant colony then the causes would likely not be related to the Haul Road (with possible causes being changes in climatic conditions such as unseasonal dry weather, a cyclone or severe rain depression, or an event such as a bush fire).</p>
<p>No introduction of meat ants into the ABAB host ant colony.</p> <p>No increase in feral animal populations within the Development Envelope.</p>	<p>Observed increase in introduced fauna (foxes, dogs, cats or meat ant) sightings.</p>	<p>Consultation with CEO DBCA to understand the regional introduced fauna control measures being implemented, with a view towards identifying if additional targeted introduced fauna controls (e.g. trapping, culling) are appropriate for the Proposal.</p>	<p>Predatory introduced fauna taxa (foxes, dogs and cats) have also been recorded within the area of the Proposal and surrounds; with the introduced fauna known to predate on Malleefowl and Chuditch.</p> <p>Introduced fauna taxa have been known to use cleared tracks and roads (such as for the Proposal) to facilitate their movement; which may in turn result in an increase in exposure of Malleefowl and Chuditch to predation.</p> <p>The risk of a change to predation on Malleefowl or Chuditch by introduced fauna taxa is not able to be quantified, however, is not an expected outcome of the Proposal, nor expected to present a greater risk than other local roads in the local area.</p> <p>The ABAB host ant population is at risk of impact from meat ant competition, which may be introduced through Proposal related vehicles (during construction and operations) or unauthorized off-road vehicles. Monitoring for meat ant presence will be undertaken and consultation with DBCA will be undertaken if identified.</p> <p>Meat ants are already present in low numbers at the location of the <i>Camponotus</i> host ant colony, and that meat ants peacefully cohabit with <i>Camponotus</i> ants Australia-wide. Conflict may only arise if <i>Camponotus</i> nests are disturbed significantly, with such disturbance avoided through the nominal 100 m separation distance between the Haul Road and the <i>Camponotus</i> host ant colony. Mineral Resources will seek the professional advice of an entomologist in the event that conflict between the meat ants is detected within the <i>Camponotus</i> host ant colony.</p> <p>Where there is an observed increase in introduced fauna sightings within or adjacent to the haul road, or in host ant colonies as a result of Proposal activities, it is appropriate to consider if the existing regional introduced fauna control measures are sufficient, or if additional targeted introduced fauna controls (e.g. trapping, culling) are appropriate for the Proposal.</p>

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## 5. STAKEHOLDER CONSULTATION

Stakeholder consultation undertaken in the development of this SFMP is summarised in Table 12. Further consultation will be undertaken with DBCA and NMRG as the SFMP is implemented, and it is therefore likely that revisions will be made if further guidance is provided by these stakeholders.

**TABLE 12: STAKEHOLDER CONSULTATION**

DATE	TYPE	STAKEHOLDER	ATTENDEES	PURPOSE AND ITEMS DISCUSSED	MATTERS RAISED	PROPONENT RESPONSE / OUTCOME
28-10-2019	Email	DPIRD	DPIRD - Craig Robins	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys. Access to Emu Proof Fence Rd where access restricted.	No issues raised.	Permit granted for access 13-23rd November. Further consent to extended field survey timeframes required.
29-10-2019	Email	Dusky Holdings & Lithos Exploration Services	Dusky Holdings & Lithos Exploration Services	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys.	No issues raised.	N/A
29-10-2019	Email	Tianye Sxo Gold Mining	Tianye Sxo Gold Mining	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys.	No issues raised.	Request for tenement expenditure.
29-10-2019	Email	Hurricane Prospecting	Vernon Strange	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys.	No issues raised.	N/A
29-10-2019	Email	Hurricane Prospecting	Vernon Strange	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys.	No issues raised.	N/A
22-11-2019	Email	DBCA	DBCA - Lindsay Bourke, Murray Baker, Michelle Corbellini, Nicholoas Woolfrey EPA - Robert Hughes Mineral Resources - Les Purves, Neil Smith	Response to email regarding potential land acquisition where DBCA have an interest in land for restoration and conservation.	No issues raised.	DBCA to provide list of potential freehold land parcels that have been identified through desktop assessment as having suitable characteristics (e.g. suitable area, proximity to other reserves, representation of poorly reserved vegetation types, or threatened flora and fauna) for addition to the conservation estate.
06-12-2019	Email	DBCA	DBCA - Lindsay Bourke, Nicholas Woolfrey EPA - Robert Hughes Mineral Resources - Neil Smith	Response to email regarding potential land acquisition where DBCA have an interest in land for restoration and conservation.	No issues raised.	DBCA to provided list of potential freehold land parcels that have been identified through desktop assessment as having suitable characteristics (e.g. suitable area, proximity to other reserves, representation of poorly reserved vegetation types, or threatened flora and fauna) for addition to the conservation estate.
07-07-2020	Various Emails	Tenement holders	Hurricane Prospecting Pty Ltd Vernon Strange Tianye Sxo Gold Mining Pty Ltd Barto Gold Mining Pty Ltd Black Dragon Energy (Aus) Pty Ltd Dusky Holdings Pty Ltd Thomas Corr	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys.	No issues raised.	Access granted by underlying tenement holders.
17/28-09-2020	Various Emails	Tenement holders	Aurenne Parker Range Pty Ltd Hurricane Prospecting Pty Ltd Vernon Strange Tianye Sxo Gold Mining Pty Ltd Barto Gold Mining Pty Ltd Black Dragon Energy (Aus) Pty Ltd Bullseye Mining Dusky Holdings Pty Ltd Thomas Corr	Notification of proposed upgrades to Emu Fence Rd and Parker Range Rd for dedicated haul road and upcoming supporting flora/fauna surveys.	No issues raised.	Access granted by underlying tenement holders.

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09-10-2020	Teams Meeting	Shire of Yilgarn	Shire - Peter Clarke, Rob Bosenberg	Parker Range road realignment Rodgers Road temporary road option Extent of disturbance to upgrade Emu Fence Road to proposed RAV rating	Shire confirmed that proposed upgrades to Emu Fence Road will require a NVCP to clear previously undisturbed vegetation. Shire has no capacity to clear to the extent required to complete all upgrades.	Shire supports Parker Range road realignment and Rodgers Road temporary road option NVCP will be progressed.
23-10-2020	Teams Meeting	EPA	EPA - Robert Hughes, Natalie McAlpine Various Mineral Resources representatives	Pre-referral meeting: Introduction of private haul road option. Upgrades to Emu Fence Rd (Sth of GE Hwy) still proposed - NVCP to be submitted by Shire. Provided indication of environmental impacts. Proposed changes to conditions: removal of original proposal upper haul rd; update of fauna conditions (species updates); PRCT removal; removal of trenching and air quality conditions	No major issues identified with proposed changes to conditions through re-referral process. Offset conditions likely to require review given the additional impacts of the proposal. Adequate stakeholder engagement will be required, particularly DCCEEW in relation to the EPBC statement and MNES. Flora/Fauna report & datasets to be referred to TEB who would provide advice on assessment level (i.e. Mineral Resources hopeful that ARI will be adequate). Referral form to be submitted with flora/fauna report and datasets. EPA highlighted resourcing issues in the department. Approval timeframes 6-8mths review and EPA report + 2 months for ministerial statement to be issued.	MRL to provide flora and fauna data for EPA/TEB review. Mineral Resources/EPA to investigate options to support resourcing deficiencies - EPA to report back whether Mineral Resources could support additional resources in the EPA to focus on Mineral Resources proposals.
10-11-2020	Teams Meeting	DWER-EPA	EPA - Anthony Sutton, Natalie McAlpine, Troy Sinclair JBS&G - Kane Moyle Various Mineral Resources representatives	Proposed haulage route to include upgrades to Emu Fence Rd. Studies completed and initial assessment of environmental values to be impacted. Approvals strategy.	EPA advised that NVCP will not be an acceptable approvals process for associated clearing and impacts. MS 892 assessed a haul road so amendment under a new referral likely to be required for new alignment.	Update of approvals strategy to be determined and communicated to EPA for acceptance.
20-11 --2020	Teams Meeting	Shire of Yilgarn	Shire - Peter Clarke, Rob Bosenberg Various Mineral Resources representatives	Negotiations with various tenement holders ongoing to enable construction of the Parker Range diversion rd. Introduction of private haul road option. Upgrades to Emu Fence Rd (Sth of GE Hwy) still proposed - NVCP to be submitted by Shire prepared by Mineral Resources Interim solution utilising GE Hwy & Mt Walton Rd to Carina presented. Rodgers Rd option lower priority.	No issues raised.	Mineral Resources to present NVCP application to Shire once drafted. Mineral Resources to present designs of private haul rd to Shire at next meeting.
23-11-2020	Teams Meeting	EPA	EPA - Robert Hughes, Natalie McAlpine Various Mineral Resources representatives	Pre-referral meeting: Introduction of private haul road option. Upgrades to Emu Fence Rd (Sth of GE Hwy) still proposed - NVCP to be submitted by Shire. Provided indication of environmental impacts. Proposed changes to conditions: removal of original proposal upper haul rd; update of fauna conditions (species updates); PRCT removal; removal of trenching and air quality conditions	No major issues identified with proposed changes to conditions through re-referral process. Offset conditions likely to require review given the additional impacts of the proposal. Adequate stakeholder engagement will be required, particularly DCCEEW in relation to the EPBC statement and MNES. Flora/Fauna report & datasets to be referred to TEB who would provide advice on assessment level (i.e. Mineral Resources hopeful that ARI will be adequate). Referral form to be submitted	Mineral Resources to provide flora and fauna data for EPA/TEB review. Mineral Resources/EPA to investigate options to support resourcing deficiencies - EPA to report back whether Mineral Resources could support additional resources in the EPA to focus on Mineral Resources proposals.

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					with flora/fauna report and datasets. EPA highlighted resourcing issues in the department. Approval timeframes 6-8mths review and EPA report + 2 months for ministerial statement to be issued.	
23-11-2020	Teams Meeting	DPIRD	DPIRD - Craig Robbins Various Mineral Resources representatives	Introduction of private haul road option. Upgrades to Emu Fence Rd (Sth of GE Hwy) still proposed - NVCP to be submitted by Shire. Provided indication of environmental impacts. Provided context of proximity of fence to private road footprint.	Only concerns with proposed private option is the potential impacts of surface water on fence and the positioning of the fence in the longer term (i.e. post MRL use of road - closure assumptions). DPIRD may be able to provide some suggestions for fence crossings to reduce breaks in fence.	Mineral Resources to confirm private road designs and arrange face to face meeting with DPIRD to go through designs.
11-12-2020	Meeting (DPIRD Offices)	DPIRD	DPIRD - Craig Robbins Mineral Resources - Phil Slater	Provide DPIRD an opportunity to review the proposed haul road layout and provide comment.	Fence line alignment to ensure no corners are created which would impede animals easily following the fence line corridor. Adequate access track either side of the fence to be maintained for fence maintenance. Erosion of the fence from surface water flows is DPIRD's main concern. DPIRD identified that there may be alternatives to cattle grid crossings that DPIRD would like Mineral Resources to look at trialling	Design will include appropriate access tracks either side of fence (ideally 10m either side of fence) where possible. Enlarged table drains will be utilised to limit the need for run off (swale) drains - designs will be revised accordingly. Further information on cattle grid alternatives to be provided by DPIRD.
18-01-2021	Meeting - EPA Office	EPA	EPA - Robert Hughes, Natalie McAlpine Various Mineral Resources representatives	Private Haul Road project definition Approval pathway - revised proposal where existing minesite impacts do not form part of the referral - assessed as ARI Confirmation of expected impacts of revised proposal and their significance. Requirement for Offsets and strategy. Deferral of implementation of offsets for original proposal in light of new offset requirements - potential removal of PRCT conditions from MS892. Greenhouse Gas Assessment	EPA confirmed s38 referral and mine does not form part of the assessment. 4 week TEB review to confirm adequacy of survey effort as per EPA guidance. 12 week EPA assessment period following public consultation period and advice from other DMA's Mineral Resources to meet with EPA Chair/Dept Chair to present approvals strategy, significance assessment and offsets. Requirement for at least two weeks public comment for ARI if being assessed under EPBC Act bilateral agreement Mineral Resources encouraged to demonstrate in ERD how impacts are avoided and minimised for priority species. New species ( <i>Microcorys</i> ) impacts need to be mitigated as much as possible. EPA tends to treat impacts like Threatened species until information is known about extent of population. DCCEEW will be most interested in impacts to breeding and foraging habitat and not just potential impacts to individuals. EPA confirmed that an offset based on habitat was simpler than justifying impact to individuals.	Mineral Resources to arrange meeting with EPA Chair/Dept Chair

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					<p>Consider the potential for fauna crossings in critical habitat areas</p> <p>Approach for dealing with PRCT separate to the revised proposal was supported. Robert recommended Mineral Resources write to the Department at the time of the revised proposal submission to request an extension from the CEO to constitute the PRCT in-light of the revised proposal and opportunity to align offsets at the completion of this assessment. Section 46 the right approach to amend offset conditions to make consistent between both proposals.</p> <p>Assessment approach on GHG emissions was confirmed. Not a key environmental factor, but will need to be considered in ERD. MRL to provide advice on any temporal change in emissions</p>	
10-02-2021	Teams Meeting	DCCEEW	DCCEEW - Leo Pure, Matthew Kuntsi, Rebecca Baumgartner Mineral Resources- Les Purves, Neil Smith, Adam Parker Strategen - Kane Moyle (Strategen)	Private Haul Road project definition Approval pathway - revised proposal where existing minesite impacts do not form part of the referral - assessed as ARI Confirmation of expected impacts of revised proposal and their significance. Requirement for Offsets and strategy.	<p>Confirmation that SBF is not causing an impediment to movement of Chuditch and Malleefowl with records found on both sides of SBF.</p> <p>MK - potential for the requirement for speed restrictions for areas where active Malleefowl mounds or Chuditch dens are identified.</p> <p>MK – confirmed that DCCEEW would be looking for the block to be vested and managed by DBCA, rather than any clear guidance on the level of conservation status, i.e. requirement for Class A reserve or the like.</p> <p>MK – Assessment timeframes appeared tight but achievable provided the supporting information was adequate for assessment.</p>	DCCEEW to review the details of the Covalent Lithium Edna May operation that had similar MNES identified to provide detail on the use of the habitat scoring methodology used in the offsets calculations.
16-04-2021	Meeting	DBCA	DBCA - Lindsay Bourke, Cassyanna Gray, David Jolliffe Mineral Resources - Neil Smith, Susanna Beech, Andy Williams	Provide update to DBCA of extension of haul road (12kms) to Koolyanobbing Implications of identification of ABAB host ant colony	<ol style="list-style-type: none"> <li>1. AW – confirmed that the host ant surveys completed to date are expected to be adequate based on previous experience of Rod Eastwood.</li> <li>2. AW – confirmed that the survey methodology proposed for detecting the ABAB in Sept-Oct was appropriate. While the ABAB could be detected year round, the primary flight period is Spring, secondary in Autumn, and that warm weather generally triggers ABAB flight.</li> <li>3. AW - confirmed that any host ant colony should be considered significant due to the low number of known sites.</li> <li>4. AW – absence of the ABAB at a host ant colony does not discount the significance of the colony. ABAB are transient and may not lay eggs at a particular colony every year but may in the future. 'No ant colony, no ABAB'.</li> <li>5. AW – advised that it may be possible to find the larvae prior to the flight period (Sept-Oct). Noted that larvae have been found previously with a preference to the eastern facing slopes of the ant mound (morning sun).</li> </ol>	Mineral Resources to arrange separate meeting to discuss the process of transfer of proposed offset site to DBCA (conservation mechanism, management liabilities etc).

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					<p>6. AW – did not confirm what percentage loss of an identified host ant colony/ABAB population would be considered acceptable within a single population but confirmed that habitat fragmentation and increased risk of vehicle strike depending on the positioning of the haul road would need to be taken into consideration.</p> <p>7. AW – Requested further time to review technical information related to the Barbalin site and the potential expansion of the host ant population to expand over time at this site to determine what an appropriate buffer distance would be. Suggested ~200m. Confirmed that the approximate territorial distance of the male ABAB was ~25m and that female ABAB tend to lay the majority of their eggs within the extent of the ant colony but may keep a smaller amount of eggs and search for new ant colonies for egg laying. AW did confirm however that it was likely that most females would die without reaching a different colony and laying eggs. Main ABAB flying period was 9:30am – 3:30pm.</p> <p>8. AW- suggested that the short mine life (5 years) would allow the proponent to be less cautious about project impacts. Consideration would need to be given to post mining land use for the road, i.e. remain a regional asset managed by the Shire or rehabilitated. SB noted that vehicle frequency would be greatly reduced following the cessation of mining operations.</p> <p>9. LB – suggested a separate meeting/discussion related to the offset site, conservation mechanism/transfer to DBCA, management liabilities etc.</p> <p>10. LB – advised that DBCA would like to inspect Lot 1416 to confirm ongoing management liabilities prior to transfer.</p> <p>11. LB - subdivision of the arable farmland from Lot 1416 should consider provision of a firebreak, 5m from the vegetation, and appropriate fencing should the arable section be utilised for grazing.</p>	
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21-04-2021	Meeting	<p>NGO's</p> <ol style="list-style-type: none"> <li>1. National Malleefowl Recovery Team</li> <li>2. Wildflower Society</li> <li>3. Wilderness Society</li> <li>4. Birdlife WA</li> </ol>	<p>Mineral Resources - Neil Smith, Dan Baker, Adam Parker                      NMFRT - Liz Lington                      Wildflower Society - Brian Moyle                      Birdlife WA - Alasdair Bulloch, Mark Henryon                      Wilderness Society - Pat Gardner</p>	<p>Stakeholder update on the proposed PRIOP Private Haul Road to Koolyanobbing.</p>	<p>General objection expressed to any further development in the Temperate Forrest (supports 30% of all Australian birdlife, 214 species)                      Interested in the actual consultants Mineral Resources used for baseline studies.                      A lot of interest around offsets. Very sceptical on the preservation of blocks for direct offset. Mineral Resources were only complying with the directions / policies of Federal &amp; State Governments. Their view was disturbance in these blocks was unlikely to be approved by regulators anyway. Requested the name of the Farmer for lot 1416. Mention of Helena Aurora and the land vesting around offsets. Mineral Resources confirmed they are working with DMIRS and DCBA in regard the appropriate vesting to manage the offset. Clear preference raised by NGO's for rehabilitation over offset, cynicism over DCBA ability to manage offset blocks due to variability in funding.                      They requested an update on the <i>Isopogon Robustus</i> at Parker Range mine. This was responded to at the meeting.                      Concern was expressed over the need for duplication of roads and the life of the asset (~5years) - equating to further removal of native vegetation. Safety issues around transport were explained. They questioned Mineral Resources decision for transporting ROM rather than processed product expressing ~20% reduction in transport efficiency between the two products.                      There was disappointment that the mining of Parker Range was approved and stating this range will now be lost forever. Discussion on the Azure Butterfly potential habitat and Mineral Resources avoiding this by diverting the haul road. The suggestion that a 200m buffer may not be enough due to vibration impacts. Mineral Resources had taken advice on this from experts.                      Issue of special deal Mineral Resources were given in regard to concession on Royalties and they hoped this ore would attract the full Tax and royalty rates. Indicated this wasn't something we could comment on.</p>	<p>Mineral Resources to provide update on status of the previous Community Consultative Group as haven't met for some time.                      Mineral Resources to provide copies of the presentation to attendees.</p>
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25/26-05-2021	On site meeting	DCCEEW	DCCEEW - Vaughn Cox, Kara De Fey, Hannah Mineral Resources - Neil Smith, Adam Parker	Field visit to Lot 451 and Lot 1416 offset locations	<p>Lot 1416 DCCEEW will complete an assessment of the habitat scoring methodology and the offset calculator to determine suitability of the direct offset requirements. This should be provided as soon as possible to enable discussions/negotiation on calculations etc. Lot appears to provide suitable habitat for both Malleefowl and Chuditch. It will be important to define what management actions will be implemented improve the habitat quality of the lot. Monitoring programs (camera trapping etc.) will be crucial to determining the presence of species. Not concerned about access track running down the centre of the lot. Could act as an important fire break/access track for management activities. The issue raised about requirement for uplift (encouraging the habitation of MNES and achieving the offset objective. What would happen in the event of fire within the timeframes associated with the offset? Lot 451 Detail will need to be provided in the OMP as to restoration/rehabilitation activities to be completed between the vegetated areas of the lot. Time to reach completion criteria will need consideration. Unlikely that it will be possible to fully rehab are return arable farming land to representative vegetation within the life of the approval - need to be careful about the selection of completion criteria/timeframes. Consideration should be given to linking Lot 451 to the GWW to the south (further rehabilitation) to encourage fauna movement to lot 451 from the surrounding areas. Further Malleefowl surveys in the adjacent GWW could be beneficial to determining their presence within the surrounding area and potential for return into Lot 451.</p>	N/A
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02-06-2021	Teams Meeting	DBCA	DBCA - David Jolliffe, Lindsay Bourke Mineral Resources - Adam Parker, Neil Smith, Les Purves	Update on lot 1416 and the flora / fauna values and the meeting with DCCEEW.	No issues raised.	DBCA to visit the lot on 16 June and provide a response to Mineral Resources a few weeks later - formal response through their DG DBCA confirmed the requirement for fire breaks and would provide further advice as it relates to subdivision following the June inspection. DBCA will investigate requirements for an easement or agreement with neighbouring pastoralist regarding maintaining access through Lot 1416 along existing track. DBCA will allow access for monitoring and controls once land transferred. DBCA confirmed that there are currently no feral animal baiting programs over lot 1416 or the adjoining reserves. Given the fauna values that have now been identified (evidence of Malleefowl and Chuditch) there may be potential for this area to be included in regional baiting programs - DBCA to investigate. If Mineral Resources push for lot1416 to be classified as Class A reserve - DBCA preferred position. Lindsay DBCA to provide advice on an option to do a direct transfer to DBCA at time titles created rather than Mineral Resources hold then transfer after the reserve created. Mineral Resources to provide shapefiles from the Phoenix surveys to DBCA ahead of the site visit 16 June.
23-06-2021	Face to face meeting	Wheatbelt Development Commission	Mineral Resources - Glenn Dovaston, Daniel Barker WDC - Grant Arthur	Update on Yilgarn Operations.	A possible 'native seed harvesting' program to help bolster the availability of seedlings to meet the future needs of mining rehabilitation.	Not overly interested in seeking Mineral Resources commitment to anything - main focus remains on agriculture.
07-10-2021	Email	EPA	Mineral Resources - Adam Parker, Neil Smith EPA - Natalie McAlpine, Robert Hughes	Update on Mineral Resources actions in response to the RFI associated with assessment 2297 and seek advice on how Mineral Resources would progress this in relation to proposed changes. After this formal RFI, Mineral Resources have reviewed the scope of the Parker Range Haul Road based on continuing discussion with Shire of Yilgarn and use of the existing Emu Fence Road, south of Great Eastern Highway, with vehicle rating concession. As a result, Mineral Resources would be looking to lodge a formal request to change the proposal, during assessment. Given feedback from the RFI's requesting a revised supporting document to include the supplementary information, it would be our intent to further revise the s38 supporting document to incorporate the revised proposal. We have discussed the change process with DCCEEW in respect to the EPBC referral and bi-lateral assessment and they have indicated they would reach out to you independently before confirming a process. Mineral Resources would	No issues raised.	Natalie McAlpine responded on 28/10/21. As the EP Act amendments have now been proclaimed (22 October 2021) the transitional arrangements for s. 43A changes to proposal will apply. Please read through the interim and new guidance applying to s.43A prior to submitting the application. The procedures manual has also been updated, which provides further detail on the s.43A process. The s.43A will need to be assessed and approved, prior to continuing with the assessment of the revised proposal. I am happy to have a chat to discuss next steps after the s.43A process .

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				appreciate a discussion about the process ahead of actions to provide an appropriate document to progress assessment of this revised proposal as this has the potential to significantly change some aspects of the proposal specifically around clearing and offsets. MRL would welcome any opportunity to discuss, including the status of the current assessment and what these proposed changes would mean.		
22-10-2021	Teams Meeting	DCCEEW	DCCEEW - Arwen Tilney Mineral Resources - Adam Parker, Neil Smith	Advise DCCEEW of the proposed changes to the referral, i.e. reduced extent of haul road and utilisation of public roads for a component of the haulage solution	DCCEEW confirmed application under s.156A would be required. DCCEEW would communicate with DWER-EPAS to confirm the requirements under the accredited assessment process.	Application under s. 156A of EPBC Act to be submitted to DCCEEW.
28-10-2021	Email	DWER	DWER - Natalie McAlpine, Robert Hughes	Advise DWER of the proposed changes to the referral, i.e. reduced extent of haul road and utilisation of public roads for a component of the haulage solution	DWER confirmed s. 43A changes to proposal will apply. The s.43A will need to be assessed and approved, prior to continuing with the assessment of the revised proposal.	Mineral Resources to submit a s. 43A application in accordance with updated guidance.
01-11-2021	Face to face meeting	DPIRD	Mineral Resources- Daniel Barker, Peter Anderton, Matt Devlin DPIRD - Craig Robins	Meeting to progress the revised Parker Range Haulage Solution.	Craig stressed the importance of retaining enough space for an access track on the East side of the fence (preferably 6m, but could work with 4m in the tight spots).	Craig remains supportive of the proposal, and in particular the revised plan that reduces the impact on the fence to the South of GEH. When sending through our draft agreement, we just need to supply detailed maps/designs that show the locations where the fence will be moved or broken, including detail showing the space allowed for between our road/the fence/the DPIRD reserve boundary. Craig will be recommending that squawker boxes be installed at each location where we are breaking the fence (x3) at an estimated additional cost of \$500 per unit.
26-11-2021	Email	Water Corporation	Mineral Resources - Phil Slater, Silvia Casquillo Water Corp - Perry Beor	Water Corp access track - decommission	Water have a registered maintenance track which was once used to from GEH. Vegetation has built up over the track indicating that the track is no longer used. Mineral Resources have queried if the track can be closed off from GEH where Mineral Resources propose to construct the acceleration lane from Emu Fence Rd.	Water Corp have confirmed the track is no longer required and the acceleration lane can progress as planned.
09-08-2022	Report	DCCEEW EPA DBCA Public	-	Significant Fauna Management Plan released with Environmental Review Document for Government and public consultation.	Minor changes required to Significant Fauna Management Plan	Mineral Resources has amended the Significant Fauna Management Plan to address matters raised in the submissions.

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## **7. APPENDICES**

### **Appendix A**

#### **Risk Assessment**

**APPENDIX A – RISK ASSESSMENT**

**Risk Assessment Methodology**

Consequence Rating					Likelihood of Occurrence	
Insignificant (1)	Minor (2)	Moderate (3)	Major (4)	Severe (5)		
Minor environmental impacts contained within site	Contamination or damage sufficiently large to impact the environment but without permanent impacts	Limited but non-permanent damage to environment, recoverable within 1 year Repeated or significant breach of regulatory compliance limits	Severe damage requiring extensive measures to restore polluted or damaged environment Repeated significant or a single major breach of regulatory compliance limits	Persistent severe environmental damage extending over a large area. Damage cannot be fully rehabilitated/remediated. Duration of harm >5yrs		
Risk Rating					Likelihood of Occurrence	
H-15	H-10	E-6	E-3	E-1	May occur frequently at site Expect to occur >2 times per year	<b>Almost Certain (A)</b>
M-19	H-14	H-9	E-5	E-2	May occur frequently within the sector Expect to occur 1-2 times/year	<b>Likely (B)</b>
L-22	M-18	H-13	E-8	E-4	May have occurred several times in the past the sector 50% chance of occurring in one year (occurs in 1-10 years)	<b>Possible (C)</b>
L-24	L-21	M-17	H-12	E-7	May have happened before within the sector but only on rare occasions 25% chance of occurring in one year (occurs in 25-100 years)	<b>Unlikely (D)</b>
L-25	L-23	M-20	H-16	H-11	May occur in exceptional circumstances. 5% chance of occurring in one year (occurs >every 100 years)	<b>Rare (E)</b>

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**Risk Assessment**

Activity	Impact	Inherent Risk			Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Clearing of fauna habitat Vehicle movement	Loss of fauna habitat	3	B	H9	No native vegetation clearing beyond the approved clearing area. Demarcation of clearing areas. 100% compliance with Site Disturbance Permit and Land Clearing Procedures	Native vegetation clearing to be limited to within the approved clearing areas through implementation of infrastructure field survey (including clearing demarcation) and adherence to Site Disturbance Permit and Land Clearing Procedures.	3	D	M17
	Individual death or injury due to construction vehicle strikes	2	B	H14	Avoid and/or minimise the risk of injury/mortality of Malleefowl, Chuditch or ABAB from clearing activities	Establish and maintain a 'Significant Fauna Register' to record all observations of conservation significant fauna (e.g. sightings of individuals [including mortalities/injury], nests/dens, host ant colony, etc) to inform the construction and operation of the Project.  Spatial data associated with Significant Fauna Register is used in Site Disturbance Permit and Land Clearing Procedures to avoid active Malleefowl mounds, Chuditch dens and ABAB host ant colony.  A fauna spotter to be present during native vegetation clearing to handle/move conservation significant fauna, if present.  Significant fauna handled/moved to be recorded through the Significant Fauna Register.  Any injured significant fauna to be taken to a local wildlife carer or vet, or as otherwise advised by CEO of DBCA.	2	D	L21
Clearing of fauna habitat Vehicle movement	Loss of fauna habitat Individual death or injury	3	B	H9	Avoid clearing of 'active' Malleefowl mounds during the breeding season.	Clearing that will impact on Malleefowl habitat or inactive mounds will be preferentially undertaken outside the mound building, breeding, and egg incubation period (i.e. between September to January) to the maximum extent practicable  Undertake 'pre-clearance' field survey for Malleefowl within 30 days prior to the clearing of native vegetation, if the clearing is to occur during the breeding season (September to January inclusive, annually). The field survey will cover the area proposed to be cleared.  If active mounds are identified within the clearing area, an avoidance buffer will be implemented and disturbance avoided, unless otherwise agreed by the CEO. The buffer and controls to minimise impacts to breeding activities will be determined through consultation with technical experts (DBCA and/or NMRG). The following will be considered:  <ul style="list-style-type: none"> <li>Re-design of haul road to maximise buffer distances</li> <li>Re-design of construction methodology to minimise clearing within 50 m of the active mound. This may include installation of a single lane access road to allow vehicle movement</li> <li>As per Internal Clearing Permit Procedure, clearing will be clearly marked</li> <li>Any clearing within 50 m of the active mound will be designed to minimise habitat fragmentation, with the retention of continuous habitat considered a priority</li> <li>A decrease in speed limits to 40km/hr to minimise potential vehicle interactions, noise and vibration</li> <li>Monitoring of active site through cameras under status is classified as inactive Malleefowl habitat containing an 'active' mound to be demarcated to inform site personnel, as necessary.</li> </ul>	3	E	M20

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Activity	Impact	Inherent Risk			Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
						All Malleefowl, active and inactive mounds will be recorded in a "Threatened Fauna Register" which will include date, observer, status of mound/Malleefowl and a GPS/location description  Clearing of the active mound can be undertaken once it has been confirmed as inactive by a fauna specialist as per National Malleefowl Monitoring Procedure (NMRT 2016).			
Clearing of fauna habitat Vehicle movement	Loss of fauna habitat Individual death or injury	3	B	H9	Avoid clearing of 'active' Chuditch dens during the breeding season.	Undertake 'pre-clearance' field survey for Chuditch within 30 days prior to the clearing of native vegetation within identified breeding habitat (Open Woodland), if the clearing is to occur during the breeding season (September to November inclusive, annually). The field survey will cover the area proposed to be cleared.  If an active den is identified within the clearing area, an avoidance buffer will be implemented and disturbance avoided, unless otherwise agreed by the CEO. The buffer and controls to minimise impacts to breeding activities will be determined through consultation with technical experts (DBCA). The following will be considered: <ul style="list-style-type: none"> <li>• Re-design of haul road to maximise buffer distances</li> <li>• Re-design of construction methodology to minimise clearing within 50 m of the active mound. This may include installation of a single lane access road to allow vehicle movement</li> <li>• As per Internal Clearing Permit Procedure, clearing will be clearly marked</li> <li>• Any clearing within 50 m of the active den will be designed to minimise habitat fragmentation, with the retention of continuous habitat considered a priority</li> <li>• A decrease in speed limits to 40 km/hr to minimise potential vehicle interactions, noise and vibration</li> <li>• Avoidance of night time activities to minimise potential vehicle interactions</li> <li>• Monitoring of active den through cameras under status is classified as inactive</li> </ul> Once the breeding/denning season is completed (when dependent young are considered unlikely in approximately November), any relocation activities that may be required will be completed, then clearing can commence.	3	E	M20
Clearing of fauna habitat Vehicle movement	Loss of fauna habitat Individual death or injury	3	B	H9	Avoid clearing of ABAB host ant colonies	If host ant colonies are identified, a 100 m avoidance buffer will be implemented with no Proposal related disturbance to occur.  Clearing within 15 km of identified host ant colony will preferentially occur outside of the main ABAB flight period (September to October) to minimize interactions.  Existing access roads into host ant colonies will be fenced off to prevent Proposal related access, where possible existing disturbed areas will be rehabilitated.	3	E	M20
Vehicle movement	Individual death or injury	3	B	H9	Minimise the risk of injury/mortality of Malleefowl, Chuditch or ABAB from vehicle strike on the haul road.	Vehicle speeds along the Haul Road will be limited to 80 km/h during operation. During construction, vehicle speeds may be limited to 40 km/h in areas where active Malleefowl breeding is identified.  Ensure personnel drive to road and weather conditions.  Install and maintain speed limit signage to minimise the risk of vehicle-fauna collision.  Install and maintain fauna signage (e.g. with pictures of fauna) at the boundaries to identified significant habitat areas (ie active mounds or den and host ant colonies) to inform site personnel.	3	E	M20

Activity	Impact	Inherent Risk			Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
						Minimise the risk of vehicle strike to Chuditch by removing any observed fauna carcass from the haul road area (move to outside of road surface and adjacent batters/drains) to minimise scavenging.			
Construction activities – excavations and containers	Individual death or injury	2	B	H14	Avoid and/or minimise the risk of injury/mortality of conservation significant fauna within water storage containers and ground excavations (> 2 m depth).	<p>Install egress points and/or fauna ladders in water storage containers and ground excavations (&gt; 2 m depth) to assist fauna with escape in the event of inadvertent access or secured against animal entry at the close of each day, where possible.</p> <p>Water containers to be secured when not in use.</p> <p>All construction pipes, culverts, or similar structures, greater than 0.5 m in diameter, stored on-site overnight, will be inspected thoroughly for wildlife by a qualified biologist or properly trained on-site personnel before the pipe is buried, capped, used, or moved. If inspection indicates presence of conservation significant species inside stored materials or equipment, work on those materials will cease until a suitably qualified environmental professional determines the appropriate course of action.</p>	2	E	L23
Clearing of fauna habitat Vehicle movement	Increased predation and competition from introduced species	2	B	H14	<p>Compliance with weed hygiene procedures including completion of a weed hygiene certificate for all vehicles/machinery</p> <p>No introduction of meat ants into the ABAB host ant colony.</p> <p>No increase in feral animal populations within the Development Envelope.</p>	<p>Implement vehicle hygiene procedures for the inspection and cleaning of vehicles, machinery and equipment entering the area of the Proposal to minimise meat ant introduction.</p> <p>Introduced species identified will be reported to the Environmental Department and recorded to monitor occurrences.</p> <p>Monitoring of host ant colony during construction and for the one month following construction completion will occur, to identify any signs of decline, including surveillance for meat ants.</p> <p>Implementation of internal clearing permit system to prevent off-road vehicle movement to minimise meat ant introduction.</p> <p>Avoid attraction of feral species to the Development Envelope by implementing domestic waste management procedures (e.g. secure lids on bins).</p> <p>Feral species control will be undertaken along the haul road in cooperation with regional control programs, if required.</p>	2	D	L21
Clearing of fauna habitat Vehicle movement	Individual displacement	2	C	M18	<p>Minimise the risk of change in behaviour of Malleefowl, Chuditch or ABAB due to dust, light, noise or vibration.</p> <p>Emissions of dust are minimised and controlled to an acceptable level, without detrimental effects to fauna habitats adjacent to the Proposal.</p>	<p>Subject to safe operating procedures, lighting (where installed) will not be directed towards retained native vegetation to minimise light emissions (light spill) into adjacent fauna habitats.</p> <p>Where applicable, vehicles will comply with relevant Australian Standards for noise emissions.</p> <p>Control emissions of dust through:</p> <ul style="list-style-type: none"> <li>Minimise the extent of open cleared areas prone to dust lift by wind, where practicable.</li> <li>Installation of bitumen along haul road to minimise dust emissions</li> <li>Minimise of land clearing activities during windy conditions.</li> <li>Restrict vehicle speeds to 40 km/hr along gravel/unsealed roads to minimise dust generation, where practical.</li> <li>Dampen open cleared areas using water carts (sprays) to minimise dust generation. A full time water cart will be utilised by each construction team.</li> </ul>	2	D	L21

Activity	Impact	Inherent Risk			Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
						<ul style="list-style-type: none"> <li>Potential dust sources, such as crushers, will not be located within proximity to the ABAB ant host colony</li> </ul>			
Clearing of fauna habitat Vehicle movement	Altered fire regime	1	D	L24	Not required – Low risk				
Clearing of fauna habitat	Habitat fragmentation	2	D	L21	Not required – Low risk				



**APPENDIX 5**

**FAUNA OFFSET STRATEGY**

**(REVISION 2, NOVEMBER 2022)**

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# Parker Range Iron Ore Project Haul Road


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## FAUNA OFFSET STRATEGY

*Environmental Protection Act 1986 (WA) and  
Environment Protection and Biodiversity Conservation  
Act 1999 (C'th)*



Proponent: Polaris Metals Pty Ltd  
Address: 20 Walters Drive, Osborne Park, WA, 6017  
Postal Address: Locked Bag 13, Osborne Park DC, WA 6916  
Corporate contact: Adam Parker  
Phone: +61 8 9315 8788  
Email: adam.parker@mrl.com.au

DOCUMENT CONTROL					
REV	DATE	PREPARED BY	REVIEWED BY	APPROVED BY	DOCUMENT PURPOSE
0	14.05.2021	L Whitley, Strategen-JBS&G	N Smith, Mineral Resources	A Parker, Mineral Resources	Draft
1	08.04.2022	R Kenworthy, Strategen-JBS&G	N Smith, Mineral Resources S Hawkins, Globe Environments A Winzer, Strategen-JBS&G A Latto, Strategen-JBS&G	Les Purves, General Manager – Environment, Approval, Land Access Mineral Resources	Submission to Environmental Protection Authority (WA) and Department of Climate Change, Energy, the Environment and Water (C'th)
2	18.11.2022	S Hawkins, Globe Environments for Strategen-JBS&G	N Smith, Mineral Resources	Les Purves, General Manager – Environment, Approval, Land Access Mineral Resources  Signature: 	Revised submission to Environmental Protection Authority (WA) and Department of Climate Change, Energy, the Environment and Water (C'th)

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## EXECUTIVE SUMMARY

The Parker Range Iron Ore Project (the Approved Proposal) is located approximately 15 km south-east of Marvel Loch, within the Shire of Yilgarn, in the Eastern Wheatbelt Region of Western Australia. The Approved Proposal consists of a mine and haul road spur, with the mine forecast to operate for a period of up to 10 years with an ore production throughput of approximately 4 million tonnes per annum. Development of the Approved Proposal commenced in July 2020. Polaris Metals Pty Ltd (Polaris Metals), a wholly-owned subsidiary of Mineral Resources Limited (Mineral Resources), is the Proponent for the Approved Proposal.

In order to support the continued growth and optimisation of Mineral Resources' broader Yilgarn Operations, the Approved Proposal is now proposed to be developed as a connected satellite operation to Minerals Resources' Koolyanobbing Range mine operations, located approximately 90 km north of the Approved Proposal. Mineral Resources propose to revise the Approved Proposal to include the development of a Haul Road (the Revised Proposal, the 'Project') to connect the Approved Proposal with the Koolyanobbing Range mine operations.

The Project extends approximately 52 km in length south to north, of which an approximately 40 km length will be adjacent to the existing State Barrier Fence, and the remaining 12 km length traversing north-east towards the Koolyanobbing Range mine operations.

Construction works for the Project will remove up to 173 hectares (ha) of native vegetation, which has been determined through the environmental assessment to constitute a 'significant' environmental effect to the following terrestrial fauna values:

- 173 ha of fauna habitat for Malleefowl *Leipoa ocellata* (EPBC-V, BC-V); and
- 168 ha of fauna habitat for Chuditch *Dasyurus geoffroii* (EPBC-V, BC-V).

This Fauna Offset Strategy has been prepared to outline Mineral Resources' proposed approach to provide an environmental offset for the significant environmental effect to Malleefowl and Chuditch habitat, with this document to support the environmental assessment of the Project. The objective of this Fauna Offset Strategy is to provide, enhance and protect continuous habitat for Malleefowl and Chuditch within the Eastern Wheatbelt Region. This objective will be met through the acquisition, protection, improvement, and management of fauna habitat used by Malleefowl and Chuditch.

To note, following endorsement of this Fauna Offsets Strategy by the State Environmental Protection Authority (EPA) and the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) as part of the environmental assessment process, Mineral Resources will subsequently prepare a detailed Offsets Management Plan (OMP) for approval of EPA and DCCEEW in consultation with key stakeholders (including the State Department of Biodiversity, Conservation and Attractions (DBCA)) to further refine the monitoring, management and reporting actions that are described within this Fauna Offset Strategy.

This Fauna Offset Strategy seeks to secure and enhance Malleefowl and Chuditch habitat, to achieve a conservation gain (ecological outcome) intended to protect and maintain Malleefowl and Chuditch fauna habitats. This will involve the acquisition and management of an Offset Site area of remnant fauna habitat (native vegetation) held in 'freehold' tenure in the eastern Wheatbelt region, to connect 4 existing Conservation Reserves managed by the State Department of Biodiversity, Conservation and Attractions.

The Fauna Offset Strategy includes the following key management measures:

- Acquisition of the Offset Site (Lot 1416, Parcel 209061) containing 878 ha of fauna habitat suitable for Malleefowl and Chuditch, as described in Section 4 *Offset Site Environmental Assessment*; and
- Management and monitoring of the Offset Site to protect Malleefowl and Chuditch habitat as described in Section 5 *Offset Site Acquisition, Management and Monitoring*, through implementation key management measures including:
  - Introduced fauna control
  - Installation/maintenance of exclusion fencing
  - Fire management
  - Environmental monitoring.

Implementation of the Fauna Offset Strategy will be undertaken in consultation with, and to the satisfaction of, DBCA, in order to ensure the management actions implemented are complementary to the practices and procedures implemented by DBCA for the adjoining Conservation Reserves.

The implementation of this Fauna Offset Strategy will be measured through defined 'Completion Criteria', with a target to achieve these criteria within a 10-year period.

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## **APPENDICES**

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Appendix B – WA Environmental Offsets Table

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## DECLARATION OF ACCURACY

I declare that:

1. To the best of my knowledge, all the information contained in, or accompanying this Fauna Offset Strategy is complete, current and correct.
2. I am duly authorised to sign this declaration on behalf of the approval holder.
3. I am aware that:
  - a) Section 490 of the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.
  - b) Section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (C'th) where the person knows the information or document is false or misleading.
  - c) The above offences are punishable on conviction by imprisonment, a fine or both.

Signed:



Les Purves  
General Manager – Environment, Approval, Land Access  
Mineral Resources Limited

18 November 2022

## 1. INTRODUCTION AND PURPOSE

### 1.1 BACKGROUND

The Parker Range Iron Ore Project (the Approved Proposal) is located approximately 15 km south-east of Marvel Loch, within the Shire of Yilgarn, in the Eastern Wheatbelt Region of Western Australia. The Approved Proposal consists of a mine and haul road spur, with the mine forecast to operate for a period of up to 10 years with an ore production throughput of approximately 4 million tonnes per annum. Development of the Approved Proposal commenced in July 2020. Polaris Metals Pty Ltd (Polaris Metals), a wholly-owned subsidiary of Mineral Resources Limited (Mineral Resources), is the Proponent for the Approved Proposal.

In order to support the continued growth and optimisation of Mineral Resources' broader Yilgarn Operations, the Approved Proposal is now proposed to be developed as a connected satellite operation to Minerals Resources' Koolyanobbing Operations, located approximately 90 km north of the Approved Proposal. Mineral Resources propose to revise the Approved Proposal to include the development of a Haul Road (the Revised Proposal, the 'Project') to connect the Approved Proposal with the Koolyanobbing Operations.

The Project extends approximately 52 km in length south to north, of which an approximately 40 km length will be adjacent to the existing State Barrier Fence, and the remaining 12 km length traversing north-east towards the Koolyanobbing Operations.

Construction works for the Project will remove up to 173 hectares (ha) of native vegetation, which has been determined through the environmental assessment to constitute a 'significant' environmental effect to the following terrestrial fauna values:

- 173 ha of fauna habitat for Malleefowl *Leipoa ocellata* (EPBC V, BC V); and
- 168 ha of fauna habitat for Chuditch *Dasyurus geoffroii* (EPBC V, BC V).

Malleefowl and Chuditch have both been assessed as a 'Threatened' species at the conservation level of 'Vulnerable' under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the State *Biodiversity Conservation Act 2016* (BC Act).

Environmental offsets for significant residual effects to Malleefowl and Chuditch have been proposed for the following:

- Potential direct impacts to breeding and foraging habitat; and
- Potential risk of injury or mortality from construction and operation.

The objective of this Fauna Offset Strategy is to provide, enhance and protect habitat for Malleefowl and Chuditch to offset the significant residual effect of the Project. This environmental offset will involve the acquisition, protection, and management of Malleefowl and Chuditch habitat.

### 1.2 PURPOSE OF THIS DOCUMENT

This Fauna Offset Strategy supports the assessment of the Project Road under the EP Act and the EPBC Act. This Fauna Offset Strategy involves the acquisition, protection, and management of Malleefowl and Chuditch habitat to offset (counterbalance) the significant residual effects associated with the removal of fauna habitat by the Project.





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**FIGURE 1: PARKER RANGE IRON ORE PROJECT HAUL ROAD PROJECT**

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## 2. PROJECT ENVIRONMENTAL ASSESSMENT

### 2.1 BIOLOGICAL SURVEYS

Phoenix (2022a, 2022b) completed biological surveys of the Project and surrounds, with 6 broad fauna habitat types identified, as presented in Table 1 and depicted in Figure 2 to Figure 4.




Four of the habitats occur on level or undulating plains and are distinguished by upper storey vegetation of low shrubs, mid to tall shrubs, mallees, and tree eucalypts. Most of the Survey Area is occupied by shrub vegetation with open to sparse mallees, with smaller areas of pure shrublands; eucalypt woodlands occur on some higher areas, hill slopes and around breakaways. The remaining two habitat types are controlled by topography, occurring at high points (breakaway platform) and low (playa).

Malleefowl and Chuditch were recorded across multiple locations within the Survey Area, as identified by Figure 2 to Figure 4. A summary of the potential effect of the Project to fauna habitats utilised by Malleefowl and Chuditch is presented in Table 2.



In relation to Malleefowl, records included sightings (individuals), tracks, foraging debris, and recently active and degraded nest mounds, occurring in Mallee over Shrubland and Mid-tall Shrubland habitats throughout the Survey Area. Nest mounds were classified as 'Active', 'Inactive' or 'Long unused' as per the National Malleefowl Monitoring Manual (NMRT 2019), as identified by Table 3. The Inactive classification was divided into two sub-classes (sub-class 1 and 2) by Phoenix to provide a more precise description of the level of Malleefowl activity, however, for the purpose of this Fauna Offset Strategy both inactive classifications are combined (consistent with NMRT 2019).

In relation to Chuditch, records included camera trap images of individuals and scats, mostly in Open Woodland and at breakaways, with few records in Mallee over Shrubland. The Chuditch records extend the current known distribution of this taxon by approximately 40 km to the north from the previously known population extent (near the Jilbadji Nature Reserve). The size of the Chuditch population is unknown, however, numerous individuals are expected. The home range of Chuditch is up to 15 km<sup>2</sup> for males and 3-4 km<sup>2</sup> for females, with a potential for overlap. Chuditch have a larger home range than Malleefowl, therefore a smaller population within the local area would be expected. In addition, Chuditch are known to be solitary animals for the majority of their lives.

**TABLE 1: PROJECT FAUNA HABITAT EXTENT AND DESCRIPTION**

HABITAT TYPE	DESCRIPTION	SPECIES HABITAT REQUIREMENTS	EXTENT IN SURVEY AREA (HA)	HAUL ROAD			REPRESENTATIVE PHOTO
				DEVELOPMENT ENVELOPE (HA)	INDICATIVE FOOTPRINT AREA (HA)	% IMPACT (INDICATIVE FOOTPRINT)	
Low open Shrubland	Low to mid open shrubland of various species with ground mostly bare; mostly chenopod shrubland near playa.	Potential habitat for Australian Bustard, not important habitat for other significant vertebrate species, but may be used for foraging/dispersal.	150	7	5	< 0.1 %	
Mid to tall Shrubland	Mid to tall shrubland, mostly <i>Allocasuarina</i> and/or <i>Melaleuca</i> spp., without tree or mallee overstorey; mainly on sandplain.	Bandicoot recorded, and potential habitat for Malleefowl (foraging/dispersal; no mounds recorded)	742	9	5	< 0.1 %	
Open Woodland	Mid to tall tree eucalypts (with hollows and fallen logs) over shrubs and/or grasses; mostly on upper slopes and around breakaways.	Breeding/foraging habitat for Chuditch; Malleefowl generally not recorded (only one mound, in a woodland patch surrounded by mallee over shrubland); potential foraging habitat for bandicoot and Australian Bustard.	3,078	140	75	< 1 %	

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HABITAT TYPE	DESCRIPTION	SPECIES HABITAT REQUIREMENTS	EXTENT IN SURVEY AREA (HA)	HAUL ROAD			REPRESENTATIVE PHOTO
				DEVELOPMENT ENVELOPE (HA)	INDICATIVE FOOTPRINT AREA (HA)	% IMPACT (INDICATIVE FOOTPRINT)	
Mallee over Shrubland	Open to semi-closed shrubland with mallee eucalypts; widespread on sandplain and undulating plains.	Breeding habitat for Malleefowl, some occurrences of Chuditch (foraging/dispersal habitat); bandicoot and Australian Bustard recorded.	6,353	138	87	< 1 %	
Breakaway Platform	Top of breakaways with stony substrate and mostly low, sparse shrub vegetation.	Chuditch utilises breakaways and adjacent woodland, platform may be used for foraging/dispersal but is not important habitat <i>per se</i> .	5	< 1	< 1	< 0.1 %	
Bare Playa	Surface of salt lakes without vegetation.	May be utilised by migratory shorebirds after summer rain, otherwise not significant fauna habitat.	42	0	0	0 %	Not available
Cleared / Disturbed	-	Dispersal/foraging habitat for fauna occupying adjacent vegetated areas.	907	44	37	< 1 %	Not available
Total	-	-	11,276	339	210	2 %	

(Source: Phoenix 2022a, 2022b)

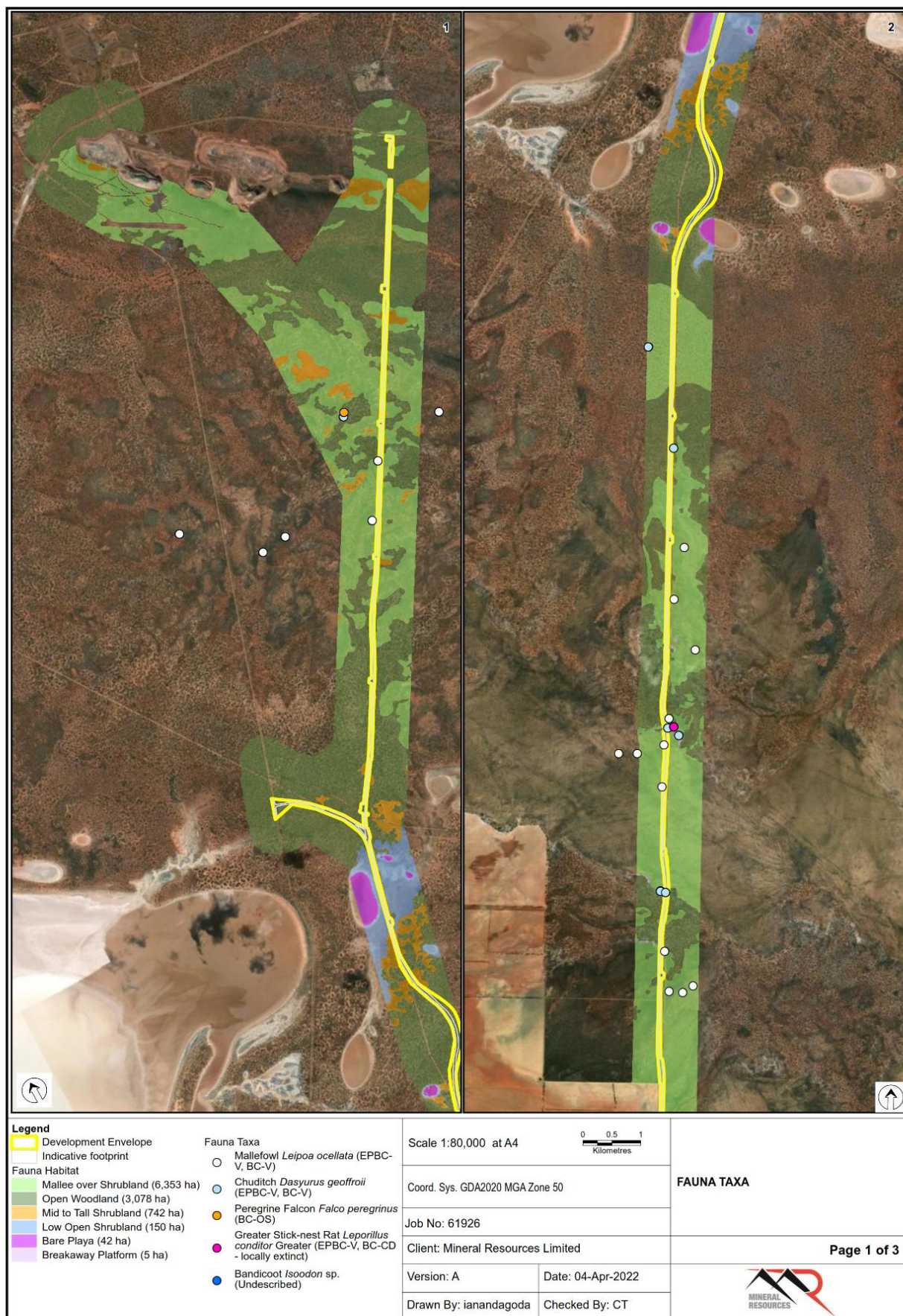
**TABLE 2: PROJECT FAUNA HABITAT IMPACT SUMMARY**

HABITAT SUITABILITY	SURVEY AREA (HA)	HAUL ROAD	
		INDICATIVE FOOTPRINT (HA)	INDICATIVE FOOTPRINT (%)
<b>Malleefowl <i>Leipoa ocellata</i> (EPBC-V, BC-V)</b>			
Breeding and Foraging: Mallee over Shrubland	6,353	87	1 %
Foraging Only: Mid to Tall Shrubland, Open Woodland, Low Open Shrubland	3,970	85	2 %
<b>Total</b>	<b>10,323</b>	<b>173</b>	<b>2 %</b>
<b>Chuditch <i>Dasyurus geoffroii</i> (EPBC-V, BC-V)</b>			
Breeding and Foraging: Open Woodland	3,078	75	2 %
Foraging Only: Mallee over Shrubland, Breakaway Platform, Low Open Shrubland	6,508	92	1 %
<b>Total</b>	<b>9,586</b>	<b>168</b>	<b>1 %</b>

**TABLE 3: MALLEEFOWL NEST MOUND CLASSIFICATION**

CLASSIFICATION	DEFINITION
Active	Currently being used by Malleefowl as an incubator for their eggs and are likely to contain eggs.
Inactive	Inactive (sub-class 1)* - Mound shows signs of recent Malleefowl activity, such as scats, tracks or fresh scrapings.
	Inactive (sub-class 2)* - No evidence of recent activity but mound remains well formed and in good condition for future use.
Long unused	Evidence of an extended period of inactivity such as dense shrubs or trees growing from hollow or mound very degraded/poorly formed. Highly unlikely to become active in the future.

\* Sub-class 1 & 2 were defined by Phoenix to allow for a monitorable Malleefowl mound dataset.



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**FIGURE 2: PROJECT FAUNA HABITAT AND FAUNA RECORDS (1 OF 3)**

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**FIGURE 3: PROJECT FAUNA HABITAT AND FAUNA RECORDS (2 OF 3)**

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**FIGURE 4: PROJECT FAUNA HABITAT AND FAUNA RECORDS (3 OF 3)**

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### 3. REQUIREMENT FOR ENVIRONMENTAL OFFSETS

#### 3.1 OBJECTIVES

This Fauna Offset Strategy seeks to secure and enhance Malleefowl and Chuditch habitat, to achieve a conservation gain (ecological outcome) intended to protect and maintain Malleefowl and Chuditch fauna habitats.

This will involve the acquisition and management of an Offset Site area of remnant fauna habitat (native vegetation) held in 'freehold' tenure in the eastern Wheatbelt region, to connect 4 existing Conservation Reserves managed by DBCA.

The Fauna Offset Strategy includes the following key management actions:

- Acquisition of the Offset Site (Lot 1416, Parcel 209061) containing 878 ha of fauna habitat suitable for Malleefowl and Chuditch, as described in Section 4 *Offset Site Environmental Assessment*); and
- Management and monitoring of the Offset Site to protect Malleefowl and Chuditch habitat as described in Section 5 *Offset Site Acquisition, Management and Monitoring*, through implementation of key management measures including:
  - Introduced fauna control
  - Installation/maintenance of exclusion fencing
  - Fire management
  - Environmental monitoring.

The Offset Site (878 ha) is located between Conservation Reserves R16000 (1,713 ha), R18583 (1,059 ha), R18584 (578 ha) and R28562 (161 ha). The acquisition and management of the Offset Site will maintain and protect fauna habitat, which combined together with the adjacent Conservation Reserves will comprise approximately 4,400 ha of protected and connected fauna habitat for Malleefowl and Chuditch. The combined area will result in one of the largest protected and connected fauna habitats for Malleefowl and Chuditch in the eastern Wheatbelt region.

Implementation of the Fauna Offset Strategy will be undertaken in consultation with, and to the satisfaction of, DBCA, in order to ensure the management actions implemented are complementary to the practices and procedures implemented by DBCA for the adjoining Conservation Reserves.

The implementation of this Fauna Offset Strategy will be measured through defined 'Completion Criteria', with a target to achieve these criteria within a 10-year period.

#### 3.2 ALIGNMENT WITH POLICY AND GUIDELINES

Development of this Fauna Offset Strategy has considered the offset principles as outlined within the State WA Environmental Offset Policy and WA Environmental Offset Guidelines (Government of Western Australia 2011, 2014) as outlined by Table 4, as well as the offset principles defined in the Commonwealth Environmental Offsets Policy (DCCEEW 2012a) as outlined by Table 5.

**TABLE 4: ALIGNMENT TO STATE GOVERNMENT POLICY AND GUIDELINES**

OFFSET PRINCIPLE	OFFSET STRATEGY
<p>1. <i>Environmental offsets will only be considered after avoidance and mitigation options have been pursued.</i></p>	<p>Fauna surveys have been used in the design of the Project to minimise direct and indirect impacts on conservation significant fauna habitat.</p> <p>The Project has been designed to minimise clearing to the maximum extent practicable through use of existing clearing/disturbance where practicable. The Project will result in clearing of up to 173 ha of native vegetation (fauna habitat) within a bioregion which has been subject to limited historical vegetation clearing.</p> <p>A Significant Fauna Management Plan has been developed and will be implemented to minimise and manage the potential environmental effect to conservation significant fauna individuals.</p>
<p>2. <i>Environmental offsets are not appropriate for all projects.</i></p>	<p>Environmental offsets have been considered appropriate for the Project as a result of impacts to fauna habitat for conservation significant fauna listed under the EPBC Act and BC Act, and the potential for an effect to individuals during vegetation clearing and from vehicle interactions.</p>
<p>3. <i>Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted.</i></p>	<p>The acquisition, improvement and protection of the Offset Site is considered a cost-effective way of increasing habitat within the eastern Wheatbelt.</p> <p>The Offset Site contains habitat for Malleefowl and Chuditch which is suitable to offset (counterbalance) the removal of Malleefowl and Chuditch habitat by the Project.</p> <p>The quantum of environmental offset has been based on calculation using the EPBC Habitat Quality Scoring Tools (DCCEEW 2022a, 2022b) and the EPBC Offsets Assessment Guide (DCCEEW 2012b) to ensure the environmental offset is proportionate to the significance of the environmental values being affected.</p>
<p>4. <i>Environmental offsets will be based on sound environmental information and knowledge.</i></p>	<p>The value and quality of the environmental offset has been based on the outcomes of biological surveys, which have been conducted by independent reputable environmental professionals with appropriate experience in the identification and management of conservation significant fauna.</p>
<p>5. <i>Environmental offsets will be applied within a framework of adaptive management.</i></p>	<p>The environmental offset includes environmental monitoring according to the schedule included within this Fauna Offset Strategy.</p> <p>Management measures proposed as part of the environmental offset will be reviewed based on data collected through environmental monitoring, and adapted/modified if required.</p>
<p>6. <i>Environmental offsets will be designed to be enduring, enforceable and deliver long term strategic outcomes.</i></p>	<p>The environmental offset will be enduring, enforceable and deliver long term strategic outcomes through:</p> <ul style="list-style-type: none"> <li>• Mineral Resources' acquisition of the Offset Site, to be transferred to the Department of Biodiversity, Conservation and Attractions (DBCA) for management as part of the State Conservation Reserve System.</li> <li>• Mineral Resources will implement the management actions for the environmental offset until the Completion Criteria are achieved.</li> </ul>

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**TABLE 5: ALIGNMENT TO COMMONWEALTH GOVERNMENT POLICY**

OFFSET PRINCIPLE	OFFSET STRATEGY
<p><i>1. Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action</i></p>	<p>The acquisition of the Offset Site provides fauna habitat for Malleefowl and Chuditch. The location and scale of the Offset Site secures this fauna habitat in perpetuity and reduces the potential risk that the Offset Site may be cleared (e.g. agriculture, mining or other purpose).</p> <p>The protection of the fauna habitat is expected to be confirmed through continued presence of Malleefowl and Chuditch within the Offset Site as indicated by the proposed environmental monitoring.</p> <p>Noting the verified evidence of both Malleefowl and Chuditch within the Offset Site, and records of both taxa within the native vegetation of the adjacent Conservation Reserves, it is reasonable to infer that within implementation of the proposed management measures that both Malleefowl and Chuditch will continue to persist within the Offset Site (and the adjacent Conservation Reserves).</p>
<p><i>2. Be built around direct offsets but may include other compensatory measures</i></p>	<p>The Offset Site will provide 100% of the offset requirement for both Malleefowl and Chuditch when assessed using the relevant Habitat Quality Scoring Tools and the EPBC Offsets Assessment Guide. Verified evidence of both Malleefowl and Chuditch within the Offset Site has been demonstrated.</p>
<p><i>3. Be in proportion to the level of statutory protection that applies to the protected matter</i></p>	<p>Malleefowl and Chuditch are each listed as a 'Threatened' species under the EPBC Act at the conservation threat level of 'Vulnerable'. The 'Vulnerable' threat level is incorporated into the assessment of the Offset Site using the EPBC Offsets Assessment Guide.</p> <p>The environmental offset proposed is consistent with DCCEEW policy. Mineral Resources has acquired the Offset Site, and will transfer ownership of the Offset Site to DBCA to be managed for conservation purposes in a manner consistent with the adjacent Conservation Reserves. Mineral Resources will provide financial provisions for management and monitoring within the Offset Site.</p>
<p><i>4. Be of a size and scale proportionate to the residual impacts on the protected matter</i></p>	<p>Malleefowl and Chuditch are each listed as a 'Threatened' species under the EPBC Act at the conservation threat level of 'Vulnerable'. The 'Vulnerable' threat level is incorporated into the assessment of the Offset Site using the EPBC Offsets Assessment Guide.</p> <p>The Offset Site provides for 878 ha of fauna habitat assessed as suitable for Malleefowl and Chuditch. The Offset Site will provide 100% of the offset requirement for the 173 ha of clearing for the Project when assessed using the relevant Habitat Quality Scoring Tools and the EPBC Offsets Assessment Guide.</p>
<p><i>5. Effectively account for and manage the risks of the offset not succeeding</i></p>	<p>The Fauna Offset Strategy includes the following key management actions:</p> <ul style="list-style-type: none"> <li>• Acquisition of the Offset Site containing fauna habitat suitable for Malleefowl and Chuditch</li> <li>• Management of the Offset Site to protect Malleefowl and Chuditch, including: <ul style="list-style-type: none"> <li>◦ Introduced fauna control</li> <li>◦ Fire management</li> <li>◦ Environmental monitoring.</li> </ul> </li> </ul> <p>The risk of the acquisition and management of the Offset Site not being implemented (not succeeding) is considered low. All actions to be implemented by Mineral Resources are considered readily achievable.</p>
<p><i>6. Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be</i></p>	<p>The Fauna Offset Strategy applies exclusively to the Project, with the Offset Site being in addition to any other legal requirement imposed upon Mineral Resources.</p>

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OFFSET PRINCIPLE	OFFSET STRATEGY
<p><i>suitable as offsets under the EPBC Act for the same action)</i></p>	
<p><i>7. Be efficient, effective, timely, transparent, scientifically robust and reasonable</i></p>	<p>The proposed environmental offset is:</p> <ul style="list-style-type: none"> <li>• <i>Efficient</i>, as it comprises a single Offset Site as a direct offset to counterbalance the effect to fauna habitat of both Malleefowl and Chuditch;</li> <li>• <i>Effective</i>, as the Offset Site will seek to protect and maintain fauna habitat of both Malleefowl and Chuditch;</li> <li>• <i>Timely</i>, as the offset can be implemented and delivered within a relatively short time-period (5 - 10 years);</li> <li>• <i>Transparent</i>, as the Fauna Offset Strategy and the subsequent Offsets Management Plan will be made publicly available;</li> <li>• <i>Scientifically robust</i>, as the selection of the Offset Site has been informed by biological surveys, and relevant taxon-specific recovery plans and conservation advice; and</li> <li>• <i>Reasonable</i>, as the acquisition and management of the Offset Site containing fauna habitat for Malleefowl and Chuditch is achievable and proportionate to the effect of the Project.</li> </ul>
<p><i>8. Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.</i></p>	<p>The Fauna Offset Strategy outlines the proposed acquisition, management and monitoring actions within the Offset Site. Implementation of the acquisition, management and monitoring actions is anticipated to be made legally binding on Mineral Resources as part of approval of the Project.</p> <p>The acquisition, management and monitoring actions within the Fauna Offset Strategy will be refined through the preparation of an Offset Management Plan following approval of the Project. The Offset Management Plan will be prepared post-approval in consultation with relevant Government stakeholders.</p> <p>Mineral Resources will seek to enter into a funding agreement (Memorandum of Understanding) with DBCA regarding the transfer of the Offset Site and the long-term management and monitoring.</p> <p>Implementation of the Fauna Offset Strategy (and the subsequent Offset Management Plan) will be reported to DCCEEW and EPA as part of the annual environmental report process.</p>

### 3.3 RECOVERY PLANS

Recovery of Malleefowl is guided by the National Recovery Plan for Malleefowl (*Leipoa ocellata*) (DCCEEW 2007) and Chuditch is guided by the Chuditch (*Dasyurus geoffroi*) National Recovery Plan (DCCEEW 2012c).

The Fauna Offset Strategy aligns to the recovery and threat abatement priorities as outlined by Table 6.

**TABLE 6: ALIGNMENT WITH RECOVERY PLANS AND THREAT ABATEMENT PLANS**

PRIORITY	PRIORITY ACTION	OFFSET STRATEGY
National Recovery Plan for Malleefowl ( <i>Leipoa ocellata</i> ) (DCCEEW 2007)		
<i>Reduce permanent habitat loss</i>	<i>Retain areas that support Malleefowl and protect them from incremental clearing, and report annually on clearing</i>	Offset Site to be acquired to remove the risk of habitat loss for Malleefowl, with the Offset Site transferred to DBCA for conservation purposes to protect and manage Malleefowl habitat.
<i>Reduce the threat of grazing pressure on Malleefowl populations</i>	<i>Erect adequate fencing to protect Malleefowl habitat</i>	Fencing of the Offset Site to be installed, or existing fencing maintained, to reduce the risk to Malleefowl habitat from disturbance from humans (unauthorised access) and grazing by large herbivores (cattle and sheep).
<i>Reduce predation</i>	<i>Reduce fox numbers in small and isolated habitat remnants where Malleefowl densities have declined, and fox predation is a likely explanation for such declines</i>	Introduced (predator) fauna control to be implemented to reduce (or potentially eliminate) predation risk on Malleefowl (targeting foxes, dogs and cats). Environmental monitoring will record introduced fauna abundance, including any changes over time following introduced fauna control. Introduced fauna control will be undertaken in consultation with DBCA and other relevant stakeholders.
<i>Reduce isolation of fragmented populations</i>	<i>Maintain and/or revegetate strategic corridors to link patches</i>	Offset site is adjacent to conservation reserves representing significant remnant vegetation, providing continuity of habitat. Secondary evidence of Malleefowl is known within the area and the Offset Site.
Chuditch ( <i>Dasyurus geoffroi</i> ) National Recovery Plan (DCCEEW 2012c).		
<i>Retain and improve habitat critical for survival</i>		Offset Site to be acquired to remove the risk of habitat loss for Chuditch, with the Offset Site transferred to DBCA for conservation purposes to protect and manage Chuditch habitat
<i>Continue, expand, and improve baiting of foxes and feral cats</i>		Introduced (predator) fauna control to be implemented to reduce (or potentially eliminate) predation risk on Chuditch (targeting foxes, dogs and cats). Environmental monitoring will record introduced fauna abundance, including any changes over time following introduced fauna control. Introduced fauna control will be undertaken in consultation with DBCA and other relevant stakeholders.
Threat Abatement Plan for Predation by the European Red Fox (DCCEEW 2008)		
<i>Undertake fox control activities</i>	<i>Identify priority areas for fox control based on:</i> <ul style="list-style-type: none"> <li><i>the significance of the population of the affected native species or of the ecological community</i></li> <li><i>the degree of threat posed by foxes to species and</i></li> </ul>	Evidence of the European Red Fox <i>Vulpes vulpes</i> was recorded by the biological surveys within the Offset Site. Introduced (predator) fauna control to be implemented to reduce (or potentially eliminate) predation risk on Malleefowl and Chuditch (targeting foxes, dogs and cats). Environmental monitoring will record introduced fauna abundance, including any changes over time following introduced fauna control.

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PRIORITY	PRIORITY ACTION	OFFSET STRATEGY
	<p><i>ecological communities relative to other threats</i></p> <ul style="list-style-type: none"> <li><i>the cost-effectiveness of maintaining fox populations below an identified 'damage threshold' in the region, and</i></li> <li><i>the feasibility of effective remedial action.</i></li> </ul> <p><i>Conduct and monitor regional fox control, through new or existing programs, in priority areas identified</i></p>	<p>Introduced fauna control will be undertaken in consultation with DBCA and other relevant stakeholders.</p>
<p>Threat Abatement Plan For Predation By Feral Cats (DCCEEW 2015)</p>		
<p><i>Baiting of feral cats</i></p>	<p><i>Ensure broad-scale toxic baits targeting feral cats are developed, registered and available for use across all of Australia, including northern Australia.</i></p>	<p>Evidence of introduced Cats <i>Felis catus</i> was recorded by the biological surveys within the Offset Site.</p> <p>Introduced (predator) fauna control to be implemented to reduce (or potentially eliminate) predation risk on Malleefowl and Chuditch (targeting foxes, dogs and cats).</p> <p>Environmental monitoring will record introduced fauna abundance, including any changes over time following introduced fauna control.</p> <p>Introduced fauna control will be undertaken in consultation with DBCA and other relevant stakeholders.</p>

## 4. OFFSET SITE ENVIRONMENTAL ASSESSMENT

Lot 1416 on Parcel 209061, is located on the Great Eastern Highway, Bodallin. The majority of Lot 1416 is located in the Shire of Yilgarn, with the remaining portion in the Shire of Westonia. Lot 1416 has a 'Freehold' land tenure. The native vegetation portion of Lot 1416 is herein termed the 'Offset Site' (with the agricultural land portion of Lot 1416 excluded).

The Offset Site, totalling 878 ha, is located between 4 existing Conservation Reserves, being:

- Conservation Reserve R16000 (1,713 ha)
- Conservation Reserve R18583 (1,059 ha)
- Conservation Reserve R18584 (578 ha)
- Conservation Reserve R28562 (161 ha).

The acquisition and management of the Offset Site will maintain and protect fauna habitat, which combined together with the adjacent Conservation Reserves will comprise approximately 4,400 ha of protected and connected fauna habitat for Malleefowl and Chuditch. The combined area will result in one of the largest protected and connected fauna habitats for Malleefowl and Chuditch in the eastern Wheatbelt region.

The regional location of the Offset Site is identified by Figure 5. The location of the Offset Site and the Conservation Reserves is identified by Figure 6.

### 4.1 BIOREGIONAL CONTEXT

The Offset Site is located within the eastern Wheatbelt region. The eastern Wheatbelt region largely comprises land cleared for agriculture, within which only remnants of native vegetation remain in isolated patches and along roadsides.

Locally, the Offset Site forms part of a large remnant of native vegetation, part of which has been set aside as Conservation Reserves. Biological surveys within the Conservation Reserves by Phoenix (2021) recorded:

- Malleefowl were recorded by tracks, approximately 800 m west of the Offset Site.
- Chuditch were recorded by scats approximately 1 km west of the Offset Site, with small caves and overhangs potentially suitable for breeding by this taxon.
- Signs of the presence of Fox were recorded at multiple sites from scats, tracks and a single individual observed.

### 4.2 BIOLOGICAL SURVEYS

#### 4.2.1 Malleefowl and Chuditch

The Offset Site contains remnant native vegetation held in 'Freehold' land tenure (i.e. privately owned). The Offset Site is therefore not currently protected from future potential impacts (e.g. agriculture, mining or other purpose).

Biological surveys were undertaken within the Offset Site by Phoenix (2021) to identify and record the environmental values present.

Phoenix (2021) identified four broadly defined vegetation types in the Offset Site, within which evidence of both Malleefowl and Chuditch were recorded.

The majority of the Offset Site had attributes of suitable breeding and foraging habitat for Malleefowl. A single old Malleefowl nest mound was located in the south of the Offset Site; demonstrating breeding by Malleefowl has previously occurred within the Offset Site (Phoenix 2021). An earlier biological survey by Ecoscape (2020) confirmed a recently active Malleefowl nest mound (2019 breeding cycle) within the centre of the Offset Site; confirming recent breeding by Malleefowl within the Offset Site.

Chuditch were recorded from scats in the north of the Offset Site. Potential refuge and denning sites for Chuditch were also identified within the Offset Site (Phoenix 2021).

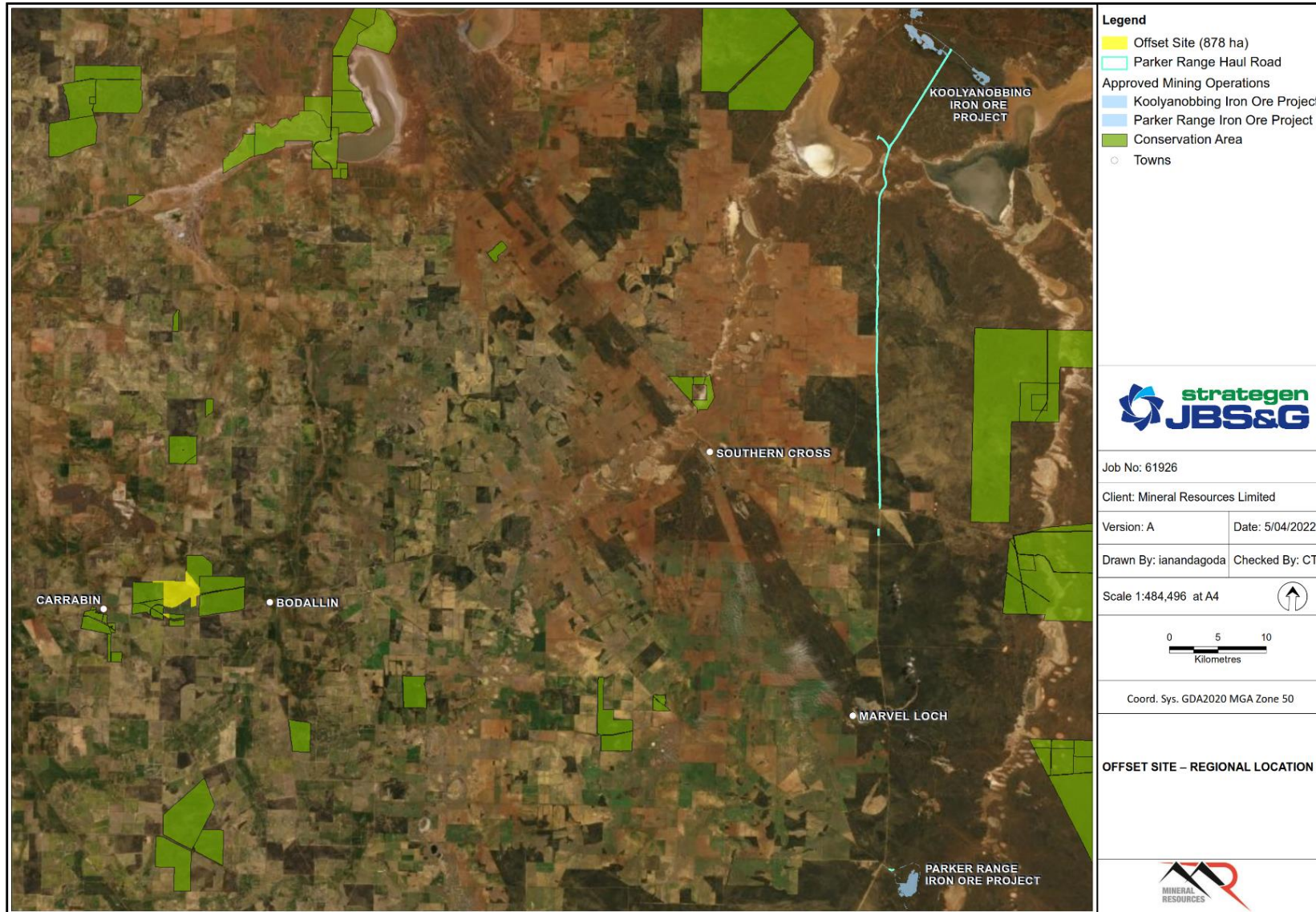
The native vegetation within the Offset Site connects the four Conservation Reserves, providing a linkage between these reserves; which together represent one of the largest intact remnants within an otherwise heavily cleared regional landscape of the eastern Wheatbelt. It may be expected that Malleefowl and Chuditch recorded within the Offset Site and the adjoining Conservation Reserves are dependent on the fauna habitat and connectivity provided by the combination of fauna habitat across the Offset Site and the Conservation Reserves (Phoenix 2021).

An assessment of potential Malleefowl and Chuditch breeding and foraging habitat within the Offset Site is outlined in Table 7 and depicted in Figure 7.

**TABLE 7: FAUNA HABITAT SUMMARY**

FAUNA HABITAT	LOT 1416 SURVEY AREA (HA, %)	AREA RESERVES (HA, %)	SPECIES RECORDS LOT 1416	COMMENT
Mallee Woodland	49 (6 %)	4 (< 1%)		Suitable Malleefowl breeding/foraging habitat; granite outcrops potential Chuditch habitat
Eucalypt Woodland	8 (1%)	1,682 (44 %)	Chuditch (scats)	Suitable Malleefowl breeding / foraging habitat; hollow logs, granite outcrops and breakaways potential Chuditch habitat, presence confirmed (scat recorded);
Open Mallee Woodland over <i>Allocasuarina</i> / <i>Acacia</i> shrubland	805 (92 %)	2,054 (54 %)	Malleefowl (nest mound) Chuditch (scats)	Suitable Malleefowl breeding / foraging habitat (mound recorded in Lot 1416, track to west); granite outcrops and breakaways potential Chuditch habitat, presence confirmed (scats recorded)
Open Eucalypt Woodland over <i>Allocasuarina</i> / <i>Acacia</i> shrubland	12 (1 %)	9 (< 1 %)		Suitable Malleefowl breeding / foraging habitat; hollow logs, granite outcrops and breakaways potential Chuditch habitat;
Cleared	4 (< 1 %)	88 (2 %)		
<b>TOTAL</b>	<b>878</b>	<b>3,838</b>		





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

**FIGURE 5: OFFSET SITE REGIONAL LOCATION**

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**FIGURE 6: OFFSET SITE AND CONSERVATION RESERVES**

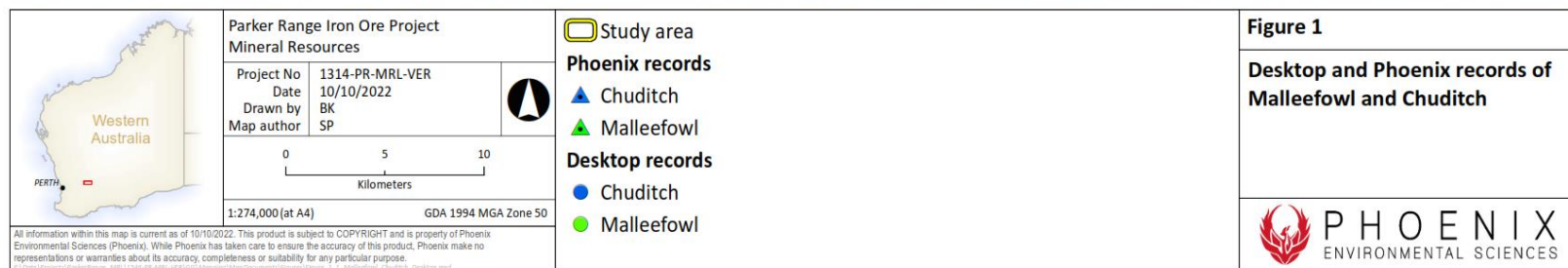
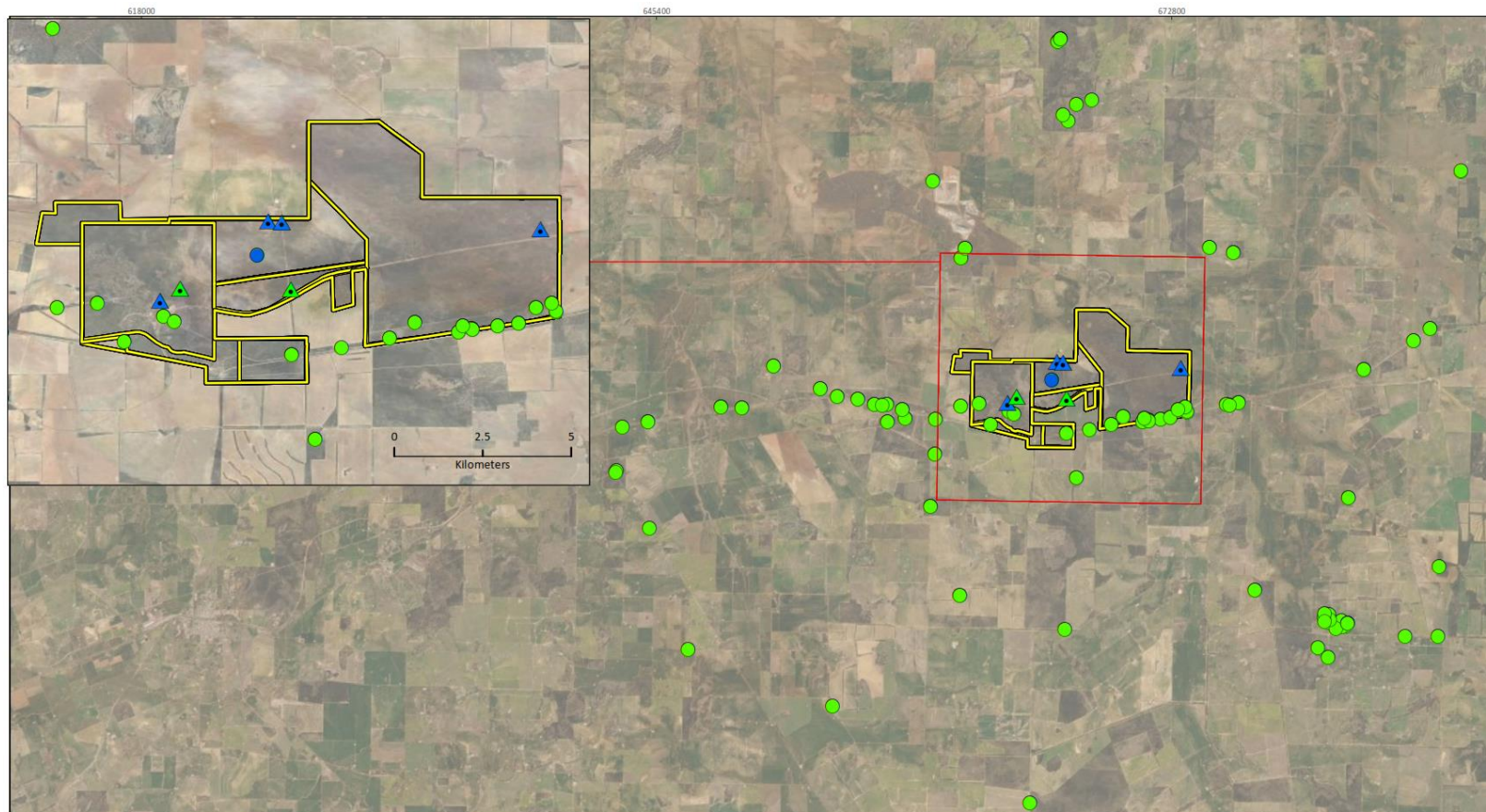
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 Image Reference: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

**FIGURE 7: OFFSET SITE BIOLOGICAL SURVEY RESULTS**

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**FIGURE 8: OFFSET SITE REGIONAL RECORDS**

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#### 4.2.2 Other Environmental Values

As outlined by Section 3 *Requirement for Environmental Offsets*, the purpose of this Fauna Offset Strategy is to mitigate the potential significant residual impact of the Project to the habitat of Malleefowl *Leipoa ocellata* and Chuditch *Dasyurus geoffroi*.

In addition to the records of Malleefowl and Chuditch, the biological survey by Phoenix (2021) additionally identified the following environmental values within the Offset Site:

- Ecological communities –
  - Eucalypt Woodlands of the Western Australian Wheatbelt (EPBC-CE, DBCA-P3)
- Fauna taxa –
  - Potential habitat for the Arid Bronze Azure Butterfly *Ogyris subterrestris petrina* (EPBC-CE, BC-CE)
- Flora taxa -
  - *Acacia crenulata* (DBCA-P3)

This Fauna Offset Strategy is not intended to specifically target any offset (management or monitoring) for these values; noting the Project will not result in a significant environmental effect to these other environmental values which would require an environmental offset. Whilst noting this, the management actions proposed within this Fauna Offset Strategy (i.e. acquisition and transfer for conservation, fire management, exclusion fencing) will function to protect and maintain these other environmental values recorded within the Offset Site.

#### 4.3 HABITAT QUALITY ASSESSMENT

The DCCEEW has developed “Habitat Quality Scoring Tools” for both Malleefowl and Chuditch to assist in determining the relative quality of fauna habitats (DCCEEW 2022a, 2022b).

The Habitat Quality Scoring Tools consider the key attributes of ‘Site Condition’, ‘Site Context’ and the ‘Species Stocking Rate’ with a numerical ‘score’ assigned based on key descriptors. The scoring system results in an overall habitat quality score out of 10; which is compatible with the EPBC Act Offsets Assessment Guide (DCCEEW 2012b). The Site Condition (i.e. habitat quality) is given the greatest weighting in the scoring (equivalent to 40 %), with the Site Context and Species Stocking Rate given equal weighting (30 % each).

The Habitat Quality Scoring Tools assess and assign scores for each attribute to the ‘Impact Site’ (i.e. the fauna habitat to be removed by the Project), and to the Offset Site in the scenarios of its ‘Start Quality’ (current condition) and a prediction of the future quality ‘Without Offset’ and ‘With Offset’.

Table 8 identifies the completed Habitat Quality Scoring Tool for Malleefowl. Table 9 identifies the completed Habitat Quality Scoring Tool for Chuditch. To note, both Habitat Quality Scoring Tools have been completed in consultation with DCCEEW.

**TABLE 8: HABITAT QUALITY SCORING TOOL FOR MALLEEFOWL**

**HABITAT SCORING SYSTEM FOR MALLEEFOWL  
(DCCEEW 2022a)**

This habitat scoring system describes elements indicative of suitable foraging habitat for the Malleefowl in WA. It does not replace robust and appropriate survey information (i.e. indicators of species presence, such as mounds, vegetation type and condition), which must be provided to support proposed offsets. Surveys must be undertaken by suitably experienced experts.

Appropriate scores will best fit a description. Not all components of the 'detail' column must be met, but a majority should be.

For an offset site to be considered, it must have a start condition of 1 for each indicator (e.g: there must be a species stocking rate score of at least 1). Species surveys for the life of offset management should be commensurate with the species stocking rate to be maintained or attained. For example, proposing to maintain species stocking rate at a score of 3 (as detailed in the table below) means surveys must be undertaken at least once every two years.

Habitat scores are for site condition (score out of 3), site context (score out of 3) and species stocking rate (score out of 4). The total makes a score out of 10, which can be used in the EPBC Offset Assessment Guide (the calculator).

INDICATOR	SCORE	DETAIL	ASSESSMENT				
			IMPACT SITE	OFFSET SITE		JUSTIFICATION	
				START	WITHOUT OFFSET		WITH OFFSET
<b>SITE CONDITION</b>							
Vegetation condition and structure. Diversity of habitat species present. Habitat features	3	<b>Keighery:</b> Pristine or Excellent. <b>Habitat quality:</b> Very High - Sandy substrate with leaf litter, intact habitat structure (groundcover, mid-storey, trees for roosting), no habitat damage by herbivores, no fire for at least 20 years		3		3	OFFSET SITE (3, 3) <ul style="list-style-type: none"> <li>○ The Offset Site (totalling 878 ha) comprises 870 ha of fauna habitat assessed as being suitable for Malleefowl foraging and/or breeding.</li> <li>○ The majority of the fauna habitat (vegetation condition) within the Offset Site is in a 'Pristine' condition (key criterion) with an intact habitat structure.</li> <li>○ The Offset Site adjoins (and will connect) to 4 existing Conservation Reserves managed by DBCA, being Conservation Reserves R16000 (1,713 ha), R18583 (1,059 ha), R18584 (578 ha) and R28562 (161 ha). Management of the Conservation Reserves is undertaken by DBCA in accordance with the objectives and strategies outlined within the <i>Wheatbelt Region Parks and Reserves Management Plan</i> (DBCA 2021).</li> <li>○ The majority of the Offset Site does not indicate recent fire. Part of the north-eastern corner of Offset Site indicates recent fire (102 ha), however, this represents a relatively small part of the Offset Site. Whilst noting the recent fire, the biological surveys assessed this area as remaining in 'Pristine' condition on the basis the habitat quality reduction is temporary and showing signs of recovery.</li> <li>○ Little damage of fauna habitat (vegetation) by introduced herbivores has been recorded within the Offset Site.</li> <li>○ The proposed environmental offset comprises:                             <ul style="list-style-type: none"> <li>○ Acquisition of the Offset Site from 'freehold' land tenure, and transfer of the Offset Site to DBCA to be managed for conservation purposes.</li> <li>○ Management of the Offset Site by:                                     <ul style="list-style-type: none"> <li>▪ Introduced (predator) fauna control – baiting/trapping/culling of introduced predator fauna (fox, cat, dog) to reduce the risk of predation on Malleefowl.</li> <li>▪ Fire management – installation and maintenance of fire breaks and low-intensity fuel reduction burns to reduce the risk of large high-intensity fires to protect Malleefowl habitat.</li> <li>▪ Fencing – Installation and maintenance of exclusion fencing to prevent human and large herbivore access to protect Malleefowl habitat.</li> </ul> </li> <li>○ Environmental Monitoring within the Offset Site to <i>inter alia</i>:</li> </ul> </li> </ul>

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INDICATOR	SCORE	DETAIL	ASSESSMENT			
			IMPACT SITE	OFFSET SITE		JUSTIFICATION
				START	WITHOUT OFFSET	
						<ul style="list-style-type: none"> <li>▪ Monitor for the presence and abundance of Malleefowl.</li> <li>▪ Identify the occurrence of any Malleefowl breeding.</li> <li>▪ Record the quality of the Malleefowl habitat, and any causes of change to the Malleefowl habitat (e.g. change in vegetation condition or structure, introduced flora).</li> </ul> <p>Management and monitoring within the Offset Site will be undertaken in consultation with DBCA. The Offset Site will be managed together with the adjoining Conservation Reserves (i.e. the Offset Site not managed in isolation) consistent with the procedures outlined within the DBCA (2021) document <i>Wheatbelt Region Parks and Reserves Management Plan</i>. Combined together the Conservation Reserves and the Offset Site will provide for approximately 4,400 ha of protected and connected fauna habitat for Malleefowl.</p> <ul style="list-style-type: none"> <li>○ Subject to the implementation of the proposed management actions (e.g. fire management) outlined within the Fauna Offset Strategy, it is anticipated the 'Site Condition' (i.e. fauna habitat quality) within the Offset Site can be maintained (i.e. Offset Site start Score 3 to be maintained). (Data source: Phoenix 2021)</li> </ul>
	2.5	<b>Keighery:</b> Very Good. <b>Habitat quality:</b> High - Sandy substrate with leaf litter, largely intact habitat structure (groundcover, mid-storey, trees for roosting), foraging available (seeds, insects), little evidence of habitat damage by herbivores (e.g. rabbits, goats, stock), no fire for at least 15 years	2.5		2.5	<p><b>IMPACT SITE (2.5)</b></p> <ul style="list-style-type: none"> <li>○ The Impact Site comprises fauna habitat assessed as being suitable for Malleefowl foraging and/or breeding. Up to 173 ha of Malleefowl foraging and/or breeding habitat will be removed by clearing for the Project. The fauna habitat does not contain any recently 'active' nest mounds or 'inactive' nest mounds for breeding, and as Malleefowl are highly mobile a direct impact to Malleefowl individuals is not anticipated during the clearing for the Project.</li> <li>○ Fauna habitat (vegetation condition) within the Impact Site varied ranged from 'Pristine' (&gt; 65 % of Survey Area) to 'Completely Degraded' (~ 20 % of Survey Area - largely by the State Barrier Fence, Emu Fence Road and access tracks) – average condition of 'Very Good' assigned (key criterion). Habitat structure was largely intact where native vegetation was present.</li> <li>○ Little damage of fauna habitat (vegetation) by introduced herbivores has been recorded within the Impact Site.</li> <li>○ The majority of the Impact Site does not indicate recent fire. (Data source: Mineral Resources 2022; Phoenix 2022a, 2022b)</li> </ul> <p><b>OFFSET SITE (2.5)</b></p> <ul style="list-style-type: none"> <li>○ Habitat loss, predation by introduced fauna and unmanaged fire present a significant risk for Malleefowl, with their naturally low abundance making local populations particularly sensitive to change.</li> </ul> <p>In the absence of the proposed management actions outlined within the Fauna Offset Strategy, notable risk exists for the 'Site Condition' (i.e. fauna habitat quality) of the Offset Site and the adjoining Conservation Reserves to be reduced (reduced from current Score 3, to Score 2.5). The potential for a reduction for the Offset Site is based upon:</p> <ul style="list-style-type: none"> <li>○ The Offset Site is currently in 'freehold' land tenure, surrounded by the largely cleared agricultural landscape of the eastern Wheatbelt region. Potentially the Offset Site may be at risk from clearing for agriculture if retained in its 'freehold' land tenure (Note Mineral Resources has acquired the Offset Site in freehold land tenure to protect it from risk of agricultural land clearing, however transfer to DBCA remains as the</li> </ul>

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INDICATOR	SCORE	DETAIL	ASSESSMENT			
			IMPACT SITE	OFFSET SITE		JUSTIFICATION
				START	WITHOUT OFFSET	
						<p>next required step to complete the protection of the Offset Site from the risk of agricultural clearing).</p> <ul style="list-style-type: none"> <li>○ Key threatening processes for Malleefowl, as outlined by the DCCEEW (2012) document <i>National Recovery Plan for Malleefowl Leipoa ocellata</i>, are currently unmanaged within the Offset Site. These key threatening processes include                             <ul style="list-style-type: none"> <li>▪ Habitat loss through clearing</li> <li>▪ Predation by introduced fauna,</li> <li>▪ Habitat loss/quality reduction from fire.</li> </ul>                             These key threatening processes have been documented as contributors to a decline in the distribution and abundance of Malleefowl across Australia; including within the Wheatbelt region of Western Australia.                             In the absence of the proposed acquisition/transfer and the management measures as outlined within the Fauna Offset Strategy, the Malleefowl habitat (and individuals of Malleefowl) occurring within the Offset Site would remain at risk from these key threatening processes.                             The risk of clearing by agriculture is verified by the existing and extensive agricultural clearing surrounding the Offset Site. The risk of predation is verified by the multiple records of introduced predator fauna taxa recorded within the Offset Site by the biological surveys. The risk of fire is verified by the recent fire indicated in the north-east corner of the Offset Site. The key threatening processes are present, with the risk assessed to be likely/high.                         </li> <li>○ A 1-step score reduction (reduced from current Score 3, to Score 2.5) is conservative; noting that loss of Malleefowl habitat through clearing or by a large-scale fire would result in a more substantial reduction (a reduction down to Score 0 if the Malleefowl habitat is cleared for agriculture).</li> </ul>
2	<b>Keighery:</b> Good. <b>Habitat quality:</b> Medium - Sandy substrate with leaf litter, largely intact habitat structure (groundcover, mid-storey, trees for roosting), some evidence of habitat damage by herbivores (e.g. rabbits, goats, stock), no fire for at least 10 years					
1.5	<b>Keighery:</b> Poor. <b>Habitat quality:</b> Low – little leaf litter, some gaps in habitat structure (groundcover, mid-storey, trees for roosting), evidence of habitat damage by herbivores (e.g. rabbits, goats, stock), fire within last 10 years					
1.0	<b>Keighery:</b> Very poor. <b>Habitat quality:</b> Very Low - little leaf litter, large gaps in habitat structure (groundcover, mid-storey, trees for roosting), considerable habitat damage by herbivores (e.g. rabbits, goats, stock), fire within last 5 years					
0.5	<b>Keighery:</b> Degraded <b>Habitat quality:</b> Marginal - no leaf litter, missing habitat structure (groundcover, mid-storey and trees for roosting), severe habitat damage					

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INDICATOR	SCORE	DETAIL	ASSESSMENT				
			IMPACT SITE	OFFSET SITE		JUSTIFICATION	
				START	WITHOUT OFFSET		WITH OFFSET
		by herbivores (e.g. rabbits, goats, stock), fire within last 5 years					
	0	<b>Keighery:</b> Completely degraded <b>Habitat quality:</b> Absent, no vegetation and/or suitable habitat on site - no leaf litter, no habitat structure					
<b>SITE CONTEXT</b>							
Movement patterns of the species. Proximity of the site in relation to other areas of suitable habitat. Overall population or extent of a species.	3	Site is connected by suitable vegetation for dispersal <sup>1</sup> to more than one area of contiguous suitable habitat. Records on the site for species within last 12 months; site is within known distribution of species.					
	2.5	Site is connected by suitable vegetation for dispersal to at least one area of contiguous suitable habitat. Records on site for species within last 2 years. Site is within known distribution of species.	2.5			2.5	IMPACT SITE (2.5) <ul style="list-style-type: none"> <li>Impact Site has been assessed to contain suitable connected habitat for Malleefowl, with inactive nest mounds recorded in adjacent areas (nil within the Impact Site) to confirm the habitat suitability.</li> <li>Impact Site occurs within known Malleefowl distribution.</li> <li>Malleefowl recorded by surveys within previous 2 years comprising sightings and tracks recorded over multiple field trips between November 2019 to March 2021 (Phoenix 2021).</li> <li>Score 2.5 for the Impact Site is largely based on the timing of the completed biological surveys; having been undertaken within the last 2 years. An increased frequency of monitoring within the Impact Site may be expected to record Malleefowl within an annual period (12 months); which would increase the result to Score 3. (Data source: Phoenix 2022a, 2022b)</li> </ul> OFFSET SITE (2.5) <ul style="list-style-type: none"> <li>Offset Site has been assessed to contain suitable connected habitat for Malleefowl, with a recently active nest mound (2019 breeding season) and an inactive nest mound confirming habitat suitability.</li> <li>Offset Site occurs within known Malleefowl distribution, including records of Malleefowl tracks and a recently active nest mound within the adjacent Conservation Reserves as recorded in March 2020 and March 2021 (Phoenix 2021).</li> <li>Subject to the implementation of the proposed monitoring actions outlined within the Fauna Offset Strategy, the increased monitoring frequency is expected to record Malleefowl within the Offset Site at a biennial frequency (2 years), or potentially at an annual frequency (12 months); resulting in the 'Site Context' of the Offset Site being increased (i.e. Score 2 increased to Score 2.5 as indicated, or potentially to Score 3). (Data source: Phoenix 2021, Ecoscape 2020)</li> </ul>
	2	Site is connected by suitable vegetation for dispersal to more than one patch of suitable habitat. Records on site or adjacent (within 2 km) to site within last 3 years. Site is within known distribution of species.		2	2		OFFSET SITE (2, 2) <ul style="list-style-type: none"> <li>Offset Site has been assessed to contain suitable connected habitat for Malleefowl, with a recently active nest mound from the 2019 breeding season as recorded in September 2020 (Ecoscape 2020) and an inactive nest mound</li> </ul>

<sup>1</sup> Dispersal habitat is usually thick vegetation, for example, along roadsides, to enable movement from one habitat patch to another.

INDICATOR	SCORE	DETAIL	ASSESSMENT				JUSTIFICATION
			IMPACT SITE	OFFSET SITE			
				START	WITHOUT OFFSET	WITH OFFSET	
							recorded March 2020 to March 2021 (Phoenix 2021); both confirming habitat suitability. <ul style="list-style-type: none"> <li>Offset Site occurs within known Malleefowl distribution, including records of Malleefowl tracks and a recently active nest mound within the adjacent Conservation Reserves as recorded in March 2020 and March 2021 (Phoenix 2021).</li> <li>Malleefowl recorded within Offset Site by biological surveys, by presence of tracks.</li> <li>Score 2 for the Offset Site is largely based on the timing of the completed biological surveys; having been undertaken within the last 3 years. The increased monitoring frequency is expected to record Malleefowl within the Offset Site at a biennial frequency (2 years), or potentially at an annual frequency (12 months); resulting in the 'Site Context' of the Offset Site being increased (i.e. Score 2 increased to Score 2.5 (as indicated), or potentially to Score 3).</li> </ul> (Data source: Phoenix 2021, Ecoscape 2020)
1.5	Site is connected by suitable vegetation for dispersal to at least one patch of suitable habitat. Records on or adjacent (within 5 km) to site within last 5 years. Site is located within known distribution of species.						
1	Site is separated from other known suitable habitat by cleared areas of up to 5 km. Records on site or adjacent (within 5 km) within last 10 years and species are capable of migrating to site. Site is located within known distribution of species.						
0.5	Site is separated from other suitable habitat by cleared areas of up to 10 km. Records on site or in region (within 10 km) within last 10 years and species may be capable of migrating to site. Site is not located within known distribution of species.						
0	Site is separated from other suitable habitat by cleared areas of more than 10 km. No records on site or in region (within 10 km) within last 10 years and species unlikely to migrate to site.						
<b>SPECIES STOCKING RATE</b>							
Usage and/or density of a species. Role of the site population in regard to overall species population viability.	4	Record of species presence on site in last 12 months (birds observed on site in last 12 months; evidence of currently active mounds); site is adjacent to verified/published records in last 12 months					
	3	Record of species presence on site in last 2 years (birds observed on site in last 2 years; evidence of mounds active in last 2 years); site is within 2-5 km of verified/published records up to 2 years					
	2	Record of species presence on site in last 3 years (birds observed on site in last 3 years; evidence of mounds active in last 3 years); site is within 5 km of verified/published records up to 3 years		2		2	OFFSET SITE (2, 2) <ul style="list-style-type: none"> <li>Malleefowl recorded within Offset Site with recently active nest mound (2019 breeding season) as recorded in September 2020 (Ecoscape 2020); being within</li> </ul>

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INDICATOR	SCORE	DETAIL	ASSESSMENT			
			IMPACT SITE	OFFSET SITE		JUSTIFICATION
				START	WITHOUT OFFSET	
						<p>prior 3 years (key criterion).</p> <ul style="list-style-type: none"> <li>Malleefowl tracks and recently active nest mound recorded within adjacent Conservation Reserves (within 5 km radius) within prior 3 years as recorded in March 2020 and March 2021 (Phoenix (2021) ).</li> <li>Subject to the implementation of the proposed management actions (introduced predator control and fire management) outlined within the Fauna Offset Strategy, it is anticipated the 'Species Stocking Rate' within the Offset Site can be maintained (i.e. Offset Site start Score 2 to be maintained).</li> </ul> <p>Note whilst the Offset Site may conceptually increase to a Score 3 with improved introduced predator control, a Score 2 value has been conservatively assessed which suggests the maintenance of the current stocking (rather an increase to Score 3 or 4) noting the limited opportunity to increase breeding activity due to Malleefowl having naturally low abundance. An increased frequency of environmental monitoring within the Offset Site (annual monitoring) would also be anticipated to result in more frequent records of Malleefowl presence within the Offset Site, however a Score 2 value has been conservatively assessed which suggests the maintenance of the current stocking (rather an increase to Score 3 or 4, which may simply represent more frequent records of the same individuals).</p> <p>(Data source: Phoenix 2021, Ecoscape 2020)</p>
1	1	Record of species presence on site in previous 5 years (Birds observed on site in last 5 years; evidence of mounds active in last 5 years); site is within 5 km of verified/published records up to 5 years (minimum required to be considered a suitable offset site for Malleefowl)	1		1	<p><b>IMPACT SITE (1)</b></p> <ul style="list-style-type: none"> <li>Impact Site has been assessed to contain suitable connected habitat for Malleefowl (as supported by records of Malleefowl within the broader Survey Area), however, nil Malleefowl mounds (either recently active or inactive) occur within the Impact Site (as confirmed by LiDAR survey and ground-truthing surveys) (key criterion). Nearest recorded recently active nest mound occurs ~ 300 m outside of the Impact Site. Malleefowl presence recorded within Survey Area by sightings and tracks.</li> </ul> <p>(Data source: Phoenix 2022a, 2022b)</p> <p><b>OFFSET SITE (1)</b></p> <ul style="list-style-type: none"> <li>Predation by introduced fauna is a significant risk for Malleefowl, with their naturally low abundance and breeding occurring by bonded mating pairs making local populations particularly sensitive to change (i.e. mortality of a single breeding individual may represent a substantial loss). Introduced predator fauna have been confirmed as present within the Offset Site (Cat <i>Felis catus</i> - 12 records, European Fox <i>Vulpes vulpes</i> - 10 records, Dog <i>Canis familiaris</i> - 6 records) with abundance confirming a risk of predation on Malleefowl. In the absence of the proposed management actions (i.e. introduced predator fauna control) outlined within the Fauna Offset Strategy, notable risk exists for the 'Species Stocking Rate' (i.e. Malleefowl activity, including breeding) within the Offset Site and the adjoining Conservation Reserves to be reduced (reduced from current Score 2, to Score 1). The potential for a reduction for the Offset Site is based upon: <ul style="list-style-type: none"> <li>The Offset Site is currently in 'freehold' land tenure, surrounded by the largely cleared agricultural landscape of the eastern Wheatbelt region. Potentially the Offset Site may be at risk from clearing for agriculture if retained in its 'freehold' land tenure.</li> <li>Key threatening processes for Malleefowl, as outlined by the DCCEEW (2012) document <i>National Recovery Plan for Malleefowl</i></li> </ul> </li> </ul>

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INDICATOR	SCORE	DETAIL	ASSESSMENT			
			IMPACT SITE	OFFSET SITE		JUSTIFICATION
				START	WITHOUT OFFSET	
						<p><i>Leipoa ocellata</i>, are currently unmanaged within the Offset Site. These key threatening processes include</p> <ul style="list-style-type: none"> <li>▪ Habitat loss through clearing</li> <li>▪ Predation by introduced fauna,</li> <li>▪ Habitat loss/quality reduction from fire.</li> </ul> <p>These key threatening processes have been documented as key contributors to a decline in the distribution and abundance of Malleefowl across Australia; including within the Wheatbelt region of Western Australia.</p> <p>In the absence of the proposed acquisition/transfer and the management measures as outlined within the Fauna Offset Strategy, the Malleefowl habitat (and individuals of Malleefowl) occurring within the Offset Site would remain at risk from these key threatening processes.</p> <p>The risk of clearing by agriculture is verified by the existing and extensive agricultural clearing surrounding the Offset Site. The risk of predation is verified by the multiple records of introduced predator fauna taxa recorded within the Offset Site by the biological surveys. The risk of fire is verified by the recent fire indicated in the north-east corner of the Offset Site (2012), as well as recent fire in the adjoining Conservation Reserves (2010, 2012, 2015) (DBCA 2022). The key threatening processes are present, with the risk assessed to be likely/high.</p> <p>A 1-step score reduction (reduced from current Score 2, to Score 1) is conservative; noting that predation of the limited number of Malleefowl individuals within the Offset Site (due to naturally low abundance) may potentially result in a complete loss of Malleefowl from within the Offset Site (a reduction down to Score 0 if no Malleefowl remain).</p>
	0	No record of species presence on site, or within 5 km in last 5 years (5 km is estimated home range for Malleefowl)				
<b>TOTALS</b>			<b>6</b>	<b>7</b>	<b>5.5 (6)</b>	<b>7.5 (8)</b>

LEGEND	
	If the site scores between 0-0.5 for site condition, 0-0.5 for the site context score, or 0 for species stocking rate, it is extremely unlikely to be considered as suitable habitat. This would not be appropriate to use as an offset site.

## NOTES

- (1) The Habitat Quality Scoring Tools assess and assign a score for each attribute to the 'Impact Site' (i.e. the fauna habitat to be removed by the Haul Road), and to the Offset Site in the scenarios of its 'Start Quality' (current condition) and a *prediction* of the future quality 'Without Offset' and 'With Offset'. The 'Justification' column seeks to provide evidence to support the assessment of the start quality, and a rationale to support the prediction of the future quality.
- (2) For some attributes, the 'Detail' column identifies a number of criteria upon which to assess and assign a score. The assessment process seeks to identify a 'best fit' whereby key criterion are met, however, it is accepted that not all criterion will be met.
- (3) Success of implementation of the environmental offset will be measured against (a) acquisition of the Offset Site and transfer to DBCA for protection and conservation, (b) management of the Offset Site (introduced predator fauna control, fire management, installation/maintenance of exclusion fencing, and (c) implementation of annual monitoring within the Offset Site. These implementation actions are considered readily achievable by Mineral Resources and implementation can commence immediately following approval of the Fauna Offset Strategy. To clarify, whilst presence and abundance of Malleefowl within the Offset Site will be monitored annually, the presence or abundance output values from the annual monitoring are not applied as a measure of success for the Offset Site.

Accordingly, for calculation inputs for the Offsets Assessment Guide are to have the following values applied:

- a. "Confidence in result (%)" to be set at a conservative value of 75 %. Whilst confidence in implementing the acquisition/transfer, management and monitoring actions is high (and potentially a > 90% confidence may be applied), it is noted typically a maximum 75 % value has been accepted by DCCEEW for environmental offsets.
  - b. "Time until ecological benefit" to be set at a conservative value of 5 years value. Whilst the ecological benefit from implementation of the management measures will be achieved within a relatively short time period (and potentially a 2-year value could be applied), a more conservative 5-year value has been applied to allow a longer time period for which the environmental monitoring can demonstrate the long-term ecological benefit.
- (4) As the success of implementation of the environmental offset will be measured against acquisition/transfer, management and monitoring (refer Note 3, above) which are readily achievable, no 'contingency measures' (e.g. actions *in lieu* of the acquisition/transfer, management or monitoring) are not considered necessary or proposed.
  - (5) The extent of Malleefowl breeding and foraging habitat within the Offset Site has been reduced from 878 ha to 870 ha (reduction of 8 ha) to exclude areas of granite geology outcropping that is devoid of native vegetation (unsuitable for Malleefowl breeding or foraging).
  - (6) Malleefowl naturally occur in low abundance, with a short life-span of ~15 years; such that a limited number of breeding pairs are anticipated to occur within the Offset Site and the adjoining Conservation Reserves at any time (likely < 10 individuals as breeding pairs). Whilst annual monitoring of Malleefowl presence and abundance will be undertaken, any changes in presence or abundance over time as indicated by the monitoring will not provide a statistically valid measure of change due to the small sample size (typically a minimum sample size of 30 is required to produce a statistically significant result) and known other environmental factors which may affect survival and breeding (e.g. rainfall/drought). Accordingly, the presence and abundance results for Malleefowl have not been proposed as a measure of success/failure of the environmental offset.
  - (7) Conservation Covenants are typically applied to land areas in which an agreement is reached with a landowner to not clear native vegetation, in which the land ownership is retained by the landowner. Conservation Covenants have the effect of a legally binding agreement that prevents the landowner from clearing the native vegetation. As the Offset Site is proposed to be transferred in 'freehold' land tenure to State DBCA to be managed for conservation purposes (i.e. land ownership not retained by Mineral Resources), the placement of a Conservation Covenant does not appear a necessary additional protection mechanism for the Offset Site. Further, a Conservation Covenant may restrict future actions by DBCA to incorporate the Offset Site into the State's Conservation Reserve System.

## REFERENCES

- Department of Biodiversity, Conservation and Attractions (2021) *Wheatbelt Region Parks and Reserves Management Plan 95 2021*.
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- Department of Climate Change, Energy, the Environment and Water (2007) *National Recovery Plan for Malleefowl *Leipoa ocellata**. National Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999 (C'th). Report prepared by Benshemesh J (Dr) of the Department for Environment and Heritage South Australia for the Commonwealth Department of Climate Change, Energy, the Environment and Water (formerly as the Department of the Environment).
- Ecoscope (Australia) Pty Ltd (2020) *Offset Fauna Habitat Assessment – September 2020*. Report prepared by Turner B of Ecoscope (Australia) Pty Ltd for Covalent Lithium. Final. December 2020.
- Mineral Resources Limited (2022) *Parker Range Iron Ore Project Haul Road: Environmental Review Document*. Report prepared by Hawkins S of Globe Environments Australia Pty Ltd and Whitley L of Strategen-JBS&G on behalf of Mineral Resources Limited. Revision 1. April 2022.
- Phoenix Environmental Sciences Pty Ltd (2021) *Flora and Fauna Assessment of Lot 1416 for the Parker Range Project*. Report prepared by Pynt S, Perkins A, Crews K and Scanlon J (Dr) of Phoenix Environmental Sciences Pty Ltd for Mineral Resources Ltd. Revision 2.0. June 2021.
- Phoenix Environmental Sciences (2022a) *Baseline Flora, Vegetation and Fauna Surveys for the Parker Range Haul Road Project*. Report prepared by Phoenix Environmental Sciences Pty Ltd for Mineral Resources Ltd. Revision 3.0 January 2022.
- Phoenix Environmental Sciences (2022b) *Baseline Flora, Vegetation and Fauna Surveys for the Parker Range Haul Road Project – Northern Extension*. Report prepared by Phoenix Environmental Sciences Pty Ltd for Mineral Resources Ltd. Revision 2.0 January 2022.

**TABLE 9: HABITAT QUALITY SCORING TOOL FOR CHUDITCH**

**HABITAT SCORING SYSTEM FOR CHUDITCH  
(DCCEEW 2022b)**

This habitat scoring system describes elements indicative of suitable habitat for Chuditch (*Dasyurus geoffroi*) in Western Australia. It must be supported by survey information (i.e. den surveys, species presence, vegetation condition), undertaken by suitably experienced experts, in accordance with the Department’s Survey Guidelines for Australia’s Threatened Mammals.

Appropriate scores will best fit a description. Not all components of the ‘detail’ column must be met, but a majority should be.

Site condition is given the largest weighting, 40%. Site condition is considered the prime indicator for Chuditch presence. Species stocking rate can vary considerably in various seasons; it is not as accurate or precise as an indicator of habitat quality. Both site context and species stocking rate are given a weighting of 30%.

Species surveys for the life of offset management should be commensurate with the species stocking rate to be maintained or attained. For example, proposing to maintain species stocking rate at a score of 3 (as detailed in the table below) means surveys must be undertaken at least once every two years.

For an offset site to be considered, it must have a start score of at least 1 for each indicator (e.g.: there must be a species stocking rate score of at least 1).

INDICATOR	SCORE	DETAIL	ASSESSMENT			JUSTIFICATION
			IMPACT SITE	OFFSET SITE		
				START	WITHOUT OFFSET	
<b>SITE CONDITION</b>						
Vegetation condition and structure. Diversity of habitat species present. Habitat features	4	<b>Habitat quality:</b> High – Moist, dense vegetation in steep-sloping forest or sparser vegetation with many areas of pronounced topography (e.g., hills, rocky outcrops) and/or riparian vegetation. High den <sup>2</sup> density (50-100 per 400ha). Large variety of prey <sup>3</sup> species available. Very limited to no habitat damage by herbivores or previous land management activities. Low density of introduced predator species <sup>4</sup> present. Little fire within site in the last 15-20 years.				
	3	<b>Habitat quality:</b> Medium – Moist, dense vegetation in steep-sloping forest or sparser vegetation with some areas of pronounced topography (e.g., hills and rocky outcrops), and/or riparian vegetation. Moderate density of denning opportunities <sup>5</sup> . Variety of prey species available. Limited habitat damage by herbivores. Low density of introduced predator species. Little fire within site in the last 10-15 years.			3	OFFSET SITE (3) <ul style="list-style-type: none"> <li>○ Predation by introduced fauna is a significant risk for Chuditch, with their naturally low abundance making local populations particularly sensitive to change. Introduced predator fauna have been confirmed as present in moderate abundance within the Offset Site (Cat <i>Felis catus</i> - 12 records, European Fox <i>Vulpes vulpes</i> - 10 records, Dog <i>Canis familiaris</i> - 6 records); confirming a risk of predation on Chuditch. Unmanaged introduced predator fauna presents a risk to Chuditch within the Offset Site, and potentially also to any Chuditch within the fauna habitat of the adjoining Conservation Reserves. Subject to the implementation of the proposed introduced predator control as outlined within the Fauna Offset Strategy, it is anticipated the ‘Site Condition’ within the Offset Site can be increased through a shift to a low predator abundance.</li> <li>○ The proposed environmental offset comprises:                             <ul style="list-style-type: none"> <li>○ Acquisition of the Offset Site from ‘freehold’ land tenure, and transfer of the Offset Site to DBCA to be managed for conservation purposes.</li> </ul> </li> </ul>

<sup>2</sup> Dens: actively used hollow logs, earth burrows, rocky crevices, or hollows in termitaria (cemented termite mounds) used by Chuditch

<sup>3</sup> Prey: beetles and other large invertebrates, small-medium mammals, birds and reptiles (some additional species, including medium-large mammals, may be consumed as carrion)

<sup>4</sup> Introduced predator species: foxes and cats. Density is % of observations and/or secondary evidence (e.g. scats) per survey.

<sup>5</sup> Denning opportunities: hollow logs, rock crevices and suitable burrows, including in termitaria

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						<ul style="list-style-type: none"> <li>○ Management of the Offset Site by:                             <ul style="list-style-type: none"> <li>▪ Introduced (predator) fauna control – baiting/trapping/culling of introduced predator fauna (fox, cat, dog) to reduce the risk of predation on Chuditch.</li> <li>▪ Fire management – installation and maintenance of fire breaks and low-intensity fuel reduction burns to reduce the risk of large high-intensity fires to protect Chuditch habitat.</li> <li>▪ Fencing – Installation and maintenance of exclusion fencing to prevent human and large herbivore access to protect Chuditch habitat.</li> </ul> </li> <li>○ Environmental Monitoring within the Offset Site to <i>inter alia</i>:                             <ul style="list-style-type: none"> <li>▪ Monitor for the presence and abundance of Chuditch.</li> <li>▪ Identify the occurrence of any Chuditch breeding.</li> <li>▪ Record the quality of the Chuditch habitat, and any causes of change to the Chuditch habitat (e.g. change in vegetation condition or structure, introduced flora).</li> </ul> </li> </ul> <p>Management and monitoring within the Offset Site will be undertaken in consultation with DBCA. The Offset Site will be managed together with the adjoining Conservation Reserves (i.e. the Offset Site not managed in isolation) consistent with the procedures to outlined within the DBCA (2021) document <i>Wheatbelt Region Parks and Reserves Management Plan</i>. Combined together the Conservation Reserves and the Offset Site will provide for approximately 4,400 ha of protected and connected fauna habitat for Chuditch.</p> <ul style="list-style-type: none"> <li>○ Unmanaged fire within presents a risk to Chuditch within the Offset Site, and potentially also to any Chuditch within the fauna habitat of the adjoining Conservation Reserves. As outlined by the DCCEEW (2012) document <i>Chuditch (Dasyurus geoffroii) National Recovery Plan</i>, broad-scale and high-intensity fires have a destructive nature that can destroy den logs and protective cover required for breeding. Subject to the implementation of the proposed fire management actions outlined within the Fauna Offset Strategy, it is anticipated the 'Site Condition' within the Offset Site can be increased through a shift to a low fire frequency. Fire management can be additionally anticipated to maintain and/or improve the density of denning opportunities and the availability of prey species.</li> <li>○ Whilst the management actions within the Offset Site cannot convert the habitat type (i.e. to '<i>moist, dense vegetation in steep-sloping forest</i>' that is more typical of South-west forest habitat for Chuditch), the Offset Site represents 'Critical Habitat' (as defined by the Chuditch Recovery Plan) to improve security of the local population of Chuditch in the Wheatbelt region. The Offset Site will join together x4 existing Conservation Reserves to form a large and connected habitat area, which if appropriately managed to reduce introduced fauna and reduce fire frequency (as outlined within the fauna Offset Strategy) to increase to a 'Medium' habitat quality. (Data source: Phoenix 2021)</li> </ul>
2	<p><b>Habitat quality:</b> Low. Sparse vegetation in mostly flat areas in poor condition. Limited denning opportunities. Some prey species available. Habitat damage by herbivores evident. Moderate density of introduced predator species. Noticeable impacts from fire within site in the last 5-10 years.</p>	2	2	2		<p>IMPACT SITE (2)</p> <ul style="list-style-type: none"> <li>○ The Impact Site comprises fauna habitat assessed as being suitable for Chuditch foraging and/or breeding. Up to 168 ha of Chuditch foraging and/or breeding habitat will be removed by clearing for the Project. The fauna habitat does not contain any identified Chuditch dens, and as Chuditch are highly mobile a direct impact to Chuditch individuals is not anticipated during the clearing for the Project.</li> <li>○ Habitat within the Impact Site is predominantly dry open to semi-closed Mallee over Shrubland (~ 60 %) and dry Open Woodland (30 %) vegetation on</li> </ul>

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						<p>sandplain and undulating plains (key criterion).</p> <ul style="list-style-type: none"> <li>○ Introduced predator fauna confirmed as present within the Impact Site through numerous records (Cat <i>Felis catus</i>, European Fox <i>Vulpes vulpes</i>, Dog <i>Canis familiaris</i>), however are generally considered to be at low density.</li> <li>○ Little damage of fauna habitat (vegetation) by introduced herbivores has been recorded within the Impact Site.</li> <li>○ The majority of the Impact Site does not indicate recent fire. (Data source: Phoenix 2022a, 2022b)</li> </ul> <p>OFFSET SITE (2, 2)</p> <ul style="list-style-type: none"> <li>○ The Offset Site comprises 878 ha of fauna habitat assessed as being suitable for Chuditch foraging and/or breeding.</li> <li>○ Habitat within the Offset Site is predominantly low sparse to open Mallee Woodland (~ 90 %) (key criterion).</li> <li>○ Potential refuge and denning sites for Chuditch were recorded within the Offset Site comprising: <ul style="list-style-type: none"> <li>○ Large horizontal hollow logs (at varying density in Eucalyptus woodland habitat)</li> <li>○ Granite outcrops and breakaways with overhangs and small caves (mostly in <i>Eucalyptus</i> woodland, however also scattered through other habitat types)</li> <li>○ Sinkholes through calcrete layers, observed at several locations in <i>Eucalyptus</i> woodland habitat)</li> <li>○ Burrows excavated by other medium-sized vertebrates (rabbit, fox, bungarra) which occur in all habitat types.</li> </ul> </li> </ul> <p>The above habitat types were also recorded by Ecoscape (2020) within the Offset Site, with Ecoscape (2020) confirming the Offset Site contained habitats suitable for Chuditch breeding.</p> <ul style="list-style-type: none"> <li>○ The Offset Site adjoins (and will connect) to 4 existing Conservation Reserves managed by DBCA, being Conservation Reserves R16000 (1,713 ha), R18583 (1,059 ha), R18584 (578 ha) and R28562 (161 ha). Management of the Conservation Reserves is undertaken by DBCA in accordance with the objectives and strategies outlined within the <i>Wheatbelt Region Parks and Reserves Management Plan</i> (DBCA 2021).</li> <li>○ Introduced predator fauna have been confirmed as present within the Offset Site (Cat <i>Felis catus</i> - 12 records, European Fox <i>Vulpes vulpes</i> - 10 records, Dog <i>Canis familiaris</i> - 6 records) with the density of predator species considered to be moderate.</li> <li>○ The majority of the Offset Site does not indicate recent fire. Part of the north-eastern corner of Offset Site indicates recent fire (102 ha), however, this represents a relatively small part of the Offset Site. It is noted fire is currently unmanaged at the Offset Site. Whilst noting the recent fire, the biological surveys assessed this area as remaining in 'Pristine' condition on the basis the habitat quality reduction is temporary and showing signs of recovery.</li> <li>○ Little damaged of fauna habitat (vegetation) by introduced herbivores has been recorded within the Offset Site. (Data source: Mineral Resources 2022; Phoenix 2021)</li> </ul>
1	<p><b>Habitat quality:</b> Marginal. Sparse vegetation in flat areas in degraded condition. Almost no denning opportunities. Limited prey species available. Extensive habitat damage by herbivores or previous land management activities. High density of introduced predator species.</p>					

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	0	<b>Habitat:</b> Absent – Little to no vegetation, no denning opportunities and/or suitable prey on site.					
SITE CONTEXT							
Movement patterns of the species. Proximity of the site in relation to other areas of suitable habitat. Overall population or extent of a species.	3	Site is connected to more than one patch of contiguous native vegetation <sup>6</sup> . Site is within ‘known’ distribution of species <sup>7</sup> , or within ‘likely’ distribution and 2km of ‘known’ distribution of species.	3	3	3	3	IMPACT SITE (3) <ul style="list-style-type: none"> <li>Impact Site forms part of a larger contiguous are of native vegetation of suitable fauna habitat. Impact Site occurs within recorded Chuditch distribution (as evidenced by verified records of Chuditch from biological surveys, and regional database records). (Data source: Phoenix 2022a, 2022b)</li> </ul> OFFSET SITE (3, 3, 3) <ul style="list-style-type: none"> <li>Offset Site forms part of a larger contiguous are of native vegetation of suitable fauna habitat, directly adjoining x4 Conservation Reserves. Offset Site occurs within recorded Chuditch distribution (as evidenced by verified records of Chuditch from biological surveys, and regional database records). (Data source: Phoenix 2021)</li> </ul>
	2	Site is within ‘known’ or ‘likely’ distribution of the species, or within 4km of ‘known’ distribution of species and connected to at least one patch of contiguous native vegetation.					
	1	Site is within the ‘likely’ distribution of the species and separated from suitable habitat by cleared areas of up to 1 km. There is evidence <sup>8</sup> Chuditch are capable of migrating across these cleared areas.					
	0	Site is located within the ‘likely’ distribution of the species but separated from suitable habitat by cleared areas more than 1 km, or site is not located within the known or likely distribution of the species.					
SPECIES STOCKING RATE							
Usage and/or density of a species. Role of the site population in regard to overall species population viability.	3	Verified record(s) <sup>9</sup> of species presence averaged <sup>10</sup> across site in last 12 months (Chuditch observed onsite in last 12 months and/or evidence of breeding population <sup>11</sup> ). Site is adjacent to verified/published records in last 12 months. High density/abundance of Chuditch <sup>12</sup> .				3	OFFSET SITE (3) <ul style="list-style-type: none"> <li>Subject to the implementation of the proposed monitoring actions outlined within the Fauna Offset Strategy, the increased monitoring frequency may be expected to record Chuditch within the Offset Site (and the adjacent x3 Conservation Reserves) at an annual frequency (12 months); resulting in the ‘Species Stocking Rate’ of the Offset Site being increased (i.e. Score 2 increased to Score 3).</li> </ul>
	2	Verified record(s) of species presence onsite in last 3 years (Chuditch observed onsite in last 3 years and/or evidence of breeding population in last 4 years). Site is within 2 km of verified/published	2	2			IMPACT SITE (2) <ul style="list-style-type: none"> <li>Chuditch recorded within Survey Area by sightings (camera trap images) and scats by the biological surveys completed over multiple field trips between November 2019 to March 2021; being within the previous 3 years (key criterion).</li> </ul>

<sup>6</sup> Contiguous native vegetation of suitable habitat: multiple patches of native vegetation sharing borders, next together in sequence, comprising a larger, continuous area

<sup>7</sup> Distribution of species as documented in Wylie, or another evidenced source

<sup>8</sup> Evidence may include: peer reviewed research or the opinion of a suitably qualified species expert

<sup>9</sup> Verified records: primary (e.g. camera detections or trap records) or secondary (e.g. scats, tracks, hairs) evidence.

<sup>10</sup> Averaged: distributed evenly, evened out

<sup>11</sup> Evidence of breeding population may include: male Chuditch appear in irregular locations during breeding period (~April-July) and/or juvenile Chuditch observed outside of dens as they start weaning (~September-November). Must be supported by robust survey evidence over sufficient time to confirm likely breeding, e.g., available data sets for location.

<sup>12</sup> Density/abundance based on % of total camera detections and/or trap success for total nights surveyed, and/or % total secondary evidence across all surveys within relevant period.

	records within last 3 years. Medium density/abundance of Chuditch.				<p>(Data source: Phoenix 2022a, 2022b)</p> <p>OFFSET SITE (2, 2)</p> <ul style="list-style-type: none"> <li>Chuditch recorded within Offset Site by scats at 2 locations during the field surveys by Phoenix (2021) undertaken in March 2020 and March 2021. Whilst it is noted Phoenix (2021) identifies the recorded Chuditch scats “<i>did not appear fresh, so do not demonstrate current occupancy</i>”, independent advice from consulting ecologist Dr Mike Bamford indicates the scats are unlikely to be &gt; 12 months old as Chuditch scats in the Wheatbelt region are likely to degrade to an unrecognisable condition within a timeframe of several weeks if deposited on logs (which is typical of Chuditch behaviour) or up to several months if deposited within a log or burrow. In this context, the Chuditch scats recorded provide verified records of Chuditch within the Offset Site within previous 3 years (key criterion).</li> </ul> <p>(Data source: Phoenix 2021, Dr M Bamford pers. com November 2022.)</p>
1	Record(s) of species presence onsite in last 5 years (Chuditch observed onsite in last 5 years). Site is within 4 km of verified/published records within last 5 years, connected by contiguous habitat. Low density/abundance of Chuditch.			1	<p>OFFSET SITE (1)</p> <ul style="list-style-type: none"> <li>Habitat loss, predation by introduced fauna and unmanaged fire present a significant risk for Chuditch, with their naturally low abundance making local populations particularly sensitive to change.</li> </ul> <p>In the absence of the proposed management actions for introduced predator control and fire management, notable risk exists for the ‘Species Stocking Rate’ (i.e. Chuditch activity, including breeding) within the Offset Site to be reduced through lower Chuditch abundance and lower frequency of records (reduced from current Score 2, to Score 1). The potential for a reduction for the Offset Site is based upon:</p> <ul style="list-style-type: none"> <li>The Offset Site is currently in ‘freehold’ land tenure, surrounded by the largely cleared agricultural landscape of the eastern Wheatbelt region. Potentially the Offset Site may be at risk from clearing for agriculture if retained in its ‘freehold’ land tenure (Note Mineral Resources has acquired the Offset Site in freehold land tenure to protect it from risk of agricultural land clearing, however transfer to DBCA remains the next step required to complete the protection of the Offset Site from the risk of agricultural clearing).</li> <li>Key threatening processes for Chuditch, as outlined by the DCCEEW (2012) document <i>Chuditch (Dasyurus geoffroii) National Recovery Plan</i>, are currently unmanaged within the Offset Site. These key threatening processes include             <ul style="list-style-type: none"> <li>Habitat loss through clearing</li> <li>Predation by introduced fauna,</li> <li>Habitat loss/quality reduction from fire.</li> </ul> </li> </ul> <p>These key threatening processes have been documented as contributors to a decline in the distribution and abundance of Chuditch across Western Australia; including within the Wheatbelt region.</p> <p>In the absence of the proposed acquisition/transfer and the management measures as outlined within the Fauna Offset Strategy, the Chuditch habitat (and individuals of Chuditch) occurring within the Offset Site would remain at risk from these key threatening processes.</p> <p>The risk of clearing by agriculture is verified by the existing and extensive agricultural clearing surrounding the Offset Site. The risk of predation is verified by the multiple records of introduced predator fauna taxa recorded within the Offset Site by the biological surveys. The risk of fire is verified by the recent fire indicated in the north-east corner of the Offset Site (2012), as well as recent fire in the adjoining Conservation Reserves (2010, 2012, 2015) (DBCA 2022). The key</p>

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							threatening processes are present, with the risk assessed to be likely/high.  A 1-step score reduction (reduced from current Score 2, to Score 1) is conservative; noting that loss of Chuditch habitat through clearing or by a large-scale fire would result in a more substantial reduction (a reduction down to Score 0 if the Chuditch habitat is cleared for agriculture). Further, predation of the limited number of Chuditch individuals within the Offset Site (due to naturally low abundance) may potentially result in a complete loss of Chuditch from within the Offset Site (a reduction down to Score 0 if no Chuditch remain).
	0	No record of species presence onsite, or within 4km within last 5 years.  [Note: if surveys at impact site are not undertaken in accordance with the survey guidelines and do not detect Chuditch presence, species stocking rate score is assumed as 0.]					
<b>TOTALS</b>			<b>7</b>	<b>7</b>	<b>6</b>	<b>9</b>	

<b>LEGEND</b>	
	Unlikely to be considered a suitable habitat/offset site.

## NOTES

- (1) The Habitat Quality Scoring Tools assess and assign a score for each attribute to the 'Impact Site' (i.e. the fauna habitat to be removed by the Haul Road), and to the Offset Site in the scenarios of its 'Start Quality' (current condition) and a prediction of the future quality 'Without Offset' and 'With Offset'. The 'Justification' column seeks to provide evidence to support the assessment of the start quality, and a rationale to support the prediction of the future quality.
- (2) For some attributes, the 'Detail' column identifies a number of criteria upon which to assess and assign a score. The assessment process seeks to identify a 'best fit' whereby key criterion are met, however, it is accepted that not all criterion will be met.
- (3) Success of implementation of the environmental offset will be measured against (a) acquisition of the Offset Site and transfer to DBCA for protection and conservation, (b) management of the Offset Site (introduced predator fauna control, fire management, installation/maintenance of exclusion fencing, and (c) implementation of annual monitoring within the Offset Site. These implementation actions are considered readily achievable by Mineral Resources and implementation can commence immediately following approval of the Fauna Offset Strategy. To clarify, whilst presence and abundance of Chuditch within the Offset Site will be monitored annually, the presence or abundance output values from the annual monitoring are not applied as a measure of success for the Offset Site.

Accordingly, for calculation inputs for the Offsets Assessment Guide are to have the following values applied:

- a. "Confidence in result (%)" to be set at a conservative value of 75 %. Whilst confidence in implementing the acquisition/transfer, management and monitoring actions is high (and potentially a > 90% confidence may be applied), it is noted typically a maximum 75 % value has been accepted by DCCEEW for environmental offsets.
  - b. "Time until ecological benefit" to be set at a conservative value of 5 years value. Whilst the ecological benefit from implementation of the management measures will be achieved within a relatively short time period (and potentially a 2-year value could be applied), a more conservative 5-year value has been applied to allow a longer time period for which the environmental monitoring can demonstrate the long-term ecological benefit.
- (4) As the success of implementation of the environmental offset will be measured against acquisition/transfer, management and monitoring (refer Note 3, above) which are readily achievable, no 'contingency measures' (e.g. actions *in lieu* of the acquisition/transfer, management or monitoring) are not considered necessary or proposed.
  - (5) Chuditch naturally occur in low abundance, with a short life-span of ~3 years; such that a limited number of individuals are anticipated to occur within the Offset Site and the adjoining Conservation Reserves at any time (likely < 10 individuals). Whilst annual monitoring of Chuditch presence and abundance will be undertaken, any changes in presence or abundance over time as indicated by the monitoring will not provide a statistically valid measure of change due to the small sample size (typically a minimum sample size of 30 is required to produce a statistically significant result) and known other environmental factors which may affect survival and breeding (e.g. rainfall/drought). Accordingly, the presence and abundance results for Chuditch have not been proposed as a measure of success/failure of the environmental offset.
  - (6) Conservation Covenants are typically applied to land areas in which an agreement is reached with a landowner to not clear native vegetation, in which the land ownership is retained by the landowner. Conservation Covenants have the effect of a legally binding agreement that prevents the landowner from clearing the native vegetation. As the Offset Site is proposed to be transferred in 'freehold' land tenure to State DBCA to be managed for conservation purposes (i.e. land ownership not retained by Mineral Resources), the placement of a Conservation Covenant does not appear a necessary additional protection mechanism for the Offset Site. Further, a Conservation Covenant may restrict future actions by DBCA to incorporate the Offset Site into the State's Conservation Reserve System.

## REFERENCES

- Department of Biodiversity, Conservation and Attractions (2021) *Wheatbelt Region Parks and Reserves Management Plan 95 2021*.
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- Department of Climate Change, Energy, the Environment and Water (2012) *Chuditch (Dasyurus geoffroii) National Recovery Plan*. National Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999 (C'th). Report prepared by Dunlop J and Morris K of the Department of Biodiversity, Conservation and Attractions Western Australia (formerly as the Department of Environment and Conservation) for the Commonwealth Department of Climate Change, Energy, the Environment and Water (formerly as the Department of Sustainability, Environment, Water, Population and Communities). July 2012.
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- Phoenix Environmental Sciences Pty Ltd (2021) *Flora and Fauna Assessment of Lot 1416 for the Parker Range Project*. Report prepared by Pynt S, Perkins A, Crews K and Scanlon J (Dr) of Phoenix Environmental Sciences Pty Ltd for Mineral Resources Ltd. Revision 2.0. June 2021.
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- Phoenix Environmental Sciences (2022b) *Baseline Flora, Vegetation and Fauna Surveys for the Parker Range Haul Road Project – Northern Extension*. Report prepared by Phoenix Environmental Sciences Pty Ltd for Mineral Resources Ltd. Revision 2.0 January 2022.

#### 4.4 OFFSET CALCULATOR

To accompany the Habitat Quality Scoring Tools, the DCCEEW has developed an Offsets Assessment Guide (DCCEEW 2012b) to calculate whether a proposed environmental offset is appropriate to counterbalance a proposed impact.

The Offsets Assessment Guide, commonly referred to as the 'EPBC Offsets Calculator', is a Microsoft Excel-based spreadsheet with multiple inputs including the listing status of the protected matter, the quantum of proposed impact, the quantum of the proposed offset, results of the Habitat Quality Scoring Tool, projected time until ecological benefit (gain) and the projected confidence in the result of the offset being achieved. The key output from the Offsets Assessment Guide is a percentage value calculation for the proposed offset; whereby a value of 100 % or greater will meet the offset requirement for the quantum of proposed impact.

Table 10 identifies the completed Offsets Assessment Guide for Malleefowl. Table 11 identifies the completed Offsets Assessment Guide for Chuditch. To note, both Offsets Assessment Guides have been completed in consultation with DCCEEW.

The completed Offsets Assessment Guides for both Malleefowl (131 %) and Chuditch (173 %) identify the Offset Site (including the proposed management measures and environmental monitoring outlined within this fauna Offset Strategy) meet the 100 % offset requirement for the Project.

**TABLE 10: OFFSETS ASSESSMENT GUIDE FOR MALLEEFOWL**

**Offsets Assessment Guide**  
 For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*  
 2 October 2012  
 This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Malleefowl
EPBC Act status	Vulnerable
Annual probability of extinction <small>Based on IUCN category definitions</small>	0.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator					
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source
<i>Ecological communities</i>					
Area of community	No		Area		
			Quality		
			Total quantum of impact	0.00	
<i>Threatened species habitat</i>					
Area of habitat	Yes		Area	173	Hectares
			Quality	6	Scale 0-10
			Total quantum of impact	103.80	Adjusted hectares
<i>Threatened species</i>					
Number of features <small>e.g. Nest hollows, habitat trees</small>	No				
Condition of habitat <small>Change in habitat condition, but no change in extent</small>	No				
Birth rate <small>e.g. Change in nest success</small>	No				
Mortality rate <small>e.g. Change in number of road kills per year</small>	No				
Number of individuals <small>e.g. Individual plants/animals</small>	No				

Offset calculator																	
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source	
<i>Ecological Communities</i>																	
Area of community	No				Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (% without offset)	Risk of loss (% with offset)	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source	
							0.0	0.0									
							Future area without offset (adjusted hectares)	Future area with offset (adjusted hectares)									
Area of habitat	Yes	103.80	Adjusted hectares	878	Time over which loss is averted (max. 20 years)	Start area (hectares)	Risk of loss (% without offset)	Risk of loss (% with offset)	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source	
							1%	0%									
							857.5	870.0									
Time until ecological benefit	Start quality (scale of 0-10)	Future quality without offset (scale of 0-10)	Future quality with offset (scale of 0-10)	2.00	75%	1.50	1.49										
<i>Threatened species habitat</i>																	
Area of habitat	Yes	103.80	Adjusted hectares	878	Time over which loss is averted (max. 20 years)	Start area (hectares)	Risk of loss (% without offset)	Risk of loss (% with offset)	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source	
							1%	0%									
							857.5	870.0									
Time until ecological benefit	Start quality (scale of 0-10)	Future quality without offset (scale of 0-10)	Future quality with offset (scale of 0-10)	2.00	75%	1.50	1.49										
<i>Threatened species</i>																	
Number of features <small>e.g. Nest hollows, habitat trees</small>	No																
Condition of habitat <small>Change in habitat condition, but no change in extent</small>	No																
Birth rate <small>e.g. Change in nest success</small>	No																
Mortality rate <small>e.g. Change in number of road kills per year</small>	No																
Number of individuals <small>e.g. Individual plants/animals</small>	No																

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**TABLE 11: OFFSETS ASSESSMENT GUIDE FOR CHUDITCH**

**Offsets Assessment Guide**  
 For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*  
 2 October 2012  
 This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Chuditch
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	0.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator						
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
			Area	Quality		
<i>Ecological communities</i>						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
<i>Threatened species habitat</i>						
Area of habitat	Yes		Area	168	Hectares	
			Quality	7	Scale 0-10	
			Total quantum of impact	117.60	Adjusted hectares	
<i>Threatened species</i>						
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Birth rate e.g. Change in nest success	No					
Mortality rate e.g. Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator																								
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source					
						Start area (hectares)	Start quality (scale of 0-10)	Future area without offset (adjusted hectares)	Future quality without offset (scale of 0-10)	Future area with offset (adjusted hectares)	Future quality with offset (scale of 0-10)													
<i>Ecological Communities</i>																								
Area of community	No				Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (%) without offset	Future area without offset (adjusted hectares)	0.0	Risk of loss (%) with offset	Future area with offset (adjusted hectares)	0.0												
																					Time until ecological benefit	Start quality (scale of 0-10)	Future quality without offset (scale of 0-10)	Future quality with offset (scale of 0-10)
																					Time over which loss is averted (max. 20 years)	Start area (hectares)	Risk of loss (%) without offset	Future area without offset (adjusted hectares)
Area of habitat	Yes	117.60	Adjusted hectares	878	20	878	1%	865.4	0%	0%	878.0	12.64	95%	12.01	11.54	203.16	172.75%	Yes						
																					Time until ecological benefit	Start quality (scale of 0-10)	Future quality without offset (scale of 0-10)	Future quality with offset (scale of 0-10)
																					Time horizon (years)	Start value	Future value without offset	Future value with offset
<i>Threatened species</i>																								
Number of features e.g. Nest hollows, habitat trees	No																							
Condition of habitat Change in habitat condition, but no change in extent	No																							
Birth rate e.g. Change in nest success	No																							
Mortality rate e.g. Change in number of road kills per year	No																							
Number of individuals e.g. Individual plants/animals	No																							

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## 4.5 OFFSET BANKING

'Offset Banking' (which may also be termed 'Advanced Offsets' or 'Bio-Banking') is an approach whereby environmental offsets may be assessed and acquired in-advance of the environmental effects of a project, with the offset value credited towards environmental offsets for future project effects. Offset banking is an accepted and established approach for the identification, management and accounting for land acquisition environmental offsets.

Mineral Resources has acquired the Offset Site for use as an environmental offset for the Project. Noting the relatively large size of the Offset Site, it has been calculated in accordance with the Offset Assessment Guide that the Offset Site exceeds the 100 % environmental offset requirement, by in the order of approximately ~ 220 ha (based upon calculations for Malleefowl, higher for Chuditch).

Mineral Resources proposes that the whole of the Offset Site is transferred to DBCA for conservation purposes, rather than only the required part of the Offset Site being transferred (through subdivision or other process).

Following completion of clearing for the Project, a detailed post-construction survey assessment will be conducted to confirm the actual disturbance area (which may be less than 173 ha of clearing proposed) and the offset requirement re-calculated for that clearing. The remainder (excess) offset value from the Offset Site will be 'banked' (credited) towards any future environmental offset requirement for Mineral Resources.

The key advantages of an 'offset banking' approach are to:

- Allow for early management of a larger offset area in advance of the full offset value being required (conservation benefit);
- Allow for the targeting and acquisition of potentially larger land areas containing native vegetation (which is preferable to seeking smaller land areas which meet only the minimum land offset requirement); and
- Encourage minimisation of total clearing, by allowing for an increase in the areas available in the offset bank.

The post-construction accounting approach will provide incentive to Mineral Resources to minimise clearing during construction works for the Project noting that any reduction in habitat clearing during construction will contribute towards a larger retained 'banked' credit. Noting this post-construction accounting approach, it is not necessary to spatially apportion which parts of the Offset Site will be used for offsets for the Project and which parts are to be credited for offset banking.

Should clearing for the Project not be implemented, Mineral Resources propose to either place the entire land value of the Offset Site into the offset bank, or alternatively, if the banked offset value is not required by Mineral Resources in the future the banked offset value may be on-sold to third parties (e.g. other mining companies) to meet their environmental offset requirements.



## 5. OFFSET SITE ACQUISITION, MANAGEMENT AND MONITORING

### 5.1 LAND ACQUISITION PROCESS

Mineral Resources, through its wholly-owned subsidiary Yilgarn Iron Pty Ltd, acquired the Offset Site in 'freehold' land tenure in March 2022. Accordingly, Mineral Resources has completed the first stage of the land acquisition process.

The second stage of the process will be subdivision of the native vegetation portion of Lot 1416 (i.e. the Offset Site), with transfer of the agricultural portion of Lot 1416 back to previous owner (consistent with the land acquisition agreement). This stage is currently being progressed by Mineral Resources through the relevant legislative processes under the State *Land Administration Act 1997* (WA).

The final stage of the process will be the transfer of the Offset Site to DBCA. The DBCA has determined the Offset Site contains suitable habitat for both Malleefowl and Chuditch (based upon site inspection and review of the biological survey reports), and is considered to be conditionally suitable for reservation and management under the State *Conservation and Land Management Act 1984* (WA). This acceptance of the Offset Site by DBCA is subject to confirmation from EPA and DCCEEW that the acquisition, scope and management of the Offset Site (as outlined within this Fauna Offset Strategy) is consistent with the approval conditions for the Project.

Following acceptance of the suitability of the Offset Site and the commencement of implementation of the Project, Mineral Resources will transfer the Offset Site to DBCA and provide funds to DBCA for its ongoing management (as per a funding agreement to be developed with DBCA).

To note, as the Offset Site is intended to be transferred to DBCA, other additional protection mechanisms (e.g. a Conservation Covenant) are not considered to be necessary.

### 5.2 CONSERVATION RESERVATION PROCESS

The DBCA has determined the Offset Site contains suitable habitat for both Malleefowl and Chuditch (based upon site inspection and review of the biological survey reports), and is considered to be conditionally suitable for reservation and management under the State *Conservation and Land Management Act 1984* (WA).

Following completion of the land transfer from Mineral Resources to DBCA, the DBCA may then seek to incorporate the Offset Site into the State Conservation Reserve system; changing the land tenure of the Offset Site from 'Freehold' to 'Conservation Reserve', to be vested in the Conservation and Parks Commission.

The reservation of the Offset Site for management under the State *Conservation and Land Management Act 1984* (WA) will be a matter coordinated under the relevant legislative provisions by DBCA and other Government agencies.

Mineral Resources will not have a role in the reservation process. Accordingly, whilst the reservation process is noted, that process is outside the scope of this Fauna Offset Strategy.

### 5.3 ENVIRONMENTAL MANAGEMENT MEASURES

Mineral Resources has identified 'Management Measures' to be implemented for the Offset Site. The success of implementation of the Management Measures will be measured against 'Completion Criteria'. The proposed Management Measures and Completion Criteria are identified by Table 12.

The Management Measures and Completion Criteria are intended to address the key Ecological Outcomes to be achieved for this Fauna Offset Strategy, being to:

- Provide and protect continuous habitat for Malleefowl and Chuditch within the eastern Wheatbelt.
- Maintain and monitor fauna habitat, and Malleefowl and Chuditch individuals.

The management measures to be implemented within the Offset Site can be expected to maintain/improve the quality of the fauna habitat present. The improvements in the fauna habitat quality (in particular, resulting from a reduction in introduced predator fauna and fire management) are intended to ensure the continued presence of Malleefowl and Chuditch within the Offset Site, and may *potentially* result in an increased abundance of Malleefowl and Chuditch within the Offset Site and/or the adjoining Conservation Reserves.

Mineral Resources will implement the Management Measures until the Completion Criteria are achieved. The management Measures will be implemented for a minimum of 5 years, and up to a maximum of 10 years (if the Completion Criteria are not achieved within the initial 5 years).

The Management Measures, Completion Criteria and Performance Criteria should be considered as 'preliminary', with a view to being further refined within the future Offset Management Plan and as implementation of this Fauna Offset Strategy / Offset Management Plan progresses.

**TABLE 12: MANAGEMENT MEASURES AND COMPLETION CRITERIA**

ECOLOGICAL OUTCOME	MANAGEMENT MEASURE <sup>13</sup>	COMPLETION CRITERIA	SCHEDULE	MONITORING ACTIVITY	PERFORMANCE CRITERIA
Provide and protect continuous habitat for Malleefowl and Chuditch within the eastern Wheatbelt.	1 - Acquisition of freehold land	Mineral Resources acquisition of freehold land.	Completed (March 2022)	N/A	Land transfer documentation obtained
	2- Subdivision of arable portions of land	Transfer of arable portions of Lot 1416 back to previous landowner, with retention of the native vegetation portions as the Offset Site	Within 5 years of commencement of construction of the Project	NA	Land transfer documentation obtained
	3 – Protection through conservation	Transfer of Offset Site to DBCA for conservation purposes	Within 5 years of commencement of construction of the Project.	N/A	Land transfer documentation obtained
Maintain and monitor fauna habitat, and Malleefowl and Chuditch individuals.	3 – Monitoring of fauna presence and habitat within Offset Site	Weed cover is consistent with neighbouring native vegetation	1 year after commencement of construction of the Project, until completion criteria are met	Annual fauna monitoring following implementation of the Project	Weed cover is not significantly greater than in existing remnant vegetation as measured within reference sites
		Leaf litter is consistent with neighbouring native vegetation			Percentage of leaf and vegetation litter is not significantly less than in existing remnant vegetation as measured within reference sites
		Presence of Malleefowl			Malleefowl recorded (via camera, tracks, scats) within 10 years
		Presence of Chuditch			Chuditch recorded (via camera, trap, scats) within 10 years
	4 - Fencing (or maintenance of existing fencing) to minimise the risk of human and stock entry which may affect fauna habitat for Malleefowl and Chuditch within the Offset Site.	Fencing established within the Offset Site.	Within 6 months of commencement of construction of the Project.	N/A	Annual inspection – confirmation of management measure
		Fence maintenance undertaken within the Offset Site.	Within 6 months of identification	Annual inspection of fencing to confirm integrity following implementation of the Project	Annual inspection of fencing to confirm integrity
	5 - Introduced (predator) fauna control program to minimise predation impacts to Malleefowl and Chuditch within the Offset Site <sup>14</sup>	Introduced (predator) fauna management controls are implemented within the Offset Site.	Annually, or as determined by DBCA regional introduced (predator) fauna control programs.	Annual fauna monitoring following implementation of the Project.	Annual inspection and monitoring to confirm no increase in feral animals
	6 - Fire management to minimise fire risk to fauna habitat for Malleefowl and Chuditch within the Offset Site <sup>15</sup> .	Fire management tracks are established within the Offset Site	Within six months of commencement of construction of the Project.	N/A	Annual inspection to confirm fire management track establishment
		Fire management track maintenance undertaken within the Offset Site	Annually following fire management track establishment.	Annual inspection of fire breaks to confirm integrity following implementation of the Project.	Fire access tracks are in good condition and easily accessible
		No unplanned fire occurs within the Offset Site	Annually following the commencement of construction of the Project	Annual fauna monitoring following implementation of the Project. Annual inspections following implementation of the Project	All fire events are scheduled controlled burns that do not adversely impact fauna habitat quality

<sup>13</sup> Management measures, completion criteria and performance criteria are preliminary, to be refined post-approval through the Offset Management Plan (refer to Section 8 *Offset Management Plan*).

<sup>14</sup> Introduced fauna control within the Offset Site is anticipated to be undertaken as part of broader regional fauna control programs coordinated by DBCA, in recognition of the adjacent x4 Conservation Reserves managed by DBCA. The specific fauna control methods (baiting, trapping, culling) will be guided by the professional advice of DBCA as the 'lead agency' for conservation, and in consultation with other local landowners.

<sup>15</sup> Fire management within the Offset Site is anticipated to be undertaken as part of broader regional fire management programs coordinated by DBCA, in recognition of the adjacent x4 Conservation Reserves managed by DBCA. The specific fire control methods (firebreak clearing, low-intensity fuel reduction burns) will be guided by the professional advice of DBCA as the 'lead agency' for conservation, and in consultation with other local landowners.

## 5.4 ENVIRONMENTAL MONITORING

Environmental monitoring of the Offset Site will be undertaken by Mineral Resources and will consist of annual fauna monitoring and periodic inspections. Details of the monitoring activities to be undertaken will be outlined within the Offset Management Plan to be prepared. Annual inspections and fauna monitoring would commence within 1 year following implementation of Project and include:

- Vegetation condition:
  - Weed presence and cover
  - Vegetation impacts as a result of unplanned fires
- Leaf and vegetation litter, specifically with reference to suitability for Malleefowl
- Presence of foraging resources for Malleefowl and Chuditch and level of hollow logs as a denning resource for Chuditch
- Monitoring of Malleefowl nest mounds and nest mound status
- Presence of Chuditch, particularly during the breeding season.

Annual inspections will be undertaken following commencement of the Project and include:

- Inspections of fencing to ensure integrity and identify any repairs required
- Visual observations to identify any increases in abundance of introduced flora or introduced (predator) fauna
- Inspections of fire management tracks to identify any maintenance required, or any unplanned fires.

To note, the annual monitoring will be in addition to periodic inspections of the Offset Site undertaken by Mineral Resources' personnel.

## 5.5 REPORTING

Mineral Resources will report annually against implementation of this Fauna Offset Strategy and the Offset Management Plan. Generally, the reporting will include:

- Progress against land transfer of the Offset Site to DBCA;
- Management of the Offset Site and progress towards achieving the Completion Criteria;
- Outcomes from annual fauna monitoring within the Offset Site; and
- Confirmation of fencing, fire management, and introduced flora and introduced fauna management measures within the Offset Site.

## 5.6 FINANCIAL PROVISION

Mineral Resources proposes to develop a funding agreement with DBCA through a Memorandum of Understanding to confirm the roles and responsibilities associated with the transfer and management of the Offset Site.

## 6. RISK ASSESSMENT

### 6.1 RISK ASSESSMENT

Risks and contingencies relating to implementation of this Fauna Offset Strategy are described in Table 15. The risk assessment was completed in accordance with DCCEE (2014) document *Environmental Management Plan Guidelines* using the matrix shown in Table 13 and Table 14.

### 6.2 CONTINGENCY RESPONSE AND CORRECTIVE ACTIONS

If final Completion Criteria, to be prescribed within the Offset Management Plan, are not met within 10 years of implementation of the Project, Mineral Resources may fund an alternative or amended environmental offset, which may include:

- Undertake any further biological field surveys, environmental studies or research deemed necessary to support the definition of site-based contingency measures;
- Implementation of site-based contingency measures, for example, undertaking additional introduced (predator) fauna control; and
- Completion of any extended environmental monitoring period.

To note, the contingency measures do not include consideration of an option to acquire an alternate offset site. The Management Measures, and their associated Completion Criteria, are focussed on actions and outcomes which can readily be achieved by Mineral Resources within the Offset Site to protect, manage and monitor fauna habitat for Malleefowl and Chuditch; and for which a high confidence level of implementation success applies.

### 6.3 ADAPTIVE MANAGEMENT

Environmental monitoring, as outlined within Section 5.4 *Environmental Monitoring*, will include targeted annual fauna monitoring for Malleefowl, Chuditch and introduced (predator) fauna. Monitoring will be compared against the Completion Criteria to determine if the Completion Criteria have been achieved.

The Offset Management Plan, to be developed within 12 months of the commencement of the Project, will include timeframes for the preliminary and final Completion Criteria. Ongoing monitoring will be reviewed against Completion Criteria to provide an indication if performance is on an appropriate trajectory. If any monitoring indicates that Performance Criteria will not be met within the expected timeframe, the Management Measures (Section 5.3 *Environmental Management Measures*) will be reviewed and amended. In the event significant changes to the Management Measures, this Fauna Offset Strategy and/or the Offset Management Plan are required, a revised version will be developed by Mineral Resources and submitted to the DCCEE and EPA for review and approval.

**TABLE 13: LIKLEIHOOD AND CONSEQUENCE**

QUALITATIVE MEASURE OF LIKELIHOOD (HOW LIKELY IS IT THAT THIS EVENT/CIRCUMSTANCES WILL OCCUR AFTER MANAGEMENT ACTIONS HAVE BEEN PUT IN PLACE/ARE BEING IMPLEMENTED)	
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances
QUALITATIVE MEASURE OF CONSEQUENCES (WHAT WILL BE THE CONSEQUENCE/RESULT IF THE ISSUE DOES OCCUR)	
Minor	Minor risk of failure to achieve the plan’s objectives. Results in short term delays to achieving plan objectives, implementing low cost, well characterised corrective actions.
Moderate	Moderate risk of failure to achieve the plan’s objectives. Results in short term delays to achieving plan objectives, implementing well characterised, high cost/effort corrective actions.
High	High risk of failure to achieve the plan’s objectives. Results in medium-long term delays to achieving plan objectives, implementing uncertain, high cost/effort corrective actions.
Major	The plan’s objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies.
Critical	The plan’s objectives are unable to be achieved, with no evidenced mitigation strategies.

**TABLE 14: RISK MATRIX**

		CONSEQUENCE				
		Minor	Moderate	High	Major	Critical
LIKELIHOOD	Highly Likely	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

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**TABLE 15: MANAGEMENT OBJECTIVES, RISKS, TRIGGERS AND CORRECTIVE ACTIONS**

ECOLOGICAL OUTCOME	EVENT OR CIRCUMSTANCE	COMPLETION CRITERIA <sup>16</sup>	RESIDUAL RISK			TRIGGER DETECTION AND MONITORING ACTIVITIES	FEASIBLE / EFFECTIVE CORRECTIVE ACTIONS
			LIKELIHOOD	CONSEQUENCE	RISK LEVEL		
Provide and protect continuous habitat for Malleefowl and Chuditch within the eastern Wheatbelt.	Unauthorised access by vehicles or stock causing habitat degradation	Fencing established within the Offset Site. Fence maintenance undertaken within the Offset Site.	Unlikely	Minor	Low	Evidence of vehicle access and disturbance Annual inspection of fencing to confirm integrity	Reinstate damaged fencing. Investigation of vehicle and stock entry points, repair infrastructure Install no access signage and gate and lock access points.
Maintain and monitor fauna habitat, and Malleefowl and Chuditch individuals.	Unplanned fire causing habitat degradation	Fire management tracks are established within the Offset Site Fire management track maintenance undertaken within the Offset Site No unplanned fire occurs within the Offset Site	Possible	Moderate	Medium	Unplanned fires Annual inspection of fire access tracks to identify any maintenance required or unplanned fires Annual vegetation monitoring to identify unplanned fire impacts	Maintain fire access tracks to ensure they are in good condition and cleared of vegetation at all times. Review of fire management measures with DBCA, local shire and DFES to prevent recurrence Rehabilitation of significantly impacted areas from unplanned fires, if required.
	Presence of Malleefowl or Chuditch is not recorded	Annual monitoring for the presence and abundance of Malleefowl is undertaken Annual monitoring for the presence and abundance of Chuditch is undertaken	Possible	Moderate	Medium	Annual monitoring does not indicate Malleefowl or Chuditch presence in consecutive years	Consult with DBCA to determine potential causes and to identify potential management / corrective actions which may be appropriate.
	Increased abundance of introduced predator fauna (fox, cat, dog) which may increase the risk of predation to Malleefowl or Chuditch.	Introduced (predator) fauna management controls are implemented within the Offset Site.	Possible	Major	High	Monitoring identifies an increased abundance of introduced (predator) fauna. Annual DBCA confirmation that introduced fauna management controls are implemented	Increase or alter introduced (predator) fauna controls. Contribute to regional introduced (predator) fauna control programs.

<sup>16</sup> Management measures should be considered preliminary. The Offset Management Plan will provide detailed management measures.

## 7. ROLES AND RESPONSIBILITIES

Roles and responsibilities are discussed in detail throughout this Strategy and are summarised in Table 16.

**TABLE 16: ROLES AND RESPONSIBILITIES**

ROLE	RESPONSIBILITY
Mineral Resources	<ul style="list-style-type: none"> <li>• Acquisition and subdivision of the Offset Site</li> <li>• Development of the Offset Management Plan within 12 months of the Project commencement</li> <li>• Develop Memorandum of Understanding with DBCA (including funding arrangement)</li> <li>• Coordination of annual monitoring within the Offset Site, in consultation with DBCA</li> <li>• Coordination of management measures within the Offset Site, in consultation with DBCA</li> </ul>
Department of Biodiversity, Conservation and Attractions (DBCA)	<ul style="list-style-type: none"> <li>• Review of the Fauna Offset Strategy and Offset Management Plan with advice to EPA / DCCEEW (including Management Measures and Environmental Monitoring to be undertaken within the Offset Site)</li> <li>• Annual review of Environmental Monitoring outcomes, in consultation with Mineral Resources</li> </ul>
Department of Climate Change, Energy, the Environment and Water (DCCEEW)	<ul style="list-style-type: none"> <li>• Review and approval of this Fauna Offset Strategy and the Offset Management Plan</li> <li>• Annual review of Environmental Monitoring outcomes, in consultation with Mineral Resources</li> </ul>
Environmental Protection Authority (EPA)	<ul style="list-style-type: none"> <li>• Review and approval of this Fauna Offset Strategy and the Offset Management Plan</li> <li>• Annual review of Environmental Monitoring outcomes, in consultation with Mineral Resources</li> </ul>



## 8. OFFSET MANAGEMENT PLAN

As outlined by Section 3 *Requirement for Environmental Offsets*, the acquisition, management and monitoring actions within the Fauna Offset Strategy will be refined through the preparation of an Offset Management Plan, to be prepared and submitted within 12 months following commencement of the Project (post-approval). The Offset Management Plan will be prepared in consultation with relevant Government stakeholders (DCCEE, EPA and DBCA) and seek to provide finer-detail as to the management, monitoring and criteria presented within this Fauna Offset Strategy.

As part of the Offset Management Plan, Mineral Resources will seek to enter into a funding agreement (Memorandum of Understanding) with DBCA regarding the transfer of the Offset Site and the long-term management and monitoring.

## 9. STAKEHOLDER CONSULTATION

Stakeholder consultation is an integral component of Mineral Resources' planning, assessment and development processes. Mineral Resources' Stakeholder Consultation Strategy adopts the principles of the Ministerial Council on Mineral and Petroleum Resources (MCMPR 2005) document *Principles for Engagement with Communities and Stakeholders*, which seeks to provide for:

- Open and effective communication:
  - Two-way communication
  - Clear, accurate and relevant information
  - Timeliness
- Transparency, requiring a process for communication and feedback
- Collaboration, working cooperatively to seek mutually beneficial outcomes
- Inclusiveness, with the aim of recognising, understanding and involving stakeholders early and throughout the process
- Integrity, with engagement undertaken in a manner that fosters mutual respect and trust.

Mineral Resources is committed to ongoing stakeholder identification, communication, engagement and consultation through the planning and approval phase, and through the implementation of the environmental offset. The outcomes of consultation with stakeholders are recorded in Mineral Resources' Stakeholder Consultation Register.

Mineral Resources has identified key stakeholders for the Offset Site as DCCEEW, EPA and DBCA. Mineral Resources has undertaken preliminary consultation with DCCEEW, EPA and DBCA on the proposed Offset Site, including on the biological surveys completed, the offset value calculations, and the proposed environmental management actions. Mineral Resources proposes to further engage with DCCEEW, EPA and DBCA in relation to approval of this fauna Offset Strategy, and in the preparation and approval of the subsequent Offset Management Plan.

Implementation of this Fauna Offset Strategy and the Offset Management Plan will be reported to DCCEEW, EPA and DBCA as part of the annual environmental report process. This process will provide for ongoing stakeholder consultation during implementation of this Fauna Offset Strategy and the Offset Management Plan.

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Phoenix Environmental Sciences (2022a) *Baseline Flora, Vegetation and Fauna Surveys for the Parker Range Haul Road Project*. Report prepared by Phoenix Environmental Sciences Pty Ltd for Mineral Resources Ltd. Revision 3.0 January 2022.

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## 11. GLOSSARY

**TABLE 17: TERMS**

TERM	DEFINITION
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>

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## **12. APPENDICES**

### **Appendix A**

Fauna Habitat Assessment Report (Phoenix 2021)

### **Appendix B**

WA Environmental Offsets Table

## APPENDIX A – FAUNA HABITAT ASSESSMENT REPORT (PHOENIX 2021)

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# PHOENIX

ENVIRONMENTAL SCIENCES

## Flora and Fauna Assessment of Lot 1416 for the Parker Range Project

Prepared for Mineral Resources Ltd

June 2021

Final Report





Flora and Fauna Assessment of Lot 1416 for the Parker Range Project  
Prepared for Mineral Resources Ltd

#### Version history

Author/s	Reviewer	Version	Version number	Date submitted	Submitted to
S.Pynt, A.Perkins	J.Clark	Draft for client comments	0.1	19-May-20	Neil Smith
S. Pynt, K. Crews	N. Smith	Final to client	1.0	1 Feb 21	Neil Smith
J. Scanlon, A. Perkins	K. Crews	Draft. Updated report following 2 <sup>nd</sup> field trip	1.1	9 Jun 21	Neil Smith
J. Scanlon, A. Perkins	D. Leach	Final to client	2.0	21 Jun 21	Neil Smith

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Phoenix Environmental Sciences Pty Ltd

2/3 King Edward Road OSBORNE PARK WA 6017

P: 08 6323 5410

E: [admin@phoenixenv.com.au](mailto:admin@phoenixenv.com.au)

Project codes: 1313-PR-MRL-BOT, 1314-PR-MRL-VER, 1402-PR-MRL-BOT, 1403-PR-MRL-VER

## EXECUTIVE SUMMARY

Mineral Resources Ltd (MRL) is required, in accordance with Condition 10 of Ministerial Statement (MS) 892 to set up the Parker Range Conservation Trust and acquire land suitable for rehabilitation to offset the residual impacts to conservation significant fauna and flora from the Parker Range Iron Ore Project (PRIOP) and proposed private haul road (the Proposal). MRL has identified Lot 1416 as a potential offset site for the Proposal.

Lot 1416 is located approximately 45 km east north-east of Merredin in the Shire of Yilgarn, Western Australia in the South-west botanical province, enclosing approximately 862.1 ha of mostly undisturbed remnant native vegetation. Lot 1416 abuts three unnamed nature reserves and another is approximately 1 km due south; all of these in addition to the Lot itself comprised the study area for the offset site investigations.

MRL engaged Phoenix Environmental Sciences (Phoenix) in March 2020 to conduct a high-level assessment of the conservation values present within the study area, including:

- high-level vegetation structure (National Vegetation Information System (NVIS) Level 2) mapping
- general location, extent and condition of potentially significant vegetation and flora
- general location, extent and condition of potential habitat for significant fauna.

Lot 1416 was visited in Autumn, from 11 – 13 March 2020. A second survey of the larger study area was undertaken on 27-31 March 2021. Field methods for the flora and vegetation survey included relevé surveys, targeted searches for significant flora, Declared Pests and Weeds of National Significance (WoNS) and assessment of the presence of Threatened and Priority Ecological Communities (TECs and PECs). Field methods for the fauna component of the survey included habitat assessments for Malleefowl (*Leipoa ocellata*) and Chuditch (*Dasyurus geoffroyi*), and active diurnal searches for signs of significant fauna.

Database searches identified 589 plant taxa recorded within a 20 km radius of the study area representing 73 families and 230 genera; of these 36 were introduced plant taxa. A total of 37 relevés were sampled for flora, with 125 vascular plant taxa recorded, representing 34 families and 71 genera. The most diverse genera were *Eucalyptus*, *Acacia* and *Melaleuca*. No Declared Pests and WoNS were recorded.

Four Priority (P) species were recorded during the surveys: *Hydrocotyle corynophora* (P1), *Eutaxia lasiocalyx* (P2), *Notisia intonsa* (P3) and *Acacia crenulata* (P3), with records of significant flora from both Lot 1416 and the adjacent reserves. None of the significant flora are known from the PRIOP mine or proposed haul road. Based on a likelihood of occurrence assessment, Lot 1416 has the potential to support a high number of significant flora species, including several taxa of relevance to PRIOP and the proposed haul road.

According to regional scale mapping, the vegetation associations present in Lot 1416 have been heavily cleared, holding the status of Vulnerable at the bioregional and subregional scale, and are poorly represented in the reserve system. Seven broadly defined vegetation types were mapped in the study area from the field survey, representing a mix of *Eucalyptus* woodlands over *Melaleuca*, *Allocasuarina*, *Acacia* and *Santalum* shrublands.

Presence of the Eucalypt Woodland of the Western Australian Wheatbelt TEC was identified at 15 sites in the study area, with one site occurring in Lot 1416. The sites assessed as TEC broadly aligned with the Department of Biodiversity, Conservation and Attractions (DBCA's) mapping for this community.

Two significant fauna species of relevance to PRIOP, Malleefowl *Leipoa ocellata* (Threatened) and Chuditch *Dasyurus geoffroyi* (also Threatened) were recorded in the surveys. The majority of sites

assessed (55 of 66) had attributes of suitable breeding and foraging habitat for Malleefowl. A single old, degraded Malleefowl mound was located in the south of Lot 1416 and a track of this species was observed in the western reserve. This demonstrates that breeding has previously occurred in the study area and at least one adult is currently resident.

Chuditch was recorded from scats at two locations in the north of Lot 1416, and at two other locations in the eastern and western reserves, indicating the study area is used at least for dispersal by the species. Potential refuge and denning sites were also identified. The scats might be up to several years old and do not demonstrate that any individuals currently occur in the study area, but the mere presence of Chuditch (whether breeding, foraging, or traversing the area between other habitat patches) is sufficient to meet criteria for habitat critical to its survival and maintenance.

The eucalypt woodland present in the study area was identified as suitable for nesting by Western Rosella *Platycercus icterotis xanthogenys* (Priority 4); this species is also of relevance to PRIOP.

Lot 1416 connects the three adjacent conservation reserves, providing both a linkage between these and collectively (with the reserves) representing a large intact remnant within a heavily cleared landscape. Local fauna populations within the adjacent reserves are likely to be dependent on the fauna habitat and connectivity provided by Lot 1416. It also potentially has important value as a linkage between other reserves and remnants.

Four introduced mammals were recorded from numerous records, indicating they are active within the study area; three of these are predator species (cat, fox and dog) that present a threat to native fauna, including Malleefowl and Chuditch.

Based on the findings of this study, Lot 1416 presents a suitable site to offset the significant residual impacts of the proposed haul road (the Proposal) and contains values relevant to the PRIOP. Lot 1416 has potentially overlapping values to those that will be impacted by the proposed haul road and appears suitable for inclusion into the conservation estate in accordance with DBCA's strategic criteria, including:

- one confirmed significant flora species present and likely to contain several others
- provides habitat for significant fauna, including Threatened species
- contains vegetation communities that are not well represented in the conservation reserve system
- will contribute to better management outcomes for existing conservation reserves.

The value of the site to Malleefowl and Chuditch could be improved by management measures, including introduced predator control and installation of predator proof fences.

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# 1 INTRODUCTION

## 1.1 OVERVIEW AND SCOPE

The Parker Range Iron Ore Project (the Project; PRIOP) was acquired by Mineral Resources Limited (MRL) (through Polaris Metals Pty Ltd (Polaris), a 100% owned Subsidiary of MRL) from Cazaly Iron Pty Ltd (Cazaly) in August 2019. The PRIOP is located approximately 15 km southeast of Marvel Loch, within the Yilgarn Shire, in the Eastern Wheatbelt Region of Western Australia. PRIOP is approved under the *Environmental Protection Act 1986* (EP Act) via Ministerial Statement (MS) 892 (Minister for Environment; Water 2012).

In order to support the continued growth and optimisation of MRL's Yilgarn Operations, the PRIOP is now proposed to be developed as a satellite operation to the Yilgarn Iron Pty Ltd Koolyanobbing Project (Koolyanobbing Operations). MRL propose to develop a new private haul road (the Proposal) to link the Parker Range mining operation with the Koolyanobbing Operations for the processing of hematite iron ore and export to international markets.

The Proposal was determined to have significant residual impacts to breeding and foraging habitat of Chuditch (*Dasyurus geoffroyi*) and Malleefowl (*Leipoa ocellata*) and the potential to impact on individuals as a result of clearing and traffic interactions. Consequently, MRL is proposing the application of an offset for fauna habitat and incidental mortality.

Mineral Resources Ltd (MRL) is required, in accordance with Condition 10 of Ministerial Statement (MS) 892 to set up the Parker Range Conservation Trust and acquire land suitable for rehabilitation to offset the residual impacts to conservation significant fauna and flora of the PRIOP and proposed private haul road (the Proposal).

Lot 1416 has been identified by MRL as a potential offset site for the Proposal. MRL engaged Phoenix Environmental Sciences (Phoenix) in March 2020 to conduct a high-level assessment of the conservation values present within the Lot including:

- high-level vegetation structure (NVIS Level 2) mapping
- general location, extent and condition of potentially significant vegetation and flora, including an assessment for presence of the Eucalypt Woodland of the Western Australian Wheatbelt Threatened Ecological Community (TEC)
- general location, extent and condition of potential habitat for significant fauna including Malleefowl (*Leipoa ocellata*), Western Rosella (inland) (*Platycercus icterotis xanthogenys*) and Chuditch (*Dasyurus geoffroyi*).

Based on the findings of the reconnaissance survey, an additional site survey was conducted to further investigate the values of Lot 1416 and the adjacent conservation reserves to assess the site's suitability as an offset for the Proposal. The scope of the additional survey was as follows:

- undertake DBCA Threatened and Priority flora, fauna and ecological communities database searches to determine if there are any records of Malleefowl, Chuditch, *Baeckea grandibracteata* subsp. Parker Range and/or *Acacia concolorans* in the study area or vicinity – these were not undertaken for the previous survey due to time constraints.
- review desktop records for Chuditch and Malleefowl to determine if recent records exist within or in the vicinity of the study area. Consider desktop records in relation to the study area, e.g. within the study area, in nearby vegetation remnants, in conjunction with field survey records, to define likely usage value of the study area to each species.

- conduct a targeted survey for Chuditch and Malleefowl in the study area to determine presence and utilisation by these species.
- undertake a detailed habitat assessment for Chuditch and Malleefowl in the study area to determine level of species habitat suitability (Chuditch – level of hollow fallen logs and prey species present; Malleefowl – level of sandy substrate with leaf litter and foraging resources present). This will build on the existing habitat assessments conducted for Lot 1416.
- complete broadscale vegetation and habitat type mapping in the adjacent reserves, and condition mapping throughout the study area, extending the existing mapping for Lot 1416.
- conduct opportunistic searches for significant flora *Baeckea grandibracteata* subsp. Parker Range and *Acacia concolorans*.

This report also provides brief comment on the overlap of biological values between Lot 1416 and those identified in the Public Environmental Review for the PRIOP mine area (Cazaly Resources Limited 2010) and more recently for the Proposal (proposed PRIOP haul road) (Mineral Resources Ltd 2021; Phoenix 2021). Reference to potential impacts on significant flora is based on the impact assessment in Mineral Resources Ltd (2021).

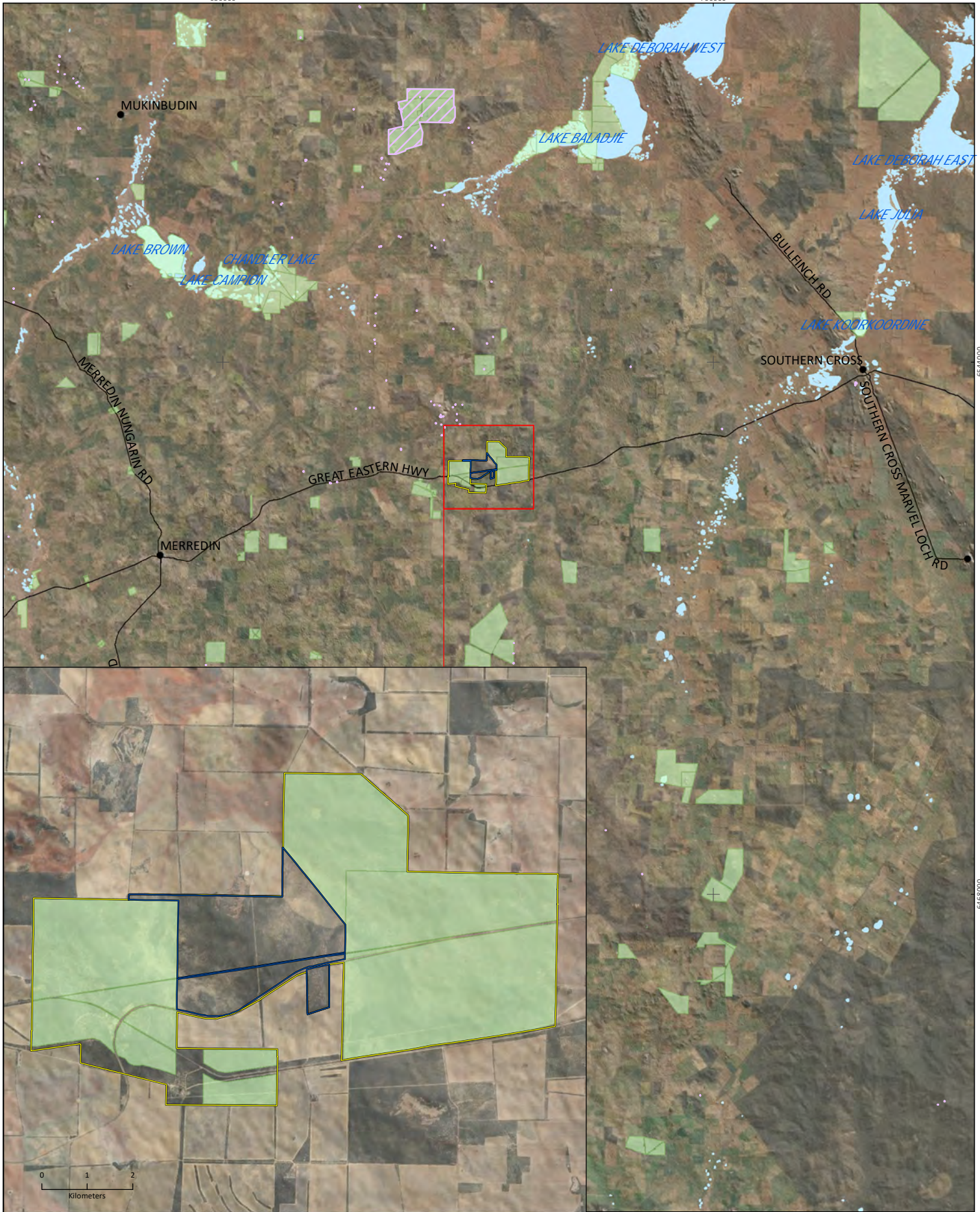
## **1.2 LOCATION AND STUDY AREA**

Lot 1416 is located approximately 45 km east north-east of Merredin in the Shire of Yilgarn, WA in the South-west botanical province (Figure 1-1). It is approximately 75 km west of the Proposal and PRIOP.

The initial survey was conducted within Lot 1416 is approximately 862.1 ha of (mostly) undisturbed remnant native vegetation (Figure 1-2).

The wider study area for the second survey encompassed Lot 1416 and four adjacent reserves: R16000, R18583, R18584 and R28562 (Figure 1-2), totalling 4,699.6 ha.


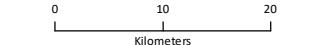








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Project No	1402/1403
Date	15/06/2021
Drawn by	IN
Map author	DL
	
	
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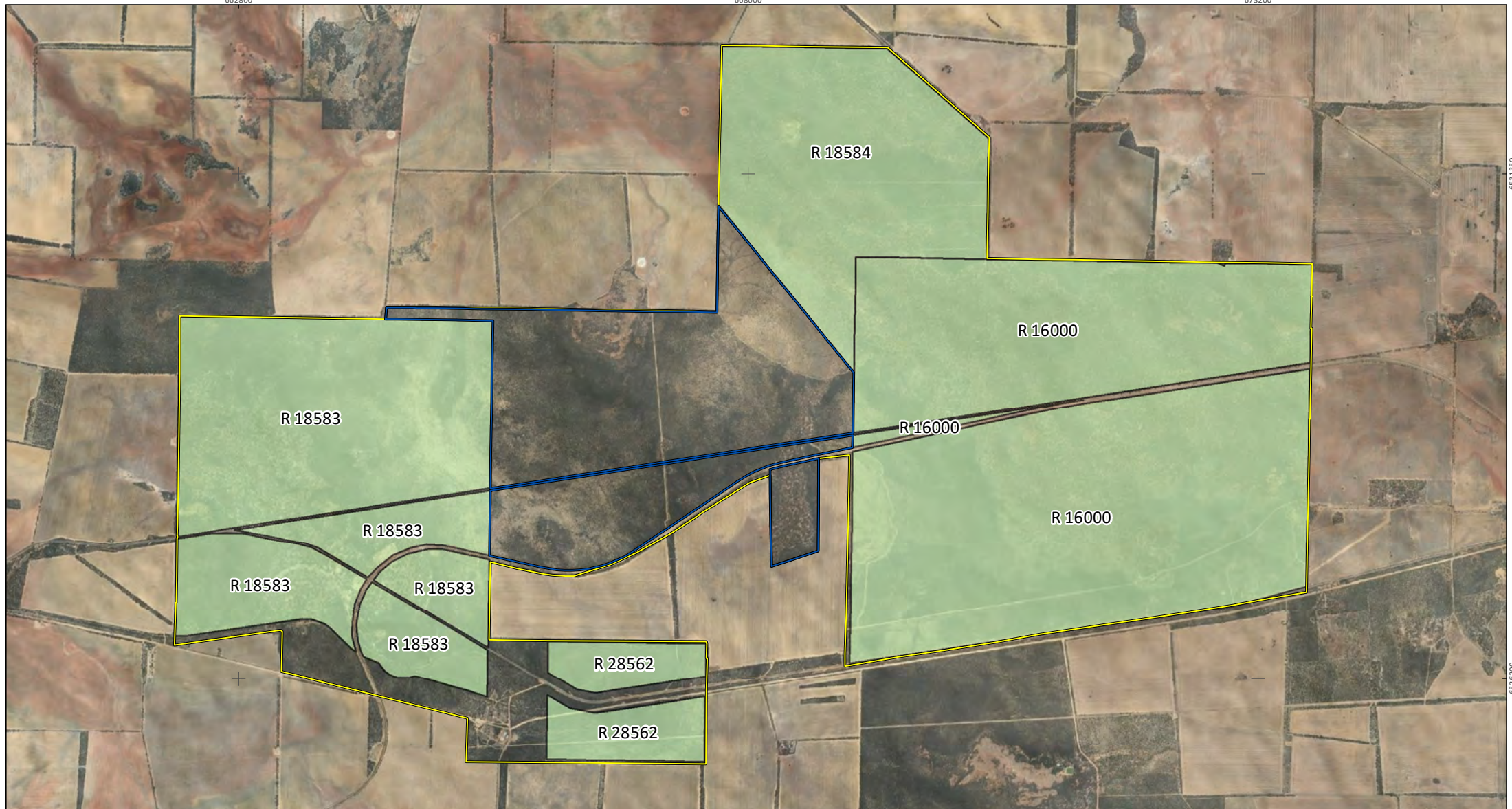
-  Lot 1416
-  Study area
-  Environmentally sensitive areas
-  Nature reserve

**Figure 1-1**  
**Project location**



**PHOENIX**  
ENVIRONMENTAL SCIENCES

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- Lot 1416
- Study area
- Nature reserve

**Figure 1-2**  
**Study area**



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## 2 METHODS

The survey was conducted in accordance with relevant survey guidelines and guidance, including:

- EPA Technical Guidance: Flora and vegetation surveys for Environmental Impact Assessment (EPA 2016a)
- EPA Technical Guidance: Terrestrial fauna surveys (EPA 2016c)
- EPA Technical Guidance: Sampling methods for terrestrial vertebrate fauna (EPA 2016b).

### 2.1 DESKTOP ASSESSMENT

A review of background environmental information for the study area was undertaken prior to the survey, including climate (Bureau of Meteorology (BoM), biogeography (IBRA 7) (DoEE 2016), soils (Stewart *et al.* 2008) and pre-European vegetation (Shepherd *et al.* 2002).

A search of several biological databases was undertaken using a 20 km search radius from the centre of area Lot 1416 to identify potential significant flora, fauna and ecological community values of the study area (Table 2-1).

To enable comparison of Lot 1416 with the PRIOP area, significant flora and fauna relevant to PRIOP were extracted from several documents:

- Cazaly Resources Limited (2010) – Parker Range Iron Ore Project - Mt Caudan Deposit, Environmental Impact Assessment (Public Environmental Review), for significant fauna of relevance to the mine
- Phoenix (2021) – Baseline flora, vegetation and fauna surveys for the Parker Range Haul Road Project, for significant fauna of relevance to the haul road
- Mineral Resources Ltd (2021) – for current list of significant flora that will be impacted by the mine and/or haul road.

**Table 2-1 Database searches conducted for the desktop review**

Database	Target group/s	Search extent	Timing of search
Protected Matters Search Tool (DoEE 2020)	Environment Protection and Biodiversity Conservation (EPBC) Act Threatened flora, fauna and ecological communities	Lot 1416 plus a 20 km buffer	Prior to initial survey in March 2020
DBCA NatureMap Database (DBCA 2020c)	Flora and fauna records	Lot 1416 plus a 20 km buffer	
Phoenix' biological database (Phoenix 2020). May include other clients records and previous desktop review data.	Flora and fauna records	Lot 1416 plus a 20 km buffer	
DBCA Threatened and Priority Flora (TPFL and WAHerb) databases (DBCA 2021c)	Threatened and priority flora	Study area plus a 20 km buffer	Prior to second survey in March 2021

Database	Target group/s	Search extent	Timing of search
DBCA Threatened and Priority Fauna database (DBCA 2021b)	Threatened and priority fauna	Study area plus a 20 km buffer	
DBCA Threatened and Priority Ecological Communities database (DBCA 2021a)	Threatened and priority ecological communities	Study area plus a 20 km buffer	

## 2.2 FIELD WORK

### 2.2.1 Survey timing and personnel

The initial survey of Lot 1416 was undertaken in autumn 2020, from 11–13 March by zoologist Simon Pynt and botanist Dr Andrew Perkins. The second survey of the study area was undertaken on 27-31 March 2021 by zoologist John Scanlon and botanist Dr Perkins.

### 2.2.2 Flora and vegetation

Field methods for the flora and vegetation survey included:

- relevé surveys
- targeted searches for significant flora, Declared Pests and Weeds of National Significance (WoNS)
- assessment of the presence of Threatened and Priority Ecological Communities (TECs and PECs).

Prior to the commencement of each field survey, data including satellite imagery, survey boundary, and pre-selected vegetation relevés were loaded onto electronic field devices. The field surveys involved conducting relevé sampling and collecting opportunistic flora specimens. All of the survey sites and flora specimen data were recorded digitally.

The second survey focussed on relevé sampling in the adjacent reserves, with supplementary relevés in Lot 1416, mapping of vegetation in the adjacent reserves, assessment for TEC and PEC presence throughout the study area and searches significant flora of relevance to PRIOP.

#### 2.2.2.1 Relevés

Relevé locations were selected to sample the major vegetation types in the study area. A total of 37 relevés were sampled, consisting of nine relevés within Lot 1416 and 28 relevés in the adjacent reserves (Figure 2-1; Appendix 1). Data recorded included:

- a geographic coordinate
- a list of the prominent flora species present
- description of vegetation – a broad description utilising the structural formation and height classes based on National Vegetation Information System (ESCAVI 2003) to level II (NVIS Technical Working Group 2017)
- habitat – a brief description of landform and habitat
- geology – a broad description of surface soil type and rock type

- disturbance history – a description of any observed disturbance including an estimate of time since last fire, weed invasions, soil disturbance, human activity and fauna activity
- vegetation condition – using the condition scale in EPA (2016a) for the South-west Botanical Province
- height and percentage foliage cover (PFC) – a visual estimate of cover of total vegetation cover, cover of shrubs and trees >2 m tall, cover of shrubs <2 m, total grass cover and total herb cover
- photograph – a colour photograph of the vegetation.

### 2.2.2.2 Targeted flora searches

Targeted searches were undertaken for significant flora (Threatened and Priority), Declared Pests and WoNS. Remnant vegetation was traversed by foot in meandering transects with the searches focussed on habitats considered likely to support significant flora, in addition to previously recorded locations of significant plants or populations in close proximity to the study area.

If a flora species was considered to potentially be a significant species (i.e. similar floristic characteristics and occurring within suitable habitat) the following information was collected:

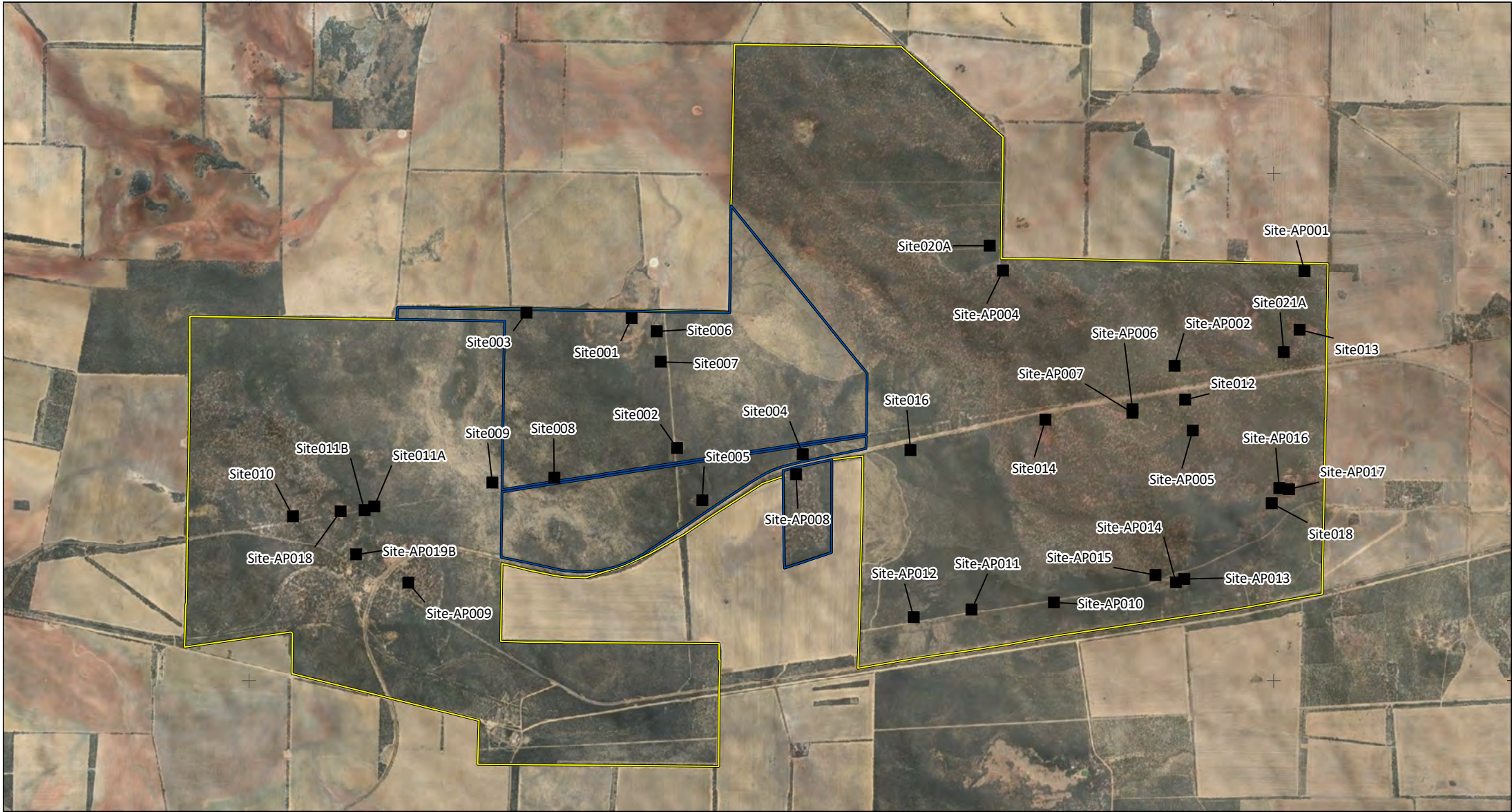
- GPS coordinates, including population boundary where applicable
- description of the habitat and floristic community in which the potential significant species was located
- population size estimate (i.e. estimated number of individual plants) where applicable
- specimen collection for taxonomic identification and lodgement at the WA Herbarium
- photograph of live plant *in situ* and description of important details, such as flower colour, height of individual or average height of population.

### 2.2.2.3 Assessment of the presence of TEC/PEC

Assessment and mapping of the extent of the Eucalypt Woodlands of the Western Australian Wheatbelt TEC was undertaken using a key and customised data collection template derived from conservation advice for the TEC (Threatened Species Scientific Committee 2015).

Thirty-seven sites were sampled for Eucalypt Woodland TEC assessments, nine within Lot 1416 and 28 in the adjacent reserves (Figure 2-1). Relevés were conducted for each site, recording habitat description, vegetation condition, plant species and a representative photo was taken for each site (Appendix 1). TEC assessments were conducted at each relevé where the vegetation present was evaluated against the diagnostic criteria for the TEC (refer to Appendix 3). The data was captured electronically in the field using Phoenix's customised data collection template (Mobile Data Studio) for the TEC.


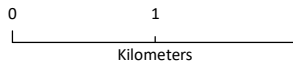
In determining the presence of the TEC, features of the remnant woodland patch including vegetation condition, patch size and the density of mature trees was considered. Suitable patches were foot-searched, and the number of mature trees counted to determine if density was sufficient for the patch to be considered representative of the TEC.






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<b>Mineral Resources Ltd Parker Range Iron Ore Project</b>		
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-  Lot 1416
-  Study area
-  Flora site

**Figure 2-1**  
**Flora and vegetation survey sites**



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### 2.2.2.4 Vegetation condition

The condition of vegetation was mapped across the study area based on the vegetation condition rating system for the South-west botanical province, as defined by EPA (2016a) (Table 2-2).

**Table 2-2 Vegetation condition rating scale (EPA 2016a)**

Condition rating	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.

### 2.2.2.5 Significant flora likelihood of occurrence assessment

The likelihood of occurrence in Lot 1416 was assessed for each significant flora species identified in the database searches. Each species was assigned to one of three ratings:

- recorded – species recorded within the study area by previous or current survey
- possible – study area within known range of species; potential habitat within the Lot 1416, records within 5 km of Lot 1416 and may not have been detectible during survey (e.g. survey conducted outside flowering period, annual plant survey conducted outside likely period of occurrence, small herbaceous plant in dense vegetation), or entire area of habitat not thoroughly searched
- unlikely – Lot 1416 outside known range of species and/or no suitable habitat present in Lot 1416 and/or suitable/potential habitat present but Lot 1416 considered adequately searched for the species.

Likelihood of occurrence was also assessed for all significant species that will be impacted by the PRIOP mine and/or haul road, as identified by Mineral Resources Ltd (2021) to evaluate the suitability of Lot 1416 as an offset site for PRIOP in relation to significant flora values.

## 2.3 TERRESTRIAL FAUNA

Field methods for the fauna component of the survey included:

- general fauna habitat assessments (see 2.3.1)
- targeted searches for signs of Malleefowl and Chuditch (2.3.2)
- Malleefowl habitat assessments (2.3.3)
- Chuditch habitat assessments (2.3.4)
- Arid Bronze Azure Butterfly habitat assessment (2.3.5).

### 2.3.1 Habitat assessment

Initial habitat characterisation was undertaken using various remote geographical tools, including aerial photography (Google Earth®), land system maps and topographic maps. Habitats with the potential to support significant terrestrial fauna species were identified based on known habitats of such species within the Avon Wheatbelt bioregion. Tentative sites were selected for the terrestrial fauna surveys to represent all habitat types. Final survey site selection was conducted after ground-truthing of site characteristics.

At the broadest scale, site selection considered aspect, topography and land systems. At the finer scale, consideration was given to proximity to water bodies (drainage lines and creek), vegetation complexes and condition and soil type. Sites were primarily chosen to represent the best example of distinct habitats within the broader habitat associations of the study area with a focus on species of conservation significance identified in the desktop review. Habitat descriptions and characteristics were recorded at 66 fauna sites (Appendix 5).

### 2.3.2 Active searches

Active searches were undertaken throughout the study area. Active searches primarily targeted significant fauna species from direct sightings and secondary evidence. Searches were undertaken in any observable microhabitats considered likely to support such species.

### 2.3.3 Malleefowl habitat assessment

Assessment of the suitability of Lot 1416 to support Malleefowl was undertaken using a set of habitat/environmental variables considered critical to Malleefowl in Western and Central Australia, as described in the National Recovery Plan (Benshemesh 2007). Sites were assessed with a numerical score as a basis for mapping areas of suitable habitat in the study area (Figure 2-2). The score used is an unweighted sum of binary values (0 = absent, 1 = present) for the following attributes:

1. sandy substrate (sand/sandy loam/sandy clay)
2. litter (leaf litter forming distinct patches under trees/shrubs or - rarely in this area - continuous blanket over soil)
3. canopy (tall shrubs or trees forming more or less continuous canopy, contributing to suitable ground microclimates and screen from aerial predators)
4. level (ground approximately level, tending to prevent disturbance of soil and litter by rainfall runoff)
5. mallee (presence of any mallee-form *Eucalyptus* sp.)



6. *Melaleuca* (presence of any *Melaleuca* sp.)
7. mulga s.l. (presence of any *Acacia* sp. of subgenus *Juliflorae*)
8. *Triodia* (presence of any *Triodia* sp.).

Scores of four or greater (meaning a site contained at least 50% of features that comprise critical Malleefowl habitat) were considered to represent potential Malleefowl habitat. Sites that attained a value of four or greater were applied to vegetation type polygons and the entire polygon (usually) assigned as potential Malleefowl habitat. Where two or more sites were assessed within a single polygon, the higher score was applied unless features of the lower-scored site(s) were more representative. Where no site occurred within a polygon, polygons were classified based on scores for similar vegetation nearby and inspection of relative vegetation density.

### 2.3.4 Chuditch habitat assessment

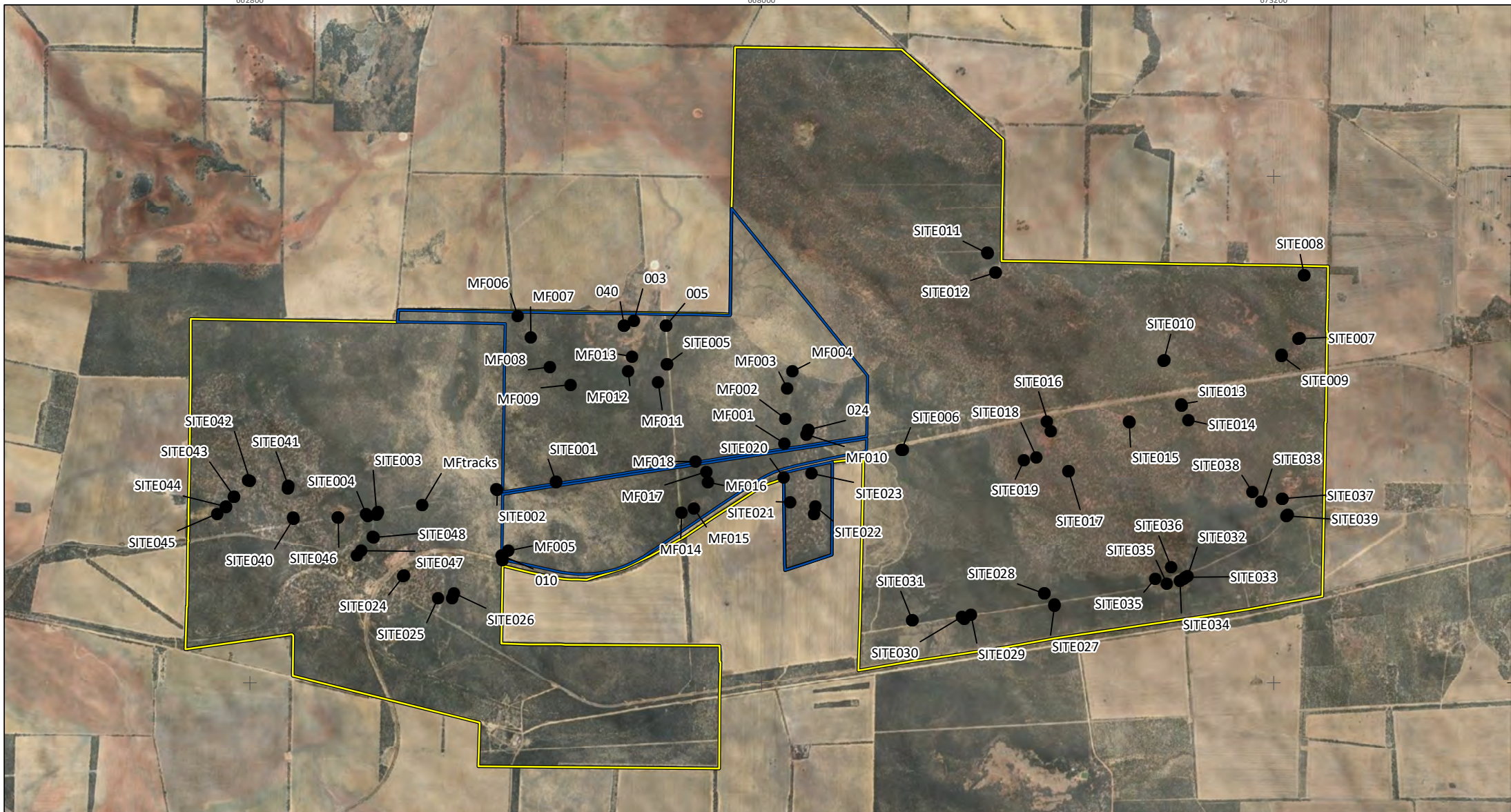
Chuditch use a range of habitats including forest, mallee shrublands, woodland and desert, requiring adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) and sufficient prey biomass (large invertebrates, reptiles and small mammals) to survive (DEC 2012).


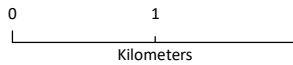
Because of their high individual mobility and naturally low population density, assessment of habitat suitability would ideally be based on abundance of den/refuge sites and prey over considerable extents of space and time, in contrast to scoring attributes of a single location as for Malleefowl. In practice, prey abundance was not assessed quantitatively, but site descriptions include notes on presence/abundance of horizontal hollow logs, and presence of rock outcrop and breakaways forming structurally complex habitat for both refuge and foraging.

### 2.3.5 Arid Bronze Azure Butterfly habitat assessment

The Arid Bronze Azure Butterfly ('ABAB', *Ogyris subterrestris petrina*, Lycaenidae, Critically Endangered) is known from a small number of localities in the Wheatbelt and Goldfields. Its larvae inhabit nests of an ant, *Camponotus* sp. nr *terebrans*, which is associated with smooth-barked eucalypts on sandy soil and has an extensive but patchy and poorly documented distribution in WA (DBCA 2020a, b). Adult butterflies are observable only during a brief and variable flight season in spring, so that survey focuses on detecting the host ant species; large colonies of the host ant are the only known habitat supporting breeding by ABAB.

Ant survey was not initially part of the scope but was conducted opportunistically during the second visit (March 2021). At each site with sandy soil, if any smooth-barked eucalypts were present the trees were inspected for an 'apron' of sand and nest refuse around the base of the tree. If present, a closer inspection was made to detect nest openings or galleries adjacent to the trunk, and (if these were present) the soil slightly disturbed to expose ants. The formulae for number and spacing of sampled trees (DBCA 2020b) were not applied.



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- Study area
- Fauna site

**Figure 2-2**  
**Fauna survey sites**



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### 2.3.6 Significant fauna likelihood of occurrence assessment

Following the field survey, the likelihood of occurrence in Lot 1416 for each significant fauna species identified in the desktop review was assessed. Likelihood of occurrence in Lot 1416 was also assessed for any additional significant fauna species that were either recorded or considered to have potential to occur in the PRIOP mine area (Cazaly Resources Limited 2010) and/or Proposal area (Phoenix 2021). Species were assigned to one of four ratings:

- recorded – species recorded within the Lot 1416 by previous or current survey
- likely – Lot 1416 within current known range of species, suitable habitat within Lot 1416 and home range of species intersects Lot 1416 based on known records
- possible – Lot 1416 within current known range of species, suitable habitat within Lot 1416 and home range of species does not intersect Lot 1416 based on known records
- unlikely – Lot 1416 outside current known range of species or no suitable habitat present in Lot 1416.

## 2.4 PERSONNEL

The personnel involved in the surveys are listed in Table 2-3. All survey work was carried out under relevant licences issued by DBCA, as follows:

- Andrew Perkins flora collection permit – FB62000181
- Regulation 4 permit to conduct survey in DBCA managed land – CE006332.

**Table 2-3 Survey personnel**

Name	Qualifications	Role/s
Karen Crews	BSc Hons (Env. Biol.)	Project oversight and report review
Dr Andrew Perkins	PhD Botany	Field survey, taxonomy and reporting
Simon Pynt	BSc (Zoology)	Field survey and reporting
Dr John Scanlon	PhD (Zoology)	Field survey and reporting
Dr David Leach	PhD (Plant Biol.); BAppSc Hons (Cons. & Park Mgmt)	Vegetation analysis, mapping, report review
Dr. Ikrom Nishanbaev	PhD (GIS)	GIS

### 3 DESKTOP REVIEW RESULTS

#### 3.1 CLIMATE

The study area is located in the Avon Wheatbelt bioregion (Beecham 2001) which is characterised as a region that experiences a dry Mediterranean climate with temperate, wet winters and warm dry summers. Most of the winter rainfall is derived from frontal systems originating in the south-west. The nearest BoM weather station with comprehensive data collection and recent historic climate data is Merredin (no. 010092) located 45 km east north-east from the study area (BoM 2020).

Daily mean temperatures at Merredin in the seven months preceding the initial survey were above average (Figure 3-1). Records from Merredin (BoM 2020) show well above average rainfall in the month preceding the initial survey but well below average falls for the three months prior (Figure 3-1).

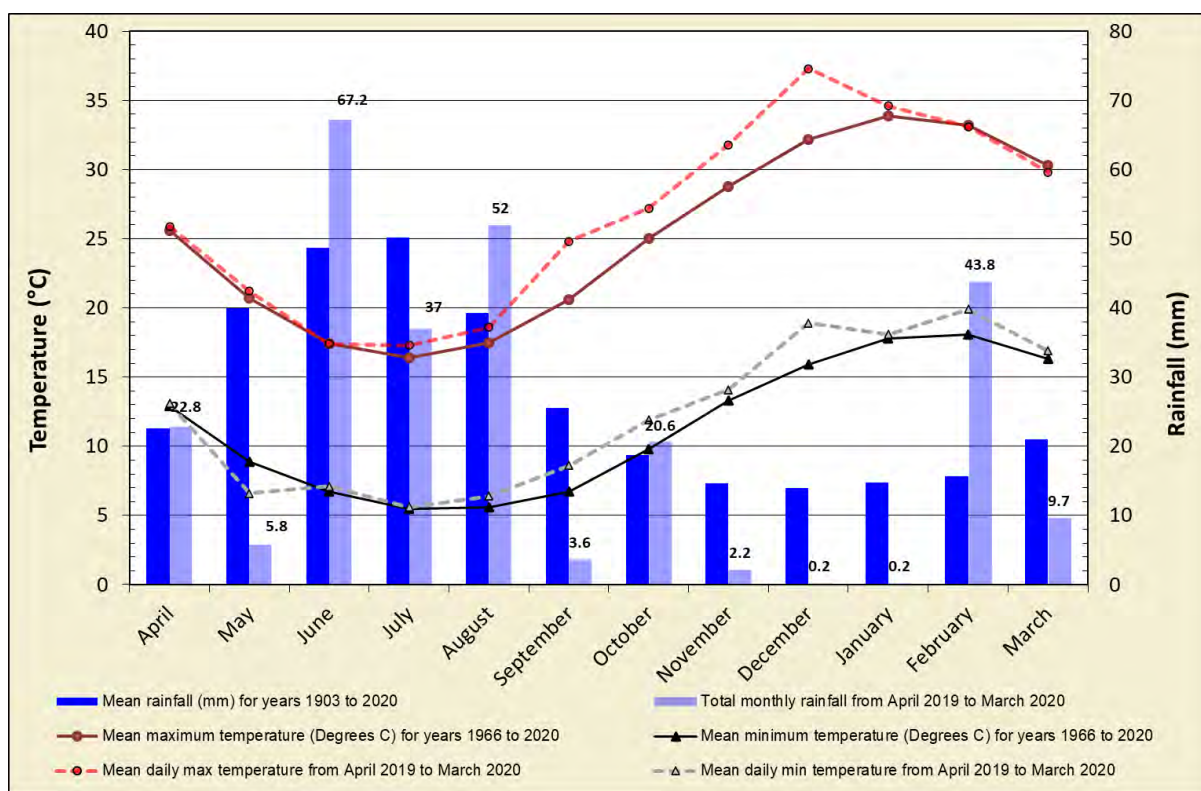


Figure 3-1 Annual climate and weather data for Merredin (no. 010092) and mean monthly data for the 12 months preceding the initial survey (BoM 2020)

#### 3.2 INTERIM BIOGEOGRAPHIC REGIONALISATION FOR AUSTRALIA

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies Australia’s landscapes into large ‘bioregions’ and ‘subregions’ based on climate, geology, landform, native vegetation and species information (DoEE 2016). The study area is located in the Merredin subregion (AVW01) of the Avon Wheatbelt bioregion. Land use in the subregion is dominated by a mixture of dryland agriculture and grazing. Undulating plain and disconnected drainage of salt lakes dissect a Tertiary plateau in Yilgarn Craton (Beecham 2001). Lateritic uplands are dominated by yellow sandplain and are vegetated with Proteaceous scrub heaths. Quaternary alluvials and eluvials contain mixed eucalypt, *Allocasuarina huegeliana* and Jam-York Gum woodlands (Beecham 2001).

### 3.3 GEOLOGY, LAND SYSTEMS AND SOILS

The study area is located in the Yilgarn Craton and its geology is dominated by Archaean sedimentary rocks and granulite-facies metamorphics. Lot 1416 intersects two land systems (Table 3-1, Figure 3-2). According to the Surface Geology of Australia 1:1,000,000 scale, Western Australia database (Stewart *et al.* 2008), Lot 1416 and the adjacent reserves intersect seven geological formations (Table 3-2; Figure 3-2).

**Table 3-1 Land systems and extent in study area**

Land system	Description	Whole study area		Lot 1416		Adjacent reserves	
		ha	%	ha	%	ha	%
Tandegin	Sandplain dominated interfluves with weakly indurated lateritised crests and upper slopes and long colluvial yellow sandplain upper to lower slopes. Unlateritised surfaces dominated by sodic and alkaline duplex soils.	4,499.4	95.7	857.1	99.4	3,642.2	94.9
Baladjie	Valley floors and lower slopes, in the northern Zone of Ancient Drainage, with calcareous loamy earth and alkaline red loamy duplex (mostly shallow). Woodland.	200.3	4.3	4.9	0.6	195.4	5.1

**Table 3-2 Surface geology of the study area, extent by deposit type**

Surface geology	Abbrev	Description	Whole study area		Lot 1416		Adjacent reserves	
			ha	%	ha	%	ha	%
Colluvium 38491	Qrc	Colluvium, sheetwash, talus; gravel piedmonts and aprons over and around bedrock; clay-silt-sand with sheet and nodular kankar; alluvial and aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin; local calcrete, reworked laterite	275.0	5.9	0.0	0.0	275.0	7.2
Felsic intrusives 74292	Ag	Undifferentiated felsic intrusive rocks, including monzogranite, granodiorite, granite, tonalite, quartz monzonite, syenogranite, diorite, monzodiorite, pegmatite. Locally metamorphosed, foliated, gneissic. Local abundant mafic and ultramafic inclusions	88.4	1.9	87.4	10.1	0.9	0.0
Ferruginous duricrust 38498	Czl	Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite	2729.6	58.1	453.6	52.6	2276.0	59.3
Gneiss, granulite, migmatite 74310	An	Banded granitic gneiss (monzogranitic to granodioritic), quartzofeldspathic gneiss with mafic bands, migmatite, granofels, mafic and felsic granulites, hypersthene-plagioclase-quartz granulite; schist, pelitic or mafic granofels	770.0	16.4	0.0	0.0	770.0	20.1
Mafic extrusive rocks 74255	Aby	Metabasalt, high-Mg basalt, tholeiitic basalt, carbonated basalt, agglomerate, mafic schist, dolerite, amphibolite; porphyritic basalt and dolerite; komatiitic basalt; mafic pyroclastics; minor mafic schist with granite intercalations	7.3	0.2	0.0	0.0	7.3	0.2
Metamorphosed clastic sedimentary rocks 74437	Ayy	Metasandstone, metashale, metasiltstone, metaconglomerate and meta-volcaniclastics, pelitic schists, phyllite, fuchsitic quartzite with clasts quartzite and felsic volcanic rock; quartzite; pelitic and psammitic gneiss	297.2	6.3	0.0	0.0	297.2	7.7
Sand plain 38499	Czs	Sand or gravel plains; quartz sand sheets commonly with ferruginous pisoliths or pebbles, minor clay; local calcrete, laterite, silcrete, silt, clay, alluvium, colluvium, aeolian sand	532.1	11.3	321.0	37.2	211.1	5.5



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|--------------------|------------------------|-----|
| Lot 1416           | <b>Surface geology</b> | Ayy |
| Study area         | Aby                    | Czl |
| <b>Land system</b> | Aey                    | Czs |
| Baladjie System    | Ag                     | Qa  |
| Tandegin System    | An                     | Qrc |

**Figure 3-2**  
Land systems and surface geology in the study area



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### 3.4 CONSERVATION RESERVES AND NATIONALLY IMPORTANT WETLANDS

Lot 1416 abuts three unnamed nature reserves immediately west (Unnamed WA18583), northeast (Unnamed WA18584) and east (Unnamed WA16000), and another (Unnamed WA28562) is approximately 1 km due south; all are part of the current study area (Figure 1-2). The Merredin subregion (AVW01) has 5.75% of its area in some form of conservation reserve (i.e. 5(1)(g) Reserve, 5(1)(h) Reserve, Conservation Covenant, Conservation Park, Conservation Reserve, Indigenous Protected Area, Nature Reserve, NRS Addition - Gazettal in Progress, Private Nature Reserve).

### 3.5 FLORA AND VEGETATION

#### 3.5.1 Floristic diversity

The NatureMap (DBCA 2020c) database search identified 589 plant taxa recorded within a 20 km radius of Lot 1416 representing 73 families and 230 genera and comprised of 36 introduced flora and 553 native flora. The most prominent families were the Myrtaceae (96 taxa), Fabaceae (78 taxa), Asteraceae (55 taxa), Proteaceae (40 taxa), Poaceae (27 taxa), Orchidaceae (23 taxa) and Goodeniaceae (22 taxa). The most diverse genera were *Acacia* (45 taxa), *Eucalyptus* (39 taxa), *Grevillea* (20 taxa), *Melaleuca* (17 taxa) and *Eremophila* (13 taxa).

#### 3.5.2 Significant flora species

The desktop review identified 32 significant flora recorded within a 20 km radius of Lot 1416 (Table 3-3) comprised of 12 Threatened taxa, three Priority 1 taxa, two Priority 2 taxa, 12 Priority 3 taxa and three Priority 4 taxa.

Four significant flora species returned in the database search are of direct relevance as they have either been recorded within proposed clearing areas for the PRIOP mine and/or the Proposal area, or are a risk of indirect impact (Cazaly Resources Limited 2010; Mineral Resources Ltd 2021; Phoenix 2021): *Lepidosperma lyonsii* (P1), *Verticordia mitodes* (P3), *Verticordia stenopetala* (P3), and *Banksia shanklandiorum* (P4) (Table 3-3).

Twenty additional significant flora species that were recorded in the PRIOP mine and/or the Proposal clearing areas were not returned in the database searches for Lot 1416 within the 20 km buffer (Table 3-4).



**Table 3-3 Significant flora identified in the desktop review for Lot 1416**

Species	Status	Habitat	Recorded flowering period	Relevance to PRIOP based on MRL (2021)
<i>Acacia ancistrophylla</i> var. <i>perarcuata</i>	P3 (DBCA list)	Red sand, clay loam, loam. Undulating plains.	Aug.-Sep.	
<i>Acacia cerastes</i>	P1 (DBCA list)	Skeletal soil. Rocky ironstone hillslopes.	Aug.-Nov.	
<i>Acacia crenulata</i>	P3 (DBCA list)	Clay, sandy clay, yellow sand. Rocky rises, granite outcrops, breakaways.	Apr., Oct.	
<i>Acacia filifolia</i>	P3 (DBCA list)	Yellow sand, gravelly lateritic sand. Sandplains.	May-Sep.	
<i>Acacia lobulata</i>	EN (EPBC & BC Acts)	Gritty loam or sand. Low granitic breakaways.	Jul.	
<i>Austrostipa blackii</i>	P3 (DBCA list)	Hill slopes, winter wet depression, red sandy clay soils, orange clay.	Sep.-Nov.	
<i>Banksia horrida</i>	P3 (DBCA list)	Sand, sometimes with gravel.	Apr.-Aug.	
<i>Banksia shanklandiorum</i>	P4 (DBCA list)	White/yellow sand with lateritic gravel.	Jun.-Aug.	Directly impacted by PRIOP mine
<i>Banksia sphaerocarpa</i> var. <i>dolichostyla</i>	VU (EPBC & BC Acts)	Lateritic gravel, grey sand.	Mar.-May.	
<i>Boronia adamsiana</i>	VU (EPBC & BC Acts)	Yellow sand/loam over laterite. Flats, road verges.	Jul.-Oct.	
<i>Dasymalla axillaris</i>	CR (EPBC & BC Acts)	Plains, flats, yellow sand, laterite.	Jul.-Dec.	
<i>Dicrasyllis reticulata</i>	P3 (DBCA list)	Sandy soils, often over granite. Among granite rock, hills, flats.	Sep.-Dec.	
<i>Eremophila resinosa</i>	EN (EPBC & BC Acts)	Clay loam, gravelly sandy clay. Road verges.	Apr., Oct.-Nov.	
<i>Eremophila virens</i>	EN (EPBC & BC Acts)	Red/brown sand. Granite hillsides.	Aug.-Oct.	
<i>Eremophila viscida</i>	EN (EPBC & BC Acts)	Granitic soils, sandy loam. Stony gullies, sandplains.	Sep.-Nov.	
<i>Eucalyptus caesia</i> subsp. <i>magna</i>	P4 (DBCA list)	Loam. Granite outcrops.	May-Sep.	
<i>Eucalyptus crucis</i> subsp. <i>crucis</i>	VU/EN (EPBC Act; BC Act)	Sand, loam. Granite outcrops.	Oct.-Mar.	

Species	Status	Habitat	Recorded flowering period	Relevance to PRIOP based on MRL (2021)
<i>Eutaxia acanthoclada</i>	P3 (DBCA list)	Light brown sandy clay, shallow sandy loam, red clay over banded ironstone, gravel. Gently undulating plains.	Oct.-Nov.	
<i>Gastrolobium diabolophyllum</i>	CR (EPBC & BC Acts)	Yellow-brown sand over laterite. Broadly undulating dunes.	Sept.	
<i>Glossostigma trichodes</i>	P1 (DBCA list)	Aquatic herb, granite pools.	Sep.	
<i>Gompholobium cinereum</i>	P3 (DBCA list)	Yellow sand, clayey sand, brown loam, sandy gravel, laterite. Well-drained open sites, slopes, plains, roadsides.	Sep.-Nov.	
<i>Goodenia granitica</i>	P2 (DBCA list)	Brown sandy clay or loam over granite. Bases of outcrops, near water sources, valley floors.	Oct.-Nov., Feb.	
<i>Grevillea dryandroides</i> subsp. <i>hirsuta</i>	EN/VU (EPBC Act; BC Act)	White or yellow sand, laterite.	May, Sep.-Nov.	
<i>Hibbertia glabriuscula</i>	P3 (DBCA list)	Yellow sand over laterite. Sandplains with some laterite breakaways.	Sep.	
<i>Lepidosperma lyonsii</i>	P1 (DBCA list)	Pale orange skeletal sandy loam with banded ironstone gravel & rock, well-drained shallow stony loamy with quartz. Gentle hill slopes, upper slopes of large hill.	NA	Directly impacted by PRIOP haul road
<i>Lepidosperma</i> sp. Pigeon Rocks (H. Pringle 30237)	P3 (DBCA list)	Granite outcrops, hills, granitic loam,	Oct	
<i>Myriophyllum petraeum</i>	P4 (DBCA list)	Strictly confined to ephemeral rock pools on granite outcrops.	Aug.-Dec.	
<i>Roycea pycnophylloides</i>	EN/VU (EPBC Act; BC Act)	Sandy soils, clay. Saline flats.	Sep.	
<i>Symonanthus bancroftii</i>	EN/CR (EPBC Act; BC Act)	Disturbed areas, fine grey sand, moist grey mud over granite, edge of ephemeral wetland.	Jul.	
<i>Verticordia mitodes</i>	P3 (DBCA list)	Yellow sand. Undulating plains.	Oct.-Jan.	Directly impacted by PRIOP mine
<i>Verticordia pulchella</i>	P2 (DBCA list)	Sandy soils over granite.	Oct-Nov.	
<i>Verticordia stenopetala</i>	P3 (DBCA list)	Yellow sand, sometimes with gravel. Undulating plains.	Oct.-Jan.	Directly impacted by PRIOP haul road

**Table 3-4 Significant flora that will be impacted by PRIOP mine and/or haul road that were not identified in the database searches for Lot 1416**

Species	Status	Relevance to PRIOP based on Mineral Resources Ltd (2021)
<i>Acacia asepala</i>	P2 (DBCA)	Directly impacted by PRIOP haul road
<i>Acacia concolorans</i>	P2 (DBCA)	Directly impacted by PRIOP mine and haul road
<i>Acacia desertorum</i> var. <i>nudipes</i>	P3 (DBCA)	Directly impacted by PRIOP haul road
<i>Baeckea grandibracteata</i> subsp. Parker Range	P1 (DBCA)	Directly impacted by PRIOP mine and haul road
<i>Bossiaea</i> sp. Jackson Range (G. Cockerton & S. McNee LCS 13614)	P3 (DBCA)	Directly impacted by PRIOP haul road
<i>Chamelaucium</i> sp. Parker Range (B.H. Smith 1255)	P1 (DBCA)	Directly impacted by PRIOP mine
<i>Cryptandra crispula</i>	P3 (DBCA)	Directly impacted by PRIOP mine and haul road
<i>Cyathostemon verrucosus</i>	P3 (DBCA)	Directly impacted by PRIOP haul road
<i>Hakea pendens</i>	P3 (DBCA)	Directly impacted by PRIOP mine and haul road
<i>Isopogon robustus</i>	T (CR EPBC Act; BC Act)	Potential for indirect impact by PRIOP mine
<i>Lepidosperma ferricola</i>	P3 (DBCA)	Directly impacted by PRIOP haul road
<i>Lepidosperma</i> sp. Mt Caudan (N. Gibson & M. Lyons 2081)	P1 (DBCA)	Directly impacted by PRIOP mine and haul road
<i>Lepidosperma</i> sp. Parker Range (N. Gibson & M. Lyons 2094)	P1 (DBCA)	Directly impacted by PRIOP mine
<i>Lissanthe scabra</i>	P2 (DBCA)	Directly impacted by PRIOP haul road
<i>Microcorys</i> sp. nov. (Parker Range)	New species	Directly impacted by PRIOP mine
<i>Phebalium drummondii</i>	P3 (DBCA)	Directly impacted by PRIOP haul road
<i>Rinzia torquata</i>	P3 (DBCA)	Directly impacted by PRIOP mine
<i>Stenanthemum bremerense</i>	P4 (DBCA)	Directly impacted by PRIOP haul road
<i>Verticordia multiflora</i> subsp. <i>solox</i>	P2 (DBCA)	Directly impacted by PRIOP haul road
<i>Westringia acifolia</i>	P1 (DBCA)	Directly impacted by PRIOP mine and haul road

### 3.5.3 Introduced flora

Of the 36 introduced flora, two are a WoNS and four are declared pests in WA (Table 3-5).

**Table 3-5 Declared pests and WoNS identified from the NatureMap (DBCA 2020c) search occurring within 20 km of Lot 1416**

Taxa	Declared Pest	WoNS
* <i>Chondrilla juncea</i>	Y	
* <i>Chrysanthemoides monilifera</i>	Y	Y
* <i>Echium plantagineum</i>	Y	
* <i>Tamarix aphylla</i>	Y	Y

### 3.5.4 Vegetation associations

Regional scale vegetation mapping by Shepherd *et al.* (2002) defined six vegetation associations in Lot 1416 (Table 3-6). Vegetation association 36 occupies most of Lot 1416 (90.0%) and is described as shrubland thicket with *Acacia-casuarina* alliance. Remaining vegetation (association 8) is described as a salmon gum and gimlet woodland. The third association (128) represents rock outcrops and/or bare areas.

At the bioregional scale, associations 8 and 36 have between 10–30% of original extent remaining (Table 3-6) and are therefore assigned the status of Vulnerable. Both associations occur exclusively (or almost exclusively) within the Merredin subregion. All of the associations are poorly represented in DBCA managed lands, particularly 8 and 36 (Table 3-6).

According to the Shepherd *et al.* (2002) mapping, four of the six associations (8, 128, 536, and 1413) are also mapped within parts of the Proposal.

**Table 3-6 Statewide extent of Pre-European vegetation associations present in Lot 1416 (Government of Western Australia 2019)**

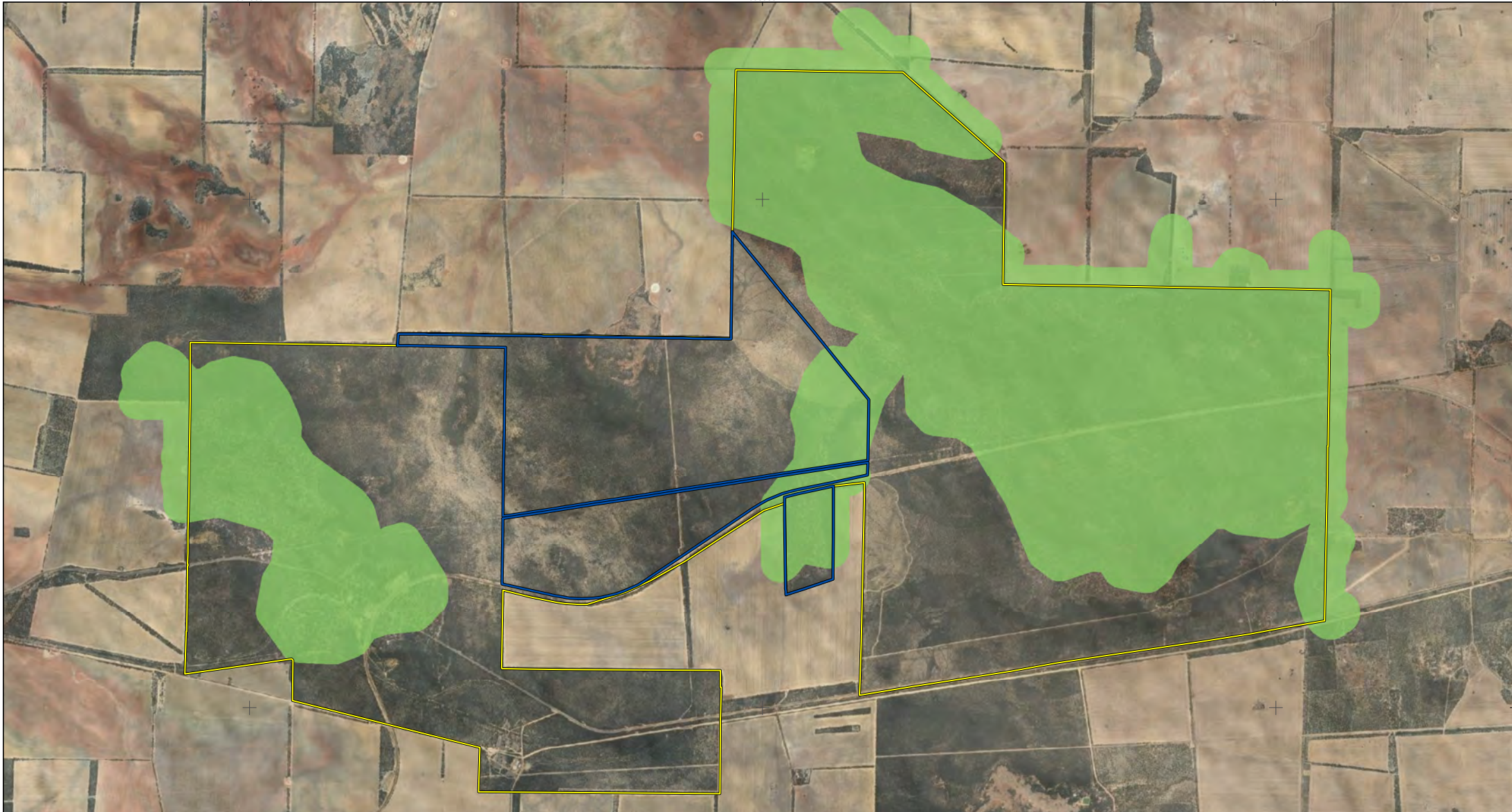
Veg. assoc.	Description	Scale	Pre-European extent (ha)	Current extent (ha)	Remaining (%) <sup>1</sup>	Current extent in DBCA lands (%)	Extent in study area		Lot 1416		Adjacent reserves		Present in the Proposal?
							ha	%	ha	%	ha	%	
8	Medium woodland; salmon gum & gimlet	WA	694,638.1	346,425.8	49.9	13.6	87.5	1.9	74.3	8.6	13.2	0.3	Yes
		AVW bioregion	356,571.8	50,340.3	14.1	8.7							
		AVW01 subregion	353,871.8	4,9941.6	14.1	8.7							
36	Shrublands; thicket, acacia-casuarina alliance	WA	495,430.7	226,242.2	45.7	12.1	2,869.9	61.1	775.7	90.0	2,094.2	54.6	No
		AVW bioregion	300,997.0	72,745.1	24.2	13.3							
		AVW01 subregion	300,997.0	72,745.1	24.2	13.3							
128	Bare areas; rock outcrops	WA	329,836.2	288,813.5	87.6	24.0	12.8	0.3	12.0	1.4	0.7	0.0	Yes
		AVW bioregion	41,967.2	22,998.9	54.8	19.0							
		AVW01 subregion	35,455.8	20,055.5	56.6	19.6							


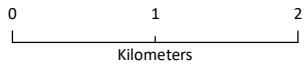
Veg. assoc.	Description	Scale	Pre-European extent (ha)	Current extent (ha)	Remaining (%) <sup>1</sup>	Current extent in DBCA lands (%)	Extent in study area		Lot 1416		Adjacent reserves		Present in the Proposal?
							ha	%	ha	%	ha	%	
536	Medium woodland; morrell & rough fruited mallee (Eucalyptus corrugata)	WA	13,177.5	5,432.8	41.2	23.5	1,322.3	28.1	0.0	0.0	1,322.3	34.5	Yes
		AVW bioregion	4,330.0	2,098.7	48.5	4.7							
		AVW01 subregion	11,170.84	3,970.04	35.54	32.2							
1065	Mosaic: Shrublands; Medium woodland; wandoo & gimlet / York gum & Eucalyptus sheathiana mallee scrub	WA	862.7	434.5	50.4	86.9	274.8	5.9	0.0	0.0	274.8	7.2	No
		AVW bioregion	862.7	434.5	50.4	86.9							
		AVW01 subregion	862.7	434.5	50.4	86.9							
1413	Shrublands; acacia, casuarina & melaleuca thicket	WA	1,679,916.3	1,286,855.5	76.6	17.3	132.3	2.8	0.0	0.0	132.3	3.5	Yes
		AVW bioregion	546,675.55	174,102.84	31.85	7.3							
		AVW01 subregion	546,675.55	174,102.84	31.85	7.3							



<sup>1</sup>Red cells = Vulnerable community (10-30% remaining), yellow cells = Depleted community (>30-50% remaining).


### 3.5.5 Threatened and priority ecological communities

A search of the DBCA Threatened and Priority Ecological Communities database identified one EPBC Act listed TEC that may occur within the study area, Eucalypt Woodlands of the Western Australian Wheatbelt, which is listed as Critically Endangered under the EPBC Act and Priority 3 by DBCA (Figure 3-3).



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-  Lot 1416
  -  Study area
- TEC and PEC**

 Eucalypt woodlands of the Western Australian Wheatbelt, CE (EPBC Act), P3 DBCA

**Figure 3-3**  
**Desktop Threatened and Priority Ecological Communities in the study area**



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## 3.6 FAUNA

The desktop review identified a total of 152 vertebrate species as potentially occurring, as well as three significant invertebrate taxa (Table 3-7). A total of 16 significant species were returned, including three invertebrates, ten birds and three mammals (Table 3-8; Table 3-9).

**Table 3-7 Summary of terrestrial fauna potentially occurring**

Class	Introduced	Native	Total
Invertebrates <sup>1</sup>	0	3	3
Amphibia	0	3	3
Reptiles	0	24	24
Birds	3	103	107
Mammals	7	12	19
<b>Total</b>	<b>10</b>	<b>145</b>	<b>155</b>

1 – significant invertebrates only.

**Table 3-8 Summary of Threatened and Priority taxa within Classes**

Class	Number of Priority species	Number of BC Act listed species	Number of EPBC Act listed species	Total significant fauna
Invertebrates	2	1	1	3
Birds	0	10	8	10
Mammals	0	3	3	3
<b>Total</b>	<b>2</b>	<b>14</b>	<b>12</b>	<b>16</b>

Significant species records were dominated by birds, in particular Malleefowl (minimum distance of a record from Lot 1416 was 1.04 km in 2006, multiple records in adjacent reserves and highway verge). Three significant species identified in the desktop review have also been recorded from the PRIOP mine area (Cazaly Resources Limited 2010) and/or haul road (Phoenix 2021) (Table 3-9): Malleefowl (*Leipoa ocellata*), Tree-stem Trapdoor Spider (*Aganippe castellum*) and Chuditch (*Dasyurus geofroii*). The TPFA search shows four records of Chuditch between 30 and 50 km from Lot 1416, the most recent in 1977.

Five additional significant species that were recorded or considered to have potential to occur in the PRIOP mine area or haul road were not identified in the desktop review for Lot 1416:

- Lake Cronin Snake *Paroplocephalus atriceps* (P3) – possible in Proposal area
- Hooded Plover *Thinornis rubricollis* (P4) – possible in Proposal area (northern salt lakes)
- Common Greenshank *Tringa nebularia* (Mig.) – possible in Proposal area (northern salt lakes)
- Western Rosella (inland) *Platycercus icterotis xanthogenys* (P4) – recorded in mine area, likely in Proposal area
- *Isoodon* sp. bandicoot, likely new taxon related to Quenda *Isoodon fusciventer* (K. Travouillon pers. comm.) – recorded in the Proposal area.

Four species identified as having medium or high potential to occur in the PRIOP mine area (Cazaly Resources Limited 2010) no longer hold a conservation status: Rainbow Bee-eater, Shy Groundwren, White-browed Babbler (western wheatbelt) and Crested Bellbird (southern).

**Table 3-9 Threatened and Priority species identified in desktop review**

Scientific name	Vernacular	Status	Distance to study area (km)	Relevance to PRIOP based on Cazaly Resources Limited (2010) and Phoenix (2021)
<b>Invertebrates</b>				
<i>Aganippe castellum</i>	Tree-stem Trapdoor Spider	P4	4.7	Recorded mine area
<i>Idiosoma nigrum</i>	Shield-backed Trapdoor Spider	EN (BC Act), VU (EPBC Act)	Unknown	
<i>Daphnia jollyi</i>	a water flea (inland southwest)	P1	Unknown	
<b>Birds</b>				
<i>Actitis hypoleucos</i>	Common Sandpiper	Mig.	Unknown	
<i>Apus pacificus</i>	Fork-tailed Swift	Mig.	Unknown	Likely but low relevance
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mig.	Unknown	Possible in haul road (northern salt lakes)
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR/Mig.	Unknown	Possible in haul road (northern salt lakes)
<i>Calidris melanotos</i>	Pectoral Sandpiper	Mig.	Unknown	Possible in haul road (northern salt lakes)
<i>Calyptorhynchus latirostris</i>	Carnaby's Black Cockatoo	EN	Unknown	
<i>Falco peregrinus</i>	Peregrine Falcon	OS (BC Act)	1.57	Likely in haul road
<i>Leipoa ocellata</i>	Malleefowl	VU	1.04	Recorded mine area and haul road
<i>Motacilla cinerea</i>	Grey Wagtail	Mig.	Unknown	
<i>Pezoporus occidentalis</i>	Night Parrot	CR (BC Act), EN (EPBC Act)	Unknown	
<b>Mammals</b>				
<i>Dasyurus geoffroii</i>	Chuditch	VU	Unknown	Recorded haul road
<i>Leporillus conditor</i>	Greater Stick-nest Rat	CD (BC Act), VU (EPBC Act)	Unknown	
<i>Phascogale calura</i>	Red-tailed Phascogale	CD (BC Act), VU (EPBC Act)	Unknown	Possible in haul road, although targeted surveys did not detect presence

## 4 FIELD SURVEY RESULTS

### 4.1 FLORA DIVERSITY

A total of 125 vascular plant taxa were identified from the 37 relevé surveys within the study area (Figure 2-1; Appendix 1), representing 34 families and 71 genera. The most diverse families were the Myrtaceae (myrtles) (34 taxa), Fabaceae (legumes) (17 taxa), Proteaceae (*Banksia* family) (seven taxa) and Poaceae (grasses) (11 taxa). The most diverse genera were *Eucalyptus* (18), *Acacia* (11) and *Melaleuca* (7). No Declared Pests and WoNS were recorded.

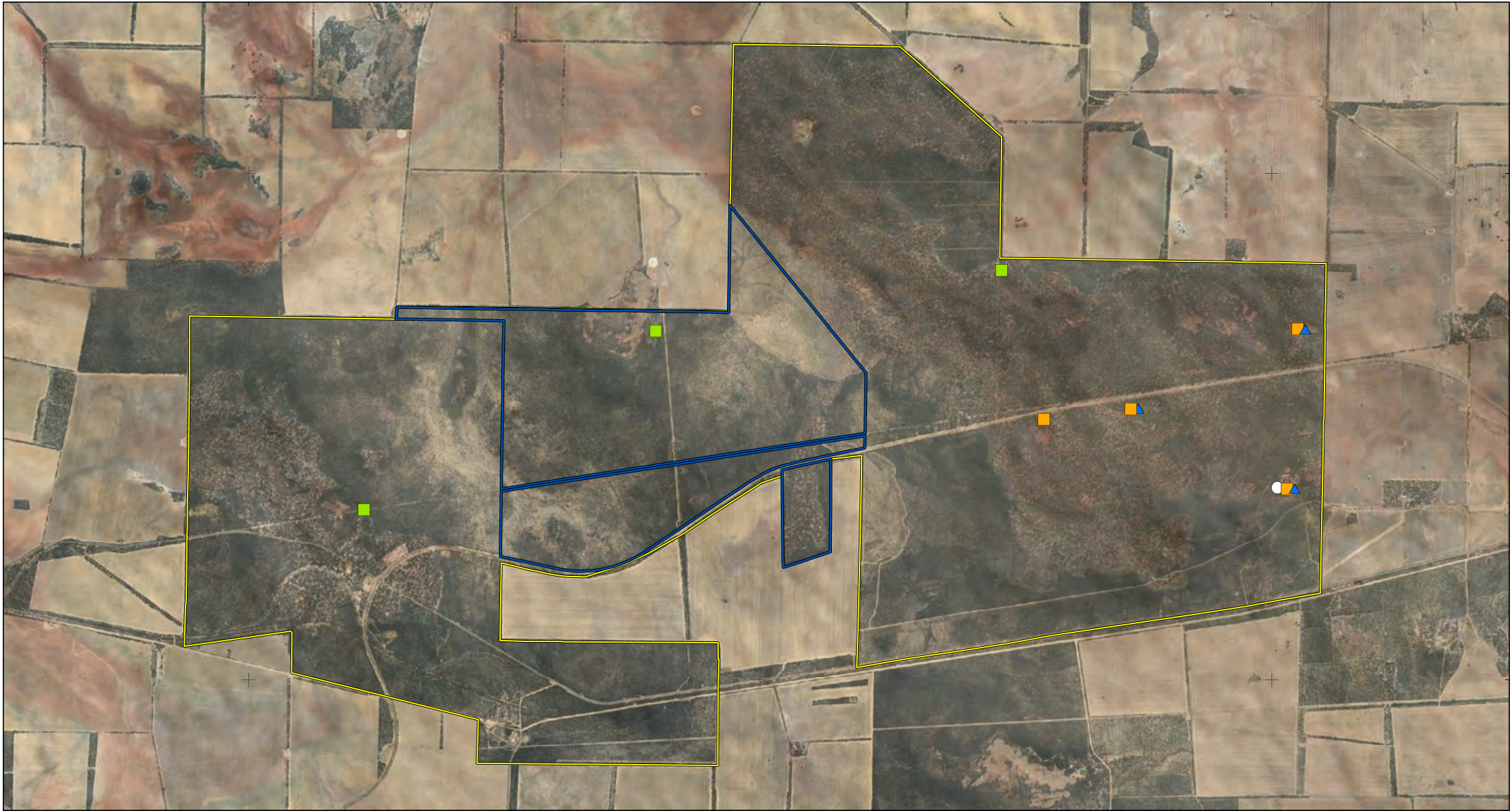
### 4.2 SIGNIFICANT FLORA

Two Priority 3 species, one Priority 2 species and a single Priority 1 species were recorded during the two survey visits (Figure 4-1):

- *Acacia crenulata* P3 – Recorded from three locations in Lot 1416 and adjacent reserves in the study area. Found in eucalypt woodlands on sandy soils often associated with breakaways or transitions in the yellow sands with granite or reddish-brown loam soils.
- *Eutaxia lasiocalyx* P2 – Recorded from one location in the study area east of Lot 1416. Found in woodland dominated by *Eucalyptus salubris*, on reddish-brown loam soils. The population observed represents a 78 km extension of range.
- *Hydrocotyle corynophora* P1 – Recorded at four locations in the study area east of Lot 1416. Found in open hermland dominated by winter annuals, on reddish-brown loam soils. The four populations observed represent a 53 km extension of range.
- *Notisia intonsa* P3 – Recorded at three locations in the study area east of Lot 1416. Found in open hermland dominated by winter annuals, on reddish-brown loam soils. The populations observed also represent a 53 km extension of range.

These four species are not known from within the PRIOP mine or Proposal study areas.

Likelihood of occurrence within Lot 1416 for the majority of significant flora identified in the database searches was assessed as 'Possible', including three species that will be impacted by PRIOP; *Banksia shanklandiorum*, *Verticordia mitodes*, and *Verticordia stenopetala* (Table 4-1). It is also considered possible that a further 12 additional significant flora that will be impacted by PRIOP and/or the Proposal area may occur in Lot 1416 (Table 4-2).



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- Lot 1416
- Study area

**Species, status**

- Acacia crenulata*, P3 (DBC list)
- Eutaxia lasiocalyx*, P2 (DBC list)
- Hydrocotyle corynophora*, P1 (DBC list)
- Notisia intonsa*, P3 (DBC list)

**Figure 4-1**  
**Significant flora recorded in the study area**



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**Table 4-1 Likelihood of occurrence in Lot 1416 for significant flora identified by database searches**

Species <sup>1</sup>	Status	Potential to occur in Lot 1416
<i>Acacia ancistrophylla</i> var. <i>perarcuata</i>	P3 (DBCA list)	Possible
<i>Acacia cerastes</i>	P1 (DBCA list)	Unlikely
<i>Acacia crenulata</i>	P3 (DBCA list)	Recorded
<i>Acacia filifolia</i>	P3 (DBCA list)	Possible
<i>Acacia lobulata</i>	EN (EPBC & BC Acts)	Possible
<i>Austrostipa blackii</i>	P3 (DBCA list)	Unlikely
<i>Banksia horrida</i>	P3 (DBCA list)	Possible
<b><i>Banksia shanklandiorum</i></b>	<b>P4 (DBCA list)</b>	<b>Possible</b>
<i>Banksia sphaerocarpa</i> var. <i>dolichostyla</i>	VU (EPBC & BC Acts)	Possible
<i>Boronia adamsiana</i>	VU (EPBC & BC Acts)	Possible
<i>Dasymalla axillaris</i>	CR (EPBC & BC Acts)	Possible
<i>Dicrastylis reticulata</i>	P3 (DBCA list)	Possible
<i>Eremophila resinosa</i>	EN (EPBC & BC Acts)	Unlikely
<i>Eremophila virens</i>	EN (EPBC & BC Acts)	Possible
<i>Eremophila viscida</i>	EN (EPBC & BC Acts)	Possible
<i>Eucalyptus crucis</i> subsp. <i>crucis</i>	VU/EN (EPBC Act; BC Act)	Possible
<i>Eutaxia acanthoclada</i>	P3 (DBCA list)	Unlikely
<i>Gastrolobium diabolophyllum</i>	CR (EPBC & BC Acts)	Possible
<i>Glossostigma trichodes</i>	P1 (DBCA list)	Possible
<i>Gompholobium cinereum</i>	P3 (DBCA list)	Possible
<i>Goodenia granitica</i>	P2 (DBCA list)	Possible
<i>Grevillea dryandroides</i> subsp. <i>hirsuta</i>	EN/VU (EPBC Act; BC Act)	Possible
<i>Hibbertia glabriuscula</i>	P3 (DBCA list)	Possible
<b><i>Lepidosperma lyonsii</i></b>	<b>P1 (DBCA list)</b>	<b>Unlikely</b>
<i>Myriophyllum petraeum</i>	P4 (DBCA list)	Possible
<i>Roycea pycnophylloides</i>	EN/VU (EPBC Act; BC Act)	Unlikely
<i>Symonanthus bancroftii</i>	EN/CR (EPBC Act; BC Act)	Possible
<b><i>Verticordia mitodes</i></b>	<b>P3 (DBCA list)</b>	<b>Possible</b>
<b><i>Verticordia stenopetala</i></b>	<b>P3 (DBCA list)</b>	<b>Possible</b>

1 – species in bold will be directly impacted by PRIOP mine and/or haul road.

**Table 4-2 Likelihood of occurrence in Lot 1416 for significant flora that will be impacted by PRIOP mine and/or Proposal study areas**

Species <sup>1</sup>	Status	Potential to occur in Lot 1416	Suitable vegetation types in Lot 1416
<i>Acacia asepala</i>	P2 (DBCA)	Unlikely	
<i>Acacia concolorans</i>	P2 (DBCA)	Possible	EsAsOm
<i>Acacia desertorum</i> var. <i>nudipes</i>	P3 (DBCA)	Unlikely	
<i>Baeckea grandibracteata</i> subsp. Parker Range	P1 (DBCA)	Possible	EIAaaTk, EbAaaEm
<i>Bossiaea</i> sp. Jackson Range (G. Cockerton & S. McNee LCS 13614)	P3 (DBCA)	Unlikely	
<i>Chamelaucium</i> sp. Parker Range (B.H. Smith 1255)	P1 (DBCA)	Possible	EIAaaTk, EbAaaEm
<i>Cryptandra crispula</i>	P3 (DBCA)	Possible	EIAaaTk, EbAaaEm
<i>Cyathostemon verrucosus</i>	P3 (DBCA)	Unlikely	
<i>Hakea pendens</i>	P3 (DBCA)	Unlikely	
<i>Isopogon robustus</i>	T (CR EPBC Act; BC Act)	Unlikely	
<i>Lepidosperma ferricola</i>	P3 (DBCA)	Unlikely	
<i>Lepidosperma</i> sp. Mt Caudan (N. Gibson & M. Lyons 2081)	P1 (DBCA)	Unlikely	
<i>Lepidosperma</i> sp. Parker Range (N. Gibson & M. Lyons 2094)	P1 (DBCA)	Possible	EbAaaEm
<i>Leucopogon</i> sp. Yellowdine (M. Hislop & F. Hort MH 3194)	P1 (DBCA)	Possible	EbAaaEm
<i>Lissanthe scabra</i>	P2 (DBCA)	Possible	Rocky outcrop portions of AaAcc and EcMpfOm
<i>Microcorys</i> sp. nov. (Parker Range)	New species	Possible	EIAaaTk, EbAaaEm
<i>Phebalium drummondii</i>	P3 (DBCA)	Possible	EIAaaTk
<i>Rinzia torquata</i>	P3 (DBCA)	Possible	EIAaaTk, EbAaaEm
<i>Stenanthemum bremerense</i>	P4 (DBCA)	Unlikely	
<i>Verticordia multiflora</i> subsp. <i>solox</i>	P2 (DBCA)	Possible	EIAaaTk, EbAaaEm
<i>Westringia acifolia</i>	P1 (DBCA)	Possible	EIAaaTk

1 – excludes species already covered in Table 4-1.

## 4.3 VEGETATION

### 4.3.1 Vegetation types

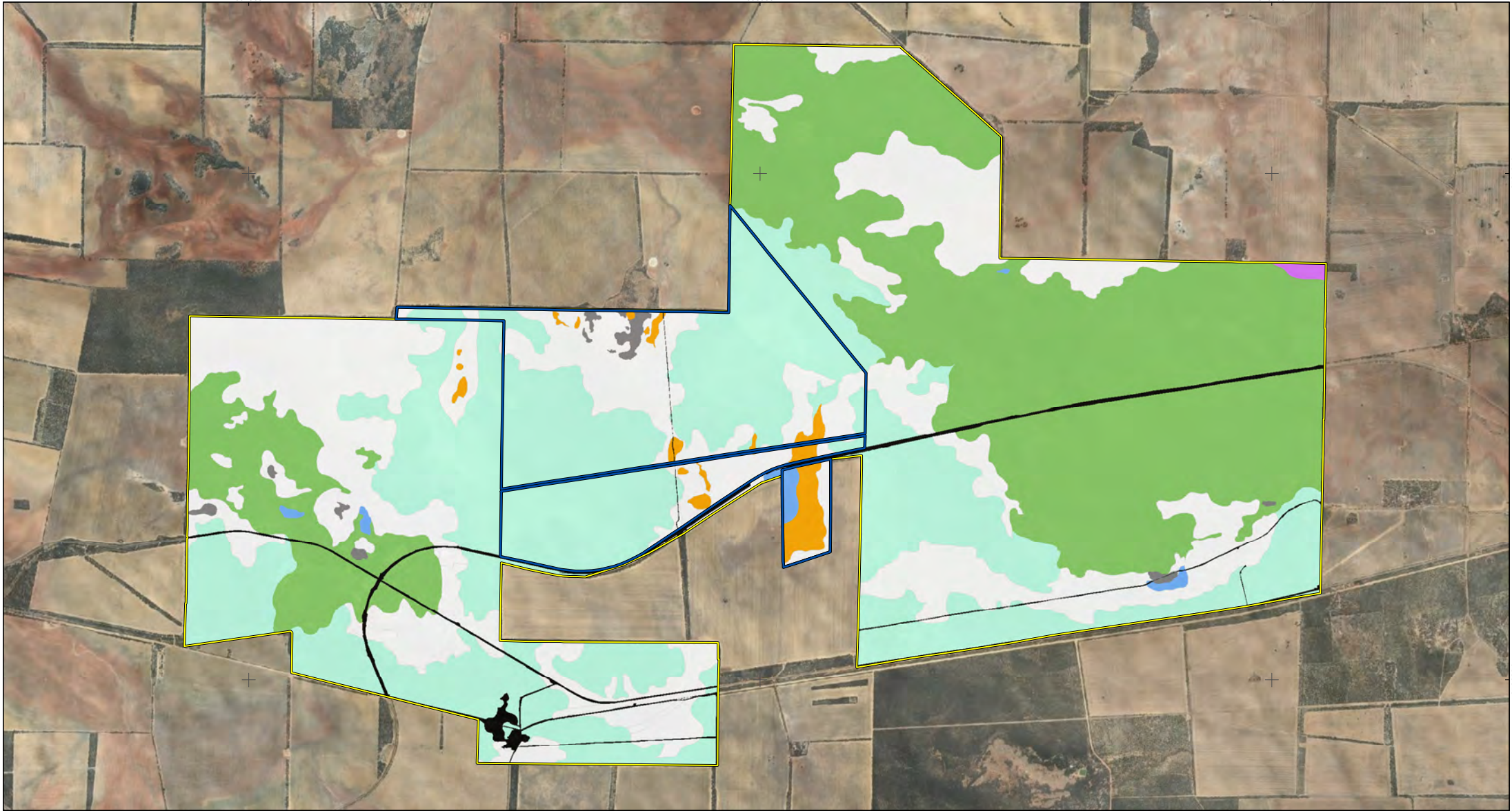
Seven broadly defined vegetation types were mapped in the study area (Figure 4-2):

- EeMIAh – Low mallee woodland of *Eucalyptus erythronema* and *E. loxophleba* subsp. *lissophloia*, over mid sparse shrubland of *Melaleuca lateriflora*, *Eremophila ionantha* and *Alyxia buxifolia*, over low sparse shrubland of *Acacia hemiteles*, *Olearia muelleri* and *A. erinacea*.
- EcMpfOm – Mid open woodland of *Eucalyptus capillosa*, *E. sheathiana* and *E. tephroclada*, over variable sparse to open shrubland of *Melaleuca pauperiflora* subsp. *fastigiata* and *Alyxia buxifolia*, over low sparse shrubland of *Olearia muelleri* and *Acacia erinacea*.
- AaAcc – Variably present low to mid woodland of *Eucalyptus capillosa* and *E. loxophleba* subsp. *lissophloia*, over variable tall open shrubland of *Acacia acuminata*, *Allocasuarina campestris* and *A. acutivalvis* subsp. *acutivalvis*, over sparse tussock grassland of *Amphipogon caricinus* var. *caricinus* with or without *Borya constricta*.
- EsSaOm – Mid open woodland of *Eucalyptus salmonophloia*, *E. salubris* and *E. yilgarnensis*, over tall sparse shrubland of *Santalum acuminatum*, over low sparse shrubland of *Olearia muelleri*, *Atriplex vesicaria* and *Acacia merrallii*.
- EaSaf – Mid woodland of *Eucalyptus aequioperta*, over isolated shrubs of *Senna artemisioides* subsp. *filifolia* and *Scaevola spinescens* and *Olearia muelleri*.
- EbAaaEm – Low sparse to open mallee woodland of *Eucalyptus burrcopinensis* and/or *E. leptopoda* subsp. *leptopoda*, over tall shrubland of *Allocasuarina acutivalvis* subsp. *acutivalvis*, *A. spinosissima* and *Melaleuca conothamnoides*, over open sedgeland of *Ecdeiocolea monostachya*, *Lepidosperma sanguinolentum* and *Schoenus hexandrus*.
- ElAaaTk – Low sparse mallee woodland of *Eucalyptus leptopoda* subsp. *leptopoda*, over tall open shrubland to shrubland of *Allocasuarina acutivalvis* subsp. *acutivalvis* and *A. corniculata*, over low to mid open shrubland of *Thryptomene kochii*, *Grevillea paradoxa* and *Melaleuca conothamnoides*.

One of the vegetation types (EaSaf) was only present outside Lot 1416, while EsSaOm was only marginally represented in the Lot (Table 4-3). The remaining vegetation types were present both in and out of Lot 1416 (Table 4-3).

**Table 4-3**      **Extent of each vegetation type in study area**

Vegetation type	Whole study area		Lot 1416		Adjacent reserves	
	ha	%	ha	%	ha	%
EeMIAh	52.9	1.1	48.9	5.7	4.0	0.1
EcMpfOm	19.4	0.4	8.4	1.0	11.1	0.3
AaAcc	20.9	0.4	11.6	1.5	9.3	0.2
EsSaOm	1,664.3	35.4	0.03	0.0	1,664.3	43.4
EaSaf	7.2	0.2	0.0	0.0	7.2	0.2
EbAaaEm	1,609.1	34.2	553.5	64.2	1055.5	27.5
ElAaaTk	1,234.4	26.3	235.7	27.3	998.7	26.0
Cleared	91.6	2.0	4.0	0.5	87.6	2.3
<b>Total</b>	<b>4,699.6</b>	<b>100.0</b>	<b>862.1</b>	<b>100.0</b>	<b>3,837.6</b>	<b>100.0</b>



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- Lot 1416
- Study area
- Vegetation type**
- AaAcc
- EaSaf
- EbAaaEm
- EcMpfOm
- EeMIAh
- EIaAaTk
- EsAsOm
- Cleared

**Figure 4-2**  
**Vegetation types recorded in the study area**



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### 4.3.2 Vegetation condition

Vegetation condition in the study area was almost entirely rated as Pristine, both within Lot 1416 and in the adjacent reserves (Table 4-4; Figure 4-3). A fire scar visible on aerial imagery straddles the northeastern boundary of Lot 1416 (approximately 100 ha burnt within the Lot) that remains considered as Pristine condition.

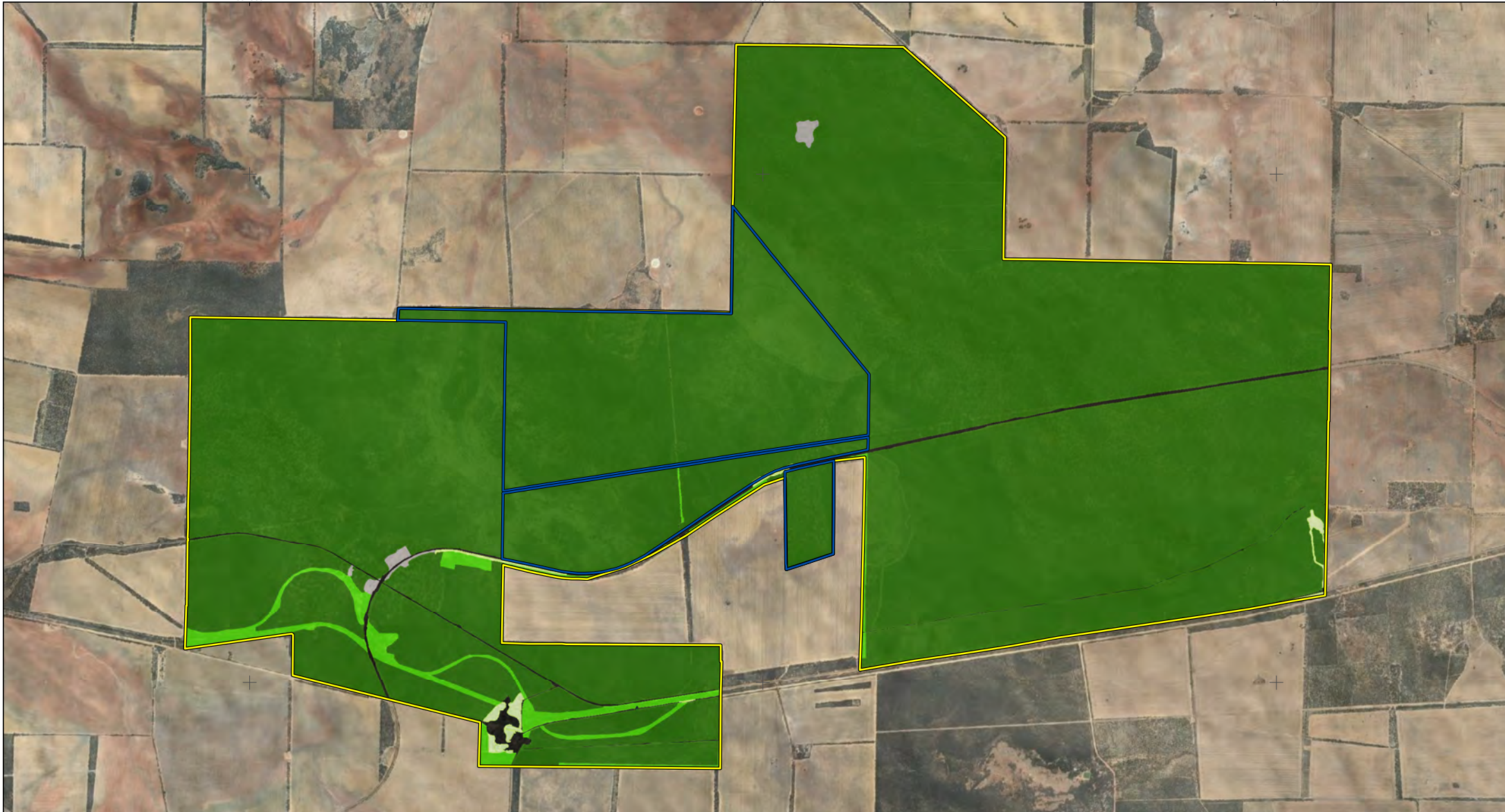
Four introduced flora species were found during survey; *Bromus rubens*, *Centaurea melitensis*, *Lysimachia arvensis*, *Medicago minima*. None of these weeds are WoNS (Weeds of National Significance) or controlled Declared Pests under the Biosecurity and Agriculture Management Act 2007. All survey records of weeds occurred outside of Lot 1416. Where recorded, occurrences of introduced flora species were generally restricted to small areas in proximity to roads, tracks, and farmland. *Centaurea. melitensis*, *L. arvensis*, and *M. minima* were low in plant density, while *B. rubens* occurred in moderate density typical of introduced grasses.

**Table 4-4 Extent of vegetation condition in the study area**

Vegetation condition	Whole study area		Lot 1416		Adjacent reserves	
	ha	%	ha	%	ha	%
Pristine	4,473.0	95.2	856.5	99.4	3,616.5	94.2
Excellent	104.1	2.3	1.0	0.1	106.4	2.8
Very Good	16.3	0.3	0.6	0.1	15.7	0.4
Good	0.0	0.0	0.0	0.0	0.0	0.0
Degraded	11.4	0.2	0.0	0.0	11.4	0.3
Completely Degraded	0.00	0.0	0.0	0.0	0.0	0.0
NA Cleared areas	91.6	1.9	4.0	0.5	87.6	2.3
<b>Total</b>	<b>4,699.6</b>	<b>100.0</b>	<b>862.1</b>	<b>100.0</b>	<b>3,881.4</b>	<b>100.0</b>

### 4.3.3 Eucalypt Woodland TEC assessment

The 37 sites assessed for presence of the Eucalypt Woodland TEC indicated this community is present in 15 sites, with one of these sites within Lot 1416 (Table 4-5; Figure 4-4). All Eucalypt Woodland TEC sites were found to be located within the areas broadly identified as TEC by DBCA's Threatened and Priority Ecological Communities database (Figure 3-3). The remaining sites assessed not qualifying as Eucalypt Woodland TEC within Lot 1416 and the adjacent reserves (Table 4-5), were due to either; 1. An absence of TEC indicator *Eucalyptus* species within the site, 2. Patch sizes of eucalypt woodland being less than 2 hectares, or 3. A low tree canopy cover of less than 10 % for the diagnostic indicator eucalypt species (refer to Appendix 3).



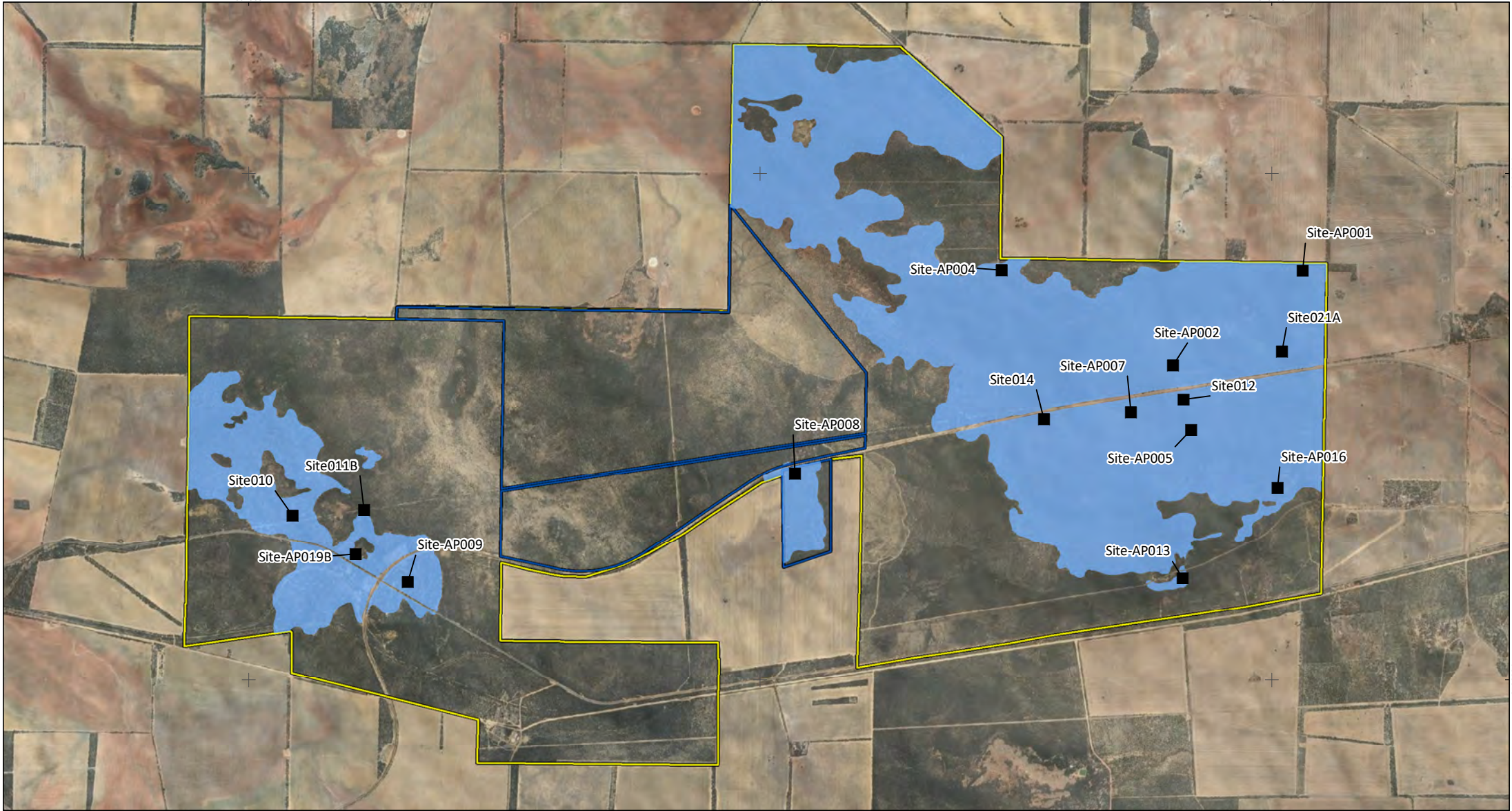
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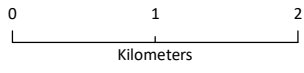
Lot 1416	<b>Vegetation condition</b>
Study area	Pristine
	Excellent
	Very Good
	Degraded
	Not applicable

**Figure 4-3**  
**Vegetation condition**



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-  Lot 1416
-  Study area
-  Eucalypt woodlands of the Western Australian Wheatbelt, CE (EPBC Act), P3 DBCA
-  Flora site

**Figure 4-4**  
**Sites assessed as Eucalypt Woodlands of the Western Australian Wheatbelt TEC and indicative distribution in study area**



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Table 4-5 Eucalypt Woodland of the Western Australian Wheatbelt TEC assessment

Sample site	General vegetation type	Dominant canopy species	Co-dominant canopy species	Crown assessment	TEC Indicator species present	Indicator Eucalypt species dominance	Vegetation condition (Keighery 1994)	Eucalypt Woodland TEC assessment
Site001	Eucalypt woodland	<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>	None	Yes, > 10%	No	No	Pristine	No, NOT TEC
Site002	Eucalypt woodland	<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i>	<i>Eucalyptus leptopoda</i> , <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> , <i>Eucalyptus moderata</i>	Yes, >10%	<i>Eucalyptus salmonophloia</i>	No	Pristine	No, NOT TEC
Site003	Mallee/ <i>Allocasuarina</i> / <i>Acacia</i> shrubland	<i>Allocasuarina acutivalvis</i> , <i>Allocasuarina spinosissima</i>	<i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i>	No, NOT TEC	No, NOT TEC	No, NOT TEC	Pristine	No, NOT TEC
Site004	Eucalypt woodland	<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i>	<i>Eucalyptus salmonophloia</i> , <i>Melaleuca lateriflora</i>	Yes, >10%	<i>Eucalyptus salmonophloia</i>	No	Pristine	No, NOT TEC
Site005	Eucalypt woodland	<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i>	<i>Melaleuca lateriflora</i>	Yes, > 10%	No	No	Pristine	No, NOT TEC
Site006	Eucalypt woodland	<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i>	<i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i> , <i>Melaleuca lateriflora</i>	Yes, > 10%	No	No	Pristine	No, NOT TEC
Site007	<i>Allocasuarina</i> / <i>Acacia</i> shrubland	<i>Allocasuarina acutivalvis</i>	<i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i>	No, NOT TEC	No, NOT TEC	No, NOT TEC	Pristine	No, NOT TEC
Site008	Mallee/ <i>Allocasuarina</i> / <i>Acacia</i> shrubland	<i>Allocasuarina corniculata</i>	<i>Thryptomene kochii</i>	No, NOT TEC	No, NOT TEC	No, NOT TEC	Pristine	No, NOT TEC
Site009	Mallee/ <i>Acacia</i> shrubland	<i>Eucalyptus burracoppinensis</i> , <i>Eucalyptus leptopoda</i>	None	No, < 10%	No, NOT TEC	No, NOT TEC	Pristine	No, NOT TEC

Sample site	General vegetation type	Dominant canopy species	Co-dominant canopy species	Crown assessment	TEC Indicator species present	Indicator Eucalypt species dominance	Vegetation condition (Keighery 1994)	Eucalypt Woodland TEC assessment
Site010	Eucalypt woodland	<i>Eucalyptus capillosa</i> , <i>Eucalyptus salmonophloia</i> , <i>Eucalyptus salubris</i>	<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i>	Yes, > 10%	<i>Eucalyptus capillosa</i> , <i>Eucalyptus salmonophloia</i> , <i>Eucalyptus salubris</i>	Yes	Pristine	Yes, TEC
Site011A	<i>Allocasuarina</i> / <i>Acacia</i> shrubland	<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>	None	No, NOT TEC	No, NOT TEC	No	Pristine	No, NOT TEC
Site011B	Eucalypt woodland	<i>Eucalyptus capillosa</i>	<i>Callitris columellaris</i>	Yes, > 10%	<i>Eucalyptus capillosa</i>	Yes	Pristine	Yes, TEC
Site012	Eucalypt woodland	<i>Eucalyptus salmonophloia</i>	<i>Pittosporum angustifolium</i>	Yes, > 10%	<i>Eucalyptus salmonophloia</i>	Yes	Pristine	Yes, TEC
Site013	Open herbfield	None	None	No, NOT TEC	No, NOT TEC	No	Pristine	No, NOT TEC
Site014	Eucalypt woodland	<i>Eucalyptus longicornis</i> , <i>Eucalyptus salmonophloia</i> , <i>Eucalyptus salubris</i>	None	Yes, > 10%	<i>Eucalyptus longicornis</i> , <i>Eucalyptus salmonophloia</i> , <i>Eucalyptus salubris</i>	Yes	Pristine	Yes, TEC
Site016	Mallee/ <i>Allocasuarina</i> / <i>Acacia</i> shrubland	<i>Eucalyptus burracoppinensis</i> , <i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i>	<i>Allocasuarina acutivalvis</i> , <i>Allocasuarina spinosissima</i>	Yes, > 10%	No, NOT TEC	No	Pristine	No, NOT TEC

Sample site	General vegetation type	Dominant canopy species	Co-dominant canopy species	Crown assessment	TEC Indicator species present	Indicator Eucalypt species dominance	Vegetation condition (Keighery 1994)	Eucalypt Woodland TEC assessment
Site018	Mallee/ <i>Allocasuarina</i> / <i>Acacia</i> shrubland	<i>Allocasuarina campestris</i> , <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>	None	Yes, > 10%	No, NOT TEC	No	Pristine	No, NOT TEC
Site020A	<i>Allocasuarina</i> / <i>Acacia</i> shrubland	<i>Allocasuarina corniculata</i> , <i>Acacia beauverdiana</i>	None	No, NOT TEC	No, NOT TEC	No	Pristine	No, NOT TEC
Site021A	Eucalypt woodland	<i>Eucalyptus salubris</i>	<i>Eucalyptus yilgarnensis</i>	Yes, > 10%	<i>Eucalyptus salubris</i>	Yes	Pristine	Yes, TEC
Site-AP001	Eucalypt woodland	<i>Eucalyptus aequioperta</i>	None	Yes, > 10%	<i>Eucalyptus aequioperta</i>	Yes	Pristine	Yes, TEC
Site-AP002	Eucalypt woodland	<i>Eucalyptus salmonophloia</i> , <i>Eucalyptus yilgarnensis</i>	None	Yes, > 10%	<i>Eucalyptus salmonophloia</i>	Yes	Pristine	Yes, TEC
Site-AP004	Eucalypt woodland	<i>Eucalyptus salmonophloia</i> , <i>Eucalyptus capillosa</i>	<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i>	Yes, > 10%	<i>Eucalyptus salmonophloia</i>	Yes	Pristine	Yes, TEC
Site-AP005	Eucalypt woodland	<i>Eucalyptus salubris</i>	None	Yes, > 10%	<i>Eucalyptus salubris</i>	Yes	Pristine	Yes, TEC
Site-AP006	Open herbfield	None	None	None	None	No	Pristine	No, NOT TEC
Site-AP007	Eucalypt woodland	<i>Eucalyptus yilgarnensis</i>	<i>Eucalyptus salmonophloia</i>	Yes, > 10%	<i>Eucalyptus salmonophloia</i>	Yes	Pristine	Yes, TEC

Sample site	General vegetation type	Dominant canopy species	Co-dominant canopy species	Crown assessment	TEC Indicator species present	Indicator Eucalypt species dominance	Vegetation condition (Keighery 1994)	Eucalypt Woodland TEC assessment
Site-AP008	Eucalypt woodland	<i>Eucalyptus salmonophloia</i>	None	Yes, > 10%	<i>Eucalyptus salmonophloia</i>	Yes	Pristine	Yes, TEC
Site-AP009	Eucalypt woodland	<i>Eucalyptus salmonophloia</i> , <i>Eucalyptus salubris</i>	<i>Acacia ancistrophylla</i>	Yes, > 10%	<i>Eucalyptus salmonophloia</i> , <i>Eucalyptus salubris</i>	Yes	Pristine	Yes, TEC
Site-AP010	Mallee/ <i>Allocasuarina</i> / <i>Acacia</i> shrubland	<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>	<i>Allocasuarina corniculata</i> , <i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i>	No, < 10%	No, NOT TEC	No	Pristine	No, NOT TEC
Site-AP011	Mallee/ <i>Allocasuarina</i> / <i>Acacia</i> shrubland	<i>Allocasuarina spinosissima</i> , <i>Eucalyptus burracoppinensis</i>	<i>Allocasuarina corniculata</i> , <i>Allocasuarina acutivalvis</i>	No, < 10%	No, NOT TEC	No	Pristine	No, NOT TEC
Site-AP012	Mallee/ <i>Acacia</i> shrubland	<i>Eucalyptus burracoppinensis</i>	None	No, < 10%	No, NOT TEC	No	Pristine	No, NOT TEC
Site-AP013	Eucalypt woodland	<i>Eucalyptus capillosa</i> , <i>Eucalyptus tephroclada</i> , <i>Eucalyptus sheathiana</i>	None	Yes, > 10%	<i>Eucalyptus capillosa</i>	Yes	Pristine	Yes, TEC
Site-AP014	Mallee/ <i>Acacia</i> shrubland	<i>Eucalyptus moderata</i>	<i>Eucalyptus calycogona</i> subsp. <i>miraculum</i>	Yes, > 10%	No, NOT TEC	No	Pristine	No, NOT TEC
Site-AP015	<i>Allocasuarina</i> / <i>Acacia</i> shrubland	<i>Acacia acuminata</i>	<i>Allocasuarina campestris</i> , <i>Allocasuarina corniculata</i>	No, NOT TEC	No, NOT TEC	No	Pristine	No, NOT TEC

Sample site	General vegetation type	Dominant canopy species	Co-dominant canopy species	Crown assessment	TEC Indicator species present	Indicator Eucalypt species dominance	Vegetation condition (Keighery 1994)	Eucalypt Woodland TEC assessment
Site-AP016	Eucalypt woodland	<i>Eucalyptus salubris</i>	<i>Eucalyptus salmonophloia</i>	Yes, > 10%	<i>Eucalyptus salmonophloia</i> , <i>Eucalyptus salubris</i>	Yes	Pristine	Yes, TEC
Site-AP017	Open herbfield	None	None	None	None	No	Pristine	No, NOT TEC
Site-AP018	Open shrubland	None	None	None	None	No	Pristine	No, NOT TEC
Site-AP019B	Eucalypt woodland	<i>Eucalyptus capillosa</i>	None	Yes, > 10%	<i>Eucalyptus capillosa</i>	Yes	Pristine	Yes, TEC



## 4.4 FAUNA AND HABITAT

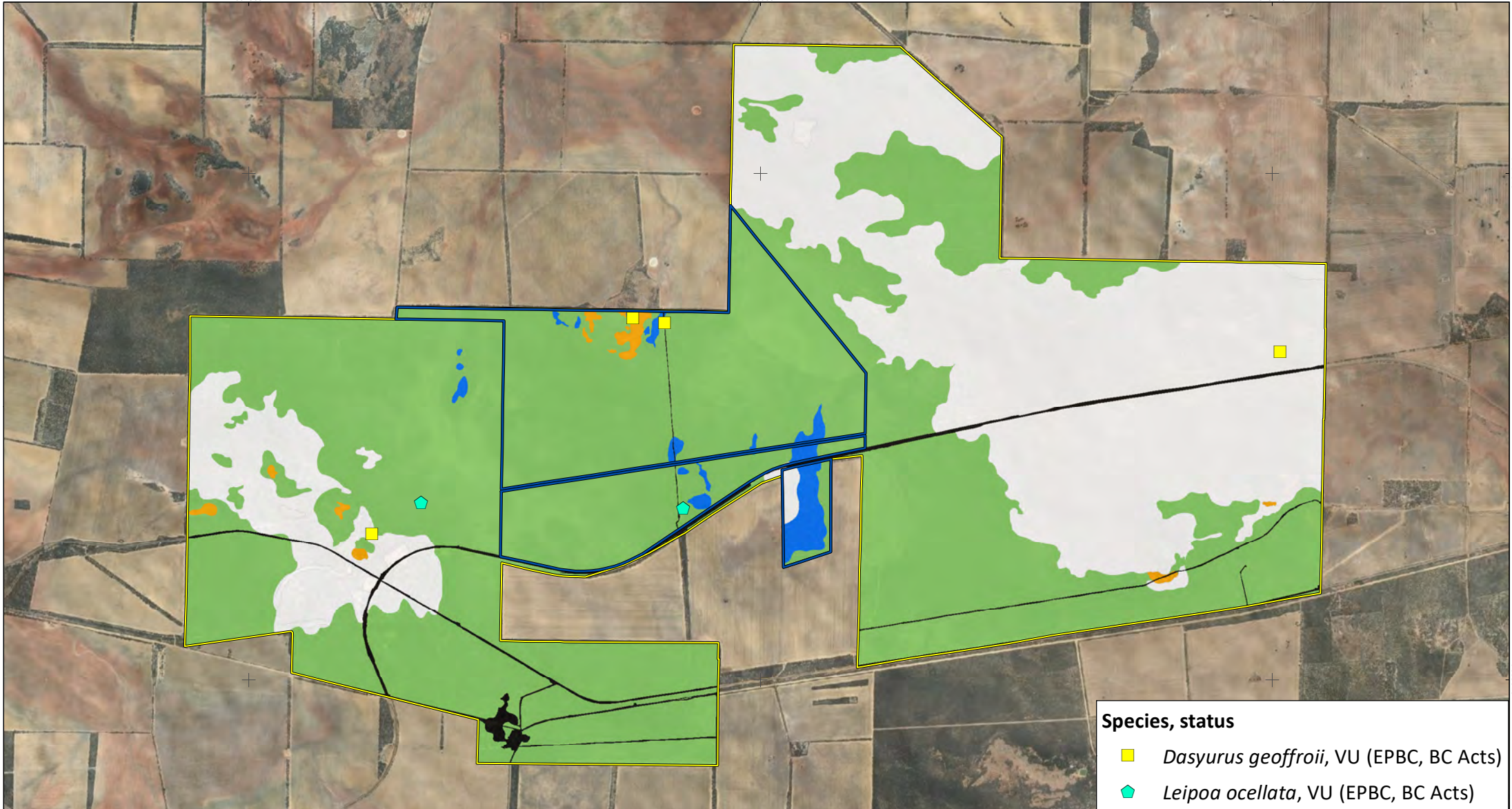
### 4.4.1 Fauna habitats

Five broad fauna habitats were identified in the study area (Table 4-6; Figure 4-5), four of which were considered suitable for significant fauna species that have been recorded from the PRIOP mine area or haul road (see sections 4.4.2.1 and 4.4.2.2). All habitats present in Lot 1416 were also present in the adjacent reserves. Lot 1416 is dominated by Open mallee woodland over *Allocasuarina/Acacia* shrubland (Table 4-6).

Several kinds of rock outcrops and ground features have not been mapped in detail and are hence not identified as a distinct habitat type but occur scattered within each of the habitats based on vegetation types, or at their boundaries. Granite outcrops occur as low domes or breakaways predominantly in the north and west of the study area, with or without overhangs and small caves at their edges. In the eucalypt woodland in the eastern part of the study area, there are some low granite outcrops and stony hills, and also a number of flat or hollowed areas interpreted as sinkholes or gilgai, where surface water drains through holes in a calcrete layer within the soil.


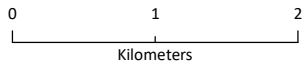
**Table 4-6 Fauna habitats of the study area**

Fauna habitat	Area (ha, %) total	Area (ha, %) Lot 1416	Area (ha, %) reserves	Comments
Mallee woodland	52.9 (1.1%)	48.9 (5.7%)	4.0 (0.1%)	Suitable Malleefowl breeding/foraging habitat; granite outcrops potential Chuditch habitat.
Eucalypt woodland	1,690.9 (36.0%)	8.4 (1.0%)	1,682.5 (43.8%)	Suitable Malleefowl breeding/foraging habitat; hollow logs, granite outcrops and breakaways potential Chuditch habitat, presence confirmed (scat recorded); potential Western Rosella habitat.
Open mallee woodland over <i>Allocasuarina/Acacia</i> shrubland	2,842.5 (60.5%)	789.2 (91.6%)	2,054.2 (53.5%)	Suitable Malleefowl breeding/foraging habitat (mound recorded in Lot 1416, track to west); granite outcrops and breakaways potential Chuditch habitat, presence confirmed (scat recorded).
Open eucalypt woodland over <i>Allocasuarina/Acacia</i> shrubland	20.9 (0.4%)	11.6 (1.3%)	9.3 (0.2%)	Suitable Malleefowl breeding/foraging habitat; hollow logs, granite outcrops and breakaways potential Chuditch habitat; potential Western Rosella habitat.
Cleared	91.6 (2.0%)	4.0 (0.5%)	87.6 (2.3%)	
<b>Total</b>	<b>4,699.6 (100%)</b>	<b>862.1 (100%)</b>	<b>3,837.6 (100%)</b>	



Species, status	
<span style="color: yellow;">■</span>	<i>Dasyurus geoffroii</i> , VU (EPBC, BC Acts)
<span style="color: cyan;">⬠</span>	<i>Leipoa ocellata</i> , VU (EPBC, BC Acts)




Mineral Resources Ltd Parker Range Iron Ore Project	
Project No	1402/1403
Date	15/06/2021
Drawn by	IN
Map author	JS
	
	
1:53,000 (at A4)	GDA 1994 MGA Zone 50

<span style="border: 2px solid blue; padding: 2px;"> </span>	Lot 1416
<span style="border: 2px solid yellow; padding: 2px;"> </span>	Study area
<b>Fauna habitat</b>	
<span style="background-color: white; border: 1px solid black; padding: 2px;"> </span>	Eucalypt woodland
<span style="background-color: blue; border: 1px solid black; padding: 2px;"> </span>	Mallee woodland
<span style="background-color: orange; border: 1px solid black; padding: 2px;"> </span>	Open Eucalypt woodland over Allocasuarina/Acacia shrubland
<span style="background-color: green; border: 1px solid black; padding: 2px;"> </span>	Open Mallee over Allocasuarina/Acacia shrubland
<span style="background-color: black; border: 1px solid black; padding: 2px;"> </span>	None

**Figure 4-5**

**Fauna habitats and significant fauna records**



All information within this map is current as of 15/06/2021. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

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## 4.4.2 Significant fauna

Two species of significant fauna that have been recorded within the PRIOP mine area and/or haul road were recorded during the field survey of Lot 1416:

- Malleefowl (see 4.4.2.1)
- Chuditch (see 4.4.2.2).

### 4.4.2.1 Malleefowl

One old, degraded Malleefowl mound was recorded in Lot 1416, and a set of tracks in the western reserve (Figure 4-5). The potential of fauna habitat to support Malleefowl was assessed at 66 locations in the study area (Figure 2-1; Table 4-7) and 55 of these recorded a score of  $\geq 4$ , indicating suitable Malleefowl breeding and foraging habitat. Most habitat used for foraging is also suitable for breeding, excepting drainage lines or flood-prone areas (not present in the study area).

Both Malleefowl records were in Open mallee over *Allocasuarina/Acacia* shrubland, but all vegetated habitat types within the study area, covering 4,608.1 ha (98.0% of the study area), were considered to include habitat suitable for Malleefowl (Table 4-6).

**Table 4-7 Malleefowl habitat assessment scores**

Site	Sand	Canopy	Litter	Ground Level	Mallee	Melaleuca	Mulga	Triodia	Score	Malleefowl Habitat
MF001	1	1	1	1	0	0	1	0	5	Yes
MF002	1	1	1	1	1	0	0	0	5	Yes
MF003	1	1	0	1	1	1	0	0	5	Yes
MF004	1	1	0	1	1	1	0	0	5	Yes
MF005	1	0	0	1	1	0	0	0	3	No
MF006	1	1	0	1	1	0	0	0	4	Yes
MF007	1	1	0	1	1	1	0	0	5	Yes
MF008	1	1	0	1	1	0	0	0	4	Yes
MF009	1	1	0	1	1	0	0	0	4	Yes
MF010	1	1	1	1	1	0	0	1	6	Yes
MF011	1	1	1	1	0	0	0	0	4	Yes
MF012	1	1	0	1	1	0	0	0	4	Yes
MF013	0	0	0	1	0	0	0	0	1	No
MF014	1	1	1	1	1	1	0	0	6	Yes
MF015	1	1	0	1	1	1	0	0	5	Yes
MF016	1	1	0	1	1	1	0	0	5	Yes
MF017	1	1	1	1	1	1	0	0	6	Yes
MF018	1	1	1	1	1	1	0	0	6	Yes
Site001	1	0	0	1	0	1	0	0	3	No
Site002	1	0	0	1	1	1	0	0	4	Yes
Site003	1	1	1	1	1	1	0	0	6	Yes
Site004	1	1	1	0	1	1	0	0	5	Yes
Site005	1	1	1	1	0	1	0	0	5	Yes
Site006	1	1	1	1	1	1	0	0	6	Yes
Site007	1	1	1	1	0	0	0	0	4	Yes
Site008	1	1	1	0	0	0	0	0	3	No

**Flora and Fauna Assessment of Lot 1416 for the Parker Range Project**  
**Prepared for Mineral Resources Ltd**

Site	Sand	Canopy	Litter	Ground Level	Mallee	Melaleuca	Mulga	Triodia	Score	Malleefowl Habitat
Site009	1	1	1	1	0	1	0	0	5	Yes
Site010	1	1	1	1	1	1	0	0	6	Yes
Site011	1	1	1	1	1	1	0	0	6	Yes
Site012	0	1	1	1	1	1	0	0	5	Yes
Site013	1	1	1	1	1	0	0	0	5	Yes
Site014	1	1	1	1	1	0	0	0	5	Yes
Site015	1	1	1	1	1	0	0	0	5	Yes
Site016	1	0	1	1	1	0	0	0	4	Yes
Site017	1	1	1	1	1	1	0	0	6	Yes
Site018	0	0	1	0	0	1	0	0	2	No
Site019	0	0	1	0	0	1	0	0	2	No
Site020	0	1	1	1	0	1	0	0	4	Yes
Site021	1	1	1	1	0	1	0	0	5	Yes
Site022	1	1	1	1	1	1	0	0	6	Yes
Site023	1	1	1	1	1	1	0	0	6	Yes
Site024	1	0	0	1	0	1	0	0	3	No
Site025	1	1	1	1	1	1	0	0	6	Yes
Site026	1	1	1	1	1	1	0	0	6	Yes
Site027	1	1	1	1	1	1	0	0	6	Yes
Site028	1	1	1	1	1	1	0	0	6	Yes
Site029	1	1	1	1	1	1	0	0	6	Yes
Site030	1	0	1	1	1	1	0	0	5	Yes
Site031	1	0	1	1	1	1	0	0	5	Yes
Site032	1	1	1	1	0	0	0	0	4	Yes
Site033	1	0	1	1	1	1	0	0	5	Yes
Site034	1	1	0	1	1	1	0	0	5	Yes
Site035	0	1	1	1	0	1	0	0	4	Yes
Site036	1	1	1	1	1	1	0	0	6	Yes
Site037	1	1	1	1	1	1	0	0	6	Yes
Site038	1	0	1	1	0	0	0	0	3	No
Site039	1	1	1	1	1	1	0	0	6	Yes
Site040	1	1	1	1	1	1	0	0	6	Yes
Site041	0	0	1	1	0	1	0	0	3	No
Site042	1	0	0	0	1	1	0	0	3	No
Site043	1	1	1	1	0	1	0	0	5	Yes
Site044	1	1	1	1	1	1	0	0	6	Yes
Site045	0	0	1	0	0	1	0	1	3	No
Site046	0	1	1	1	0	1	0	0	4	Yes
Site047	1	0	1	1	1	1	0	1	6	Yes
Site048	1	0	1	1	1	1	0	0	5	Yes

#### 4.4.2.2 Chuditch

Chuditch (*Dasyurus geoffroii*; VU) was recorded from scats at two locations in the north of Lot 1416, and at two other locations in the eastern and western reserves (Figure 4-5). The scats did not appear fresh, so do not demonstrate current occupancy.

Historically occurring across 70% of Australia, Chuditch are capable of occupying a variety of habitats from wet sclerophyll forest, eucalypt woodland and mallee shrubland to arid desert (DEC 2012). As a result, it is not possible to list a specific set of characteristics that are indicative of habitat suitability or to accurately predict the likelihood of occurrence; however, some key aspects are considered important for Chuditch survival in an area. These include adequate den resources (hollow logs, burrows or rock crevices), adequate prey resources (particularly large invertebrates) and sizeable areas of >20,000 ha (DEC 2012).

The 4,699.7 ha study area (including Lot 1416 and adjacent reserves) is well under the 20,000 ha threshold; however, potential refuge/den structures, including hollow logs and rock crevices were observed during the survey. Potential refuge and denning sites for Chuditch are provided in the study area by:

- relatively large horizontal hollow logs (present at varying density in both eucalypt woodland habitat types)
- granite outcrops and breakaways with overhangs and small caves (mostly observed in eucalypt woodland in the western part of the study area, but also scattered through all habitat types)
- sinkholes through calcrete layers, observed at several locations in eucalypt woodland habitat in eastern part of the study area (e.g. SITE010, SITE013, SITE017)
- burrows excavated by other medium-sized vertebrates (rabbit, fox, bungarra) which occur in all habitat types.

Further, the evidence of presence indicates Chuditch are utilising the study area, including Lot 1416, to some extent, at least for dispersal and possibly foraging and denning. Observations of prey resources were not undertaken during the survey. However, to the extent that Chuditch and fox overlap in diet (Glen *et al.* 2009; Glen & Dickman 2008), the numerous records of foxes in the study area indicate suitable food resources are present.

#### 4.4.2.3 *Camponotus* sp. nr *terebrans*, host ant of ABAB

Only a single nest of a *Camponotus* ant species, possibly either *C. nigriceps* or *C. sp. nr terebrans*, was located during the second survey (-31.366792, 118.757211, near centre of Lot 1416). The nest architecture, structure and colouring of the ants appeared similar to that of the host species, but specific identity was not confirmed and no vouchers were collected. No other nests consistent with *C. sp. nr terebrans* were observed at nearby trees or in any part of the study area. Further survey to detect the ABAB would only be required only if a large colony of the host ant were present.

#### 4.4.2.4 Other significant fauna species

Based on the likelihood of occurrence assessment (see 2.3.6), five additional significant fauna species from the desktop review may occur in the study area (Table 4-8). One of these, Western Rosella (inland) *Platycercus icterotis xanthogenys*, was previously recorded for PRIOP in the mine area. Although not identified in either the desktop database searches for Lot 1416, or the field survey, the study area represents suitable habitat within its known range, so it is considered possible.

The Red-tailed Phascogale and Western Brush Wallaby possibly occur, with suitable habitat present for the species and both having been recorded in small fragments of remnant vegetation in the wheatbelt throughout their range (Short *et al.* 2011). Both species were also considered to have potential to occur in the PRIOP haul road (Phoenix 2021), although fauna surveys did not record their presence.

A Peregrine Falcon was identified in the desktop review approximately 1.5 km to the west. The species is likely to visit the study area as part of its wider foraging range. Within the Wheatbelt, this species has been recorded roosting and nesting on telecommunications towers, wheat silos and similar infrastructure (Ecoscape 2012).

Unconfirmed foraging traces of a bandicoot likely to be an undescribed species of *Isoodon* smaller than the Quenda *I. fusciventer* (Travouillon 2019) were recorded in the PRIOP haul road (Phoenix 2021) in dense, low *Allocasuarina* shrubland. No evidence of this species was recorded during the field survey and it is considered unlikely to occur in the taller, more open *Allocasuarina* shrubland in Lot 1416.

**Table 4-8 Significant fauna likelihood of occurrence assessment**

Species	Status	Relevance to PRIOP based on Cazaly Resources Limited (2010) and Phoenix (2021)	Likelihood of occurrence in Lot 1416
<b>Invertebrates</b>			
<i>Idiosoma (Aganippe) castellum</i> Tree-stem Trapdoor Spider	P4 (DBC list)	Recorded in mine area	Unlikely; study area lacks flood prone depressions and flats that support myrtaceous shrub communities necessary to support the species (Inglis 2007).
<b>Reptiles</b>			
<i>Paroplocephalus atriceps</i> Lake Cronin Snake	P3 (DBC list)	Possible in haul road	Unlikely; outside known distribution.
<b>Birds</b>			
<i>Apus pacificus</i> Fork-tailed Swift	Mig. (EPBC & BC Acts)	Likely but low relevance	Possible; may occur over the study area intermittently in summer.
<i>Falco peregrinus</i> Peregrine Falcon	OS (BC Act)	Likely in haul road	Likely to occur or as part of foraging range. Possible resident in vicinity, but more likely to nest on artificial structures outside the study area than on trees.
<i>Leipoa ocellata</i> Malleefowl	VU (EPBC & BC Acts)	Recorded mine area and haul road	Recorded (old, degraded mound; fresh tracks); habitat suitable for foraging and breeding.
<i>Thinornis rubricollis</i> Hooded Plover	P4 (DBC list)	Possible in haul road (northern salt lakes)	Unlikely; no suitable wetland or saltlake habitat.
<i>Calidris acuminata</i> Sharp-tailed Sandpiper	Mig. (EPBC & BC Acts)	Possible in haul road (northern salt lakes)	Unlikely; no suitable wetland or saltlake habitat.

Species	Status	Relevance to PRIOP based on Cazaly Resources Limited (2010) and Phoenix (2021)	Likelihood of occurrence in Lot 1416
<i>Calidris ferruginea</i> Curlew Sandpiper	CR, Mig. (EPBC & BC Acts)	Possible in haul road (northern salt lakes)	Unlikely; no suitable wetland or saltlake habitat.
<i>Calidris melanotos</i> Pectoral Sandpiper	Mig. (EPBC & BC Acts)	Possible in haul road (northern salt lakes)	Unlikely; no suitable wetland or saltlake habitat.
<i>Tringa nebularia</i> Common Greenshank	Mig. (EPBC & BC Acts)	Possible in haul road (northern salt lakes)	Unlikely; no suitable wetland or saltlake habitat.
<i>Platycercus icterotis xanthogenys</i> Western Rosella (inland)	P4 (DBCA)	Recorded in mine area, Likely in haul road	Possible; suitable woodland habitat and potential breeding hollows present.
<b>Mammals</b>			
<i>Dasyurus geoffroii</i> Western Quoll, Chuditch	VU (EPBC & BC Acts)	Recorded in haul road	Recorded (scats); study area used at least for dispersal, potentially suitable foraging and denning habitat is present.
<i>Phascogale calura</i> Red-tailed Phascogale	EN (EPBC); CD (BC Act)	Possible in haul road	Possible; suitable habitat present.
<i>Notamacropus irma</i> Western Brush Wallaby	P4 (DBCA)	Possible in haul road	Possible; suitable habitat present, but viability dependent on habitat fragmentation and intensity of fox predation.
<i>Isoodon</i> sp. Bandicoot, likely new taxon related to Quenda <i>Isoodon fusciventer</i> (K. Travouillon pers. comm.)	Not assigned, equivalent to Priority at least (cf. Quenda P4)	Recorded in haul road	Unlikely; no suitable habitat present.

#### 4.4.3 Introduced fauna

Thirty-three records of introduced fauna were obtained across the study area, including three predator species (Table 4-9).

**Table 4-9 Introduced fauna recorded from the study area**

Species	Record evidence	Number of records
Dog ( <i>Canis familiaris</i> )	scats, tracks	6
Rabbit ( <i>Oryctolagus cuniculus</i> )	scats, foraging evidence	5
Cat ( <i>Felis catus</i> )	scats, tracks	12
Fox ( <i>Vulpes vulpes</i> )	burrow, carcass, scats, sighting	10

## 5 DISCUSSION

### 5.1 FLORA AND VEGETATION

Lot 1416 is adjacent to three nature reserves (unnamed) and has the potential to contain a high diversity of flora, as suggested by results of the database searches (see 4.1). From high-level sampling of 37 sites throughout the study area, 125 species were recorded representing 34 families and 71 genera; this result should be considered a small subset of the potential species diversity. Detailed sampling of each vegetation type in appropriate seasons is required to more completely capture the floral diversity.

The four significant flora species recorded in the surveys; *Acacia crenulata* P3, *Eutaxia lasiocalyx* P2, *Notisia intonsa* P3 and *Hydrocotyle corynophora* P1; are not known from the PRIOP or Proposal study areas. However, the study area has the potential to support a high number of significant flora species, including several taxa that will be impacted by PRIOP (Table 4-1; Table 4-2). Targeted surveys at an appropriate seasonal time would be required to confirm presence, location and numbers of these species.

### 5.2 TERRESTRIAL FAUNA

All broad habitat types and most individual sites assessed (55 of 66) were suitable habitat for Malleefowl foraging and breeding. A single old mound was located in the south of Lot 1416, and tracks at one location in the western reserve demonstrate that one or more individuals are resident in the study area. Due to the density of shrubland habitat in the study area, detectability of the birds and nest mounds by ground survey is low. The DBCA database identified numerous Malleefowl sightings along the Great Eastern Highway immediately adjacent to the study area up to 2011; the lack of more recent local records may be an artefact of lagging updates, so does not necessarily indicate a decline. The presence and persistence of the species within Lot 1416 is likely tied to the connectivity and habitat suitability of the adjacent reserves, road verges, and other strips of remnant vegetation in the landscape.

Similarly, the survey identified presence of Chuditch in the study area. While usage of the study area by the species cannot be confidently determined from the limited evidence to date, one of two possible scenarios may be inferred:

- a) the study area has a resident Chuditch population of unknown number which is foraging and breeding within the study area; or
- b) the study area provides supporting habitat for foraging/breeding which occurs within nearby patches, noting though the relative isolation of the site from other vegetation remnants.

DEC (2012) gives a very inclusive definition of habitat critical to Chuditch survival and maintenance of important populations, which includes areas of natural vegetation used by Chuditch to breed, forage, or move from one area to another. The natural vegetation of the study area forms one of the largest contiguous remnants within the Wheatbelt, but is well below the threshold size of 20,000 ha considered 'key' to survival (DEC 2012). There are very few records of Chuditch in recent decades within ~100 km, so the status of the population in this area is poorly known (e.g. relative to populations in Jarrah forest); if remnants below the threshold size are too exposed to introduced predators, they may be occupied intermittently but act as population sinks on longer timescales. Presence of foxes, in particular, is likely to reduce Chuditch occupation of the study area in several ways including direct conflict, scent-mediated avoidance, and competition for food and den sites (Glen *et al.* 2009).



A single nest consistent with *Camponotus* sp. nr *terebrans*, host ant for the Arid Bronze Azure Butterfly, was located during the survey, i.e. the ant appears to be uncommon in the study area (if actually present, as identity was not confirmed) and no large colonies were detected. The habitat is therefore considered currently unsuitable for the ABAB.

More broadly, Lot 1416 contains a range of fauna habitats (and therefore likely supports a diverse assemblage of ground-dwelling reptiles and mammals, and bird species) which should act to provide added protection from predators and increased foraging and reproductive opportunities for common and significant fauna species. Most of the fauna species recorded in the study area are also known from the PRIOP mine area and/or Proposal area (Appendix 5), indicating they represent generally similar habitats.

The large number of introduced fauna records from limited survey effort, indicates they are active within the study area and present a threat to native fauna, including Malleefowl and Chuditch, particularly predator species (cat, fox and dog).

### **5.3 CONSIDERATION OF INCLUSION OF LOT 1416 INTO CONSERVATION ESTATE**

MRL has received advice from DBCA (N. Smith, MRL, pers. comm., 11 November 2020) that Lot 1416 is a 'property of interest' for potential inclusion into the conservation estate. Further to this, DBCA has advised its strategic approach for additions to the conservation estate included the acquisition of lands:

- containing significant flora and fauna values
- containing communities and/or habitat that are not well represented in the reserve system
- those areas that contribute to better management outcomes for the existing reserves.

Based on this high-level assessment, Lot 1416 potentially meets all of the above criteria. The site potentially supports several significant flora species, as well as Threatened fauna species of relevance to PRIOP and the Proposal area (Chuditch and Malleefowl). The latter two species appear to be present in low numbers (or intermittently) in Lot 1416 and adjacent reserves, so that there is potential for resident populations to increase under favourable conditions of climatic variation or management actions such as control of introduced predators.

The vegetation associations of Lot 1416 have been heavily cleared, holding the status of Vulnerable at the bioregional and subregional scale, and are poorly represented in the reserve system. The Avon Wheatbelt bioregion is one of the most heavily modified bioregions in Australia, with a total vegetation loss of around 85%. Aside from the immediate impact of habitat destruction and modification, remnant vegetation suffers ongoing, longer term effects of fragmentation (Abensperg-Traun *et al.* 1996).

Lot 1416 is of particular importance in this regard because it connects the three adjacent conservation reserves, providing both a linkage between these and collectively (with the reserves) representing a large intact remnant within a heavily cleared landscape. Local fauna populations within the adjacent reserves are likely to be dependent on the fauna habitat and connectivity provided by Lot 1416. It also potentially has important value as a linkage between other reserves and remnants.

### **5.4 CONCLUSION AND RECOMMENDATIONS**

Based on the findings of this study, Lot 1416 potentially presents a suitable site to offset the significant residual impacts of the Proposal area. The site has potentially overlapping values to those that will be impacted by PRIOP and the Proposal area and appears suitable for inclusion into the conservation estate in accordance with DBCA's strategic criteria.

Lot 1416 and the surrounding reserves may be important to regional populations of some Threatened fauna species even if they currently occur in low numbers, particularly Malleefowl and Chuditch. Further targeted surveys (e.g. LiDAR and ground-truthing to identify Malleefowl mounds, detailed mapping and ground survey of rock outcrops potentially providing Chuditch den sites) and subsequent monitoring would assist in better defining the utilisation of the study area by these species.

Ongoing monitoring and management of introduced predator species is recommended to reduce this threat on the local Malleefowl and Chuditch population. This can be achieved in part by 1080 baiting and cat trapping.

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**Appendix 1**    **Flora survey site descriptions**

Site details			
Site	Site001	Position (WGS84)	-31.353586, 118.752356
Slope	negligible	Topography	plain
Soil colour	red-brown	Soil texture	sandy loam
Rock cover (%)	30	Rock type	granite bolders

Observation details - visit 1 (11 Mar 2020)			
Sample description	Tall open woodland of <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>		
Habitat	open woodland		
Disturbance	none		
Vegetation condition	Excellent	Fire age	not evident
Total veg. cover (%)	50	Tree cover (%)	30
Shrub cover (%)	20	Grass cover (%)	10
Herb cover (%)	5		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1	11-Mar-2020	unbounded	Andrew Perkins

Species (16)	Status	Cover (%)	Height (m)
<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>		30	10
<i>Santalum acuminatum</i>		10	2
<i>Alyxia buxifolia</i>		5	1.8
<i>Acacia erinacea</i>		5	0.4
<i>Olearia muelleri</i>		2	0.5
<i>Eremophila ionantha</i>		2	0.4
<i>Platysace trachymenioides</i>		2	0.4
<i>Thysanotus manglesianus</i>		1	0.9
<i>Dianella revoluta</i> var. <i>divaricata</i>		1	0.6
<i>Acacia hemiteles</i>		1	0.6
<i>Acacia merrallii</i>		1	0.4
<i>Enchylaena lanata</i>		1	0.4
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		1	0.2
<i>Waitzia acuminata</i> var. <i>acuminata</i>		1	0.1
<i>Podolepis capillaris</i>		1	0.1
<i>Sclerolaena diacantha</i>		1	0.1



Site details			
Site	Site002	Position (WGS84)	-31.365464, 118.757444
Slope	negligible	Topography	plain
Soil colour	red-orange, yellow	Soil texture	sandy loam
Rock cover (%)	0	Rock type	none

Observation details - visit 1 (12 Mar 2020)			
Sample description	Woodland with scattered emergent trees amongst mallee <i>Eucalyptus erythronema</i> , <i>Acacia erinacaea</i> and low isolated <i>Olearia muelleri</i> shrubs.		
Habitat	open woodland		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	Fire age	not evident
Total veg. cover (%)	50	Tree cover (%)	50
Shrub cover (%)	10	Grass cover (%)	1
Herb cover (%)	1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1	12-Mar-2020	unbounded	Andrew Perkins

Species (12)	Status	Cover (%)	Height (m)
<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i>		30	6
<i>Eucalyptus horistes</i>		10	7
<i>Eucalyptus salmonophloia</i>		5	15
<i>Acacia erinacea</i>		5	0.4
<i>Eucalyptus moderata</i>		3	12
<i>Melaleuca lateriflora</i>		2	3.1
<i>Olearia muelleri</i>		2	0.5
<i>Alyxia buxifolia</i>		1	2.2
<i>Eremophila ionantha</i>		1	1.4
<i>Acacia hemiteles</i>		1	1
<i>Acacia merrallii</i>		1	0.6
<i>Sclerolaena diacantha</i>		1	0.1

Site details			
Site	Site003	Position (WGS84)	-31.353303, 118.741131
Slope	negligible	Topography	plain
Soil colour	BLK	Soil texture	ALUV
Rock cover (%)	0	Rock type	none

Observation details - visit 1 (12 Mar 2020)			
Sample description	Isolated <i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i> over <i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i> and <i>A. spinosissima</i> dominant shrubland		
Habitat	shrubland		
Disturbance	none		
Vegetation condition	Excellent	Fire age	not evident
Total veg. cover (%)	80	Tree cover (%)	60
Shrub cover (%)	40	Grass cover (%)	10
Herb cover (%)	1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1	12-Mar-2020	unbounded	Andrew Perkins

Species (7)	Status	Cover (%)	Height (m)
<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>		25	3.5
<i>Allocasuarina spinosissima</i>		25	3
<i>Ecdeiocolea monostachya</i>		20	0.6
<i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i>		10	3.5
<i>Grevillea didymobotrya</i> subsp. <i>didymobotrya</i>		1	1.7
<i>Acacia acuminata</i>		1	1.5
<i>Dianella revoluta</i> var. <i>divaricata</i>		1	1

Site details			
Site	Site004	Position (WGS84)	-31.365833, 118.770847
Slope	negligible	Topography	plain
Soil colour	yellow, grey, whitish	Soil texture	sandy loam
Rock cover (%)	0	Rock type	none

Observation details - visit 1 (12 Mar 2020)			
Sample description	Tall <i>Eucalyptus erythronema</i> subsp. <i>erythronema</i> woodland over low open shrubs of <i>Acacia erinacea</i> and <i>Olearia muelleri</i> .		
Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	Fire age	not evident
Total veg. cover (%)	50	Tree cover (%)	45
Shrub cover (%)	15	Grass cover (%)	1
Herb cover (%)	1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1	12-Mar-2020	unbounded	Andrew Perkins

Species (17)	Status	Cover (%)	Height (m)
<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i>		35	5
<i>Acacia erinacea</i>		10	0.8
<i>Enchylaena lanata</i>		10	0.5
<i>Eucalyptus salmonophloia</i>		5	18
<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>		5	12
<i>Melaleuca lateriflora</i>		5	3
<i>Acacia hemiteles</i>		2	1.6
<i>Phebalium tuberculosum</i>		2	1.1
<i>Acacia merrallii</i>		2	0.6
<i>Olearia muelleri</i>		2	0.5
<i>Cassyltha melantha</i>		1	2.5
<i>Melaleuca hamata</i>		1	1.9
<i>Eremophila ionantha</i>		1	1.5
<i>Austrostipa</i>		1	0.7
<i>Westringia cephalantha</i>		1	0.4
<i>Sclerolaena diacantha</i>		1	0.1
<i>Waitzia acuminata</i> var. <i>acuminata</i>		1	0.1

Site details			
Site	Site005	Position (WGS84)	-31.370178, 118.760222
Slope	negligible	Topography	plain
Soil colour	yellow, grey	Soil texture	sandy loam
Rock cover (%)	0	Rock type	none

Observation details - visit 1 (18 Mar 2020)			
Sample description	<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i> woodland over tall <i>Melaleuca lateriflora</i> shrubs over low open <i>Olearia muelleri</i> and <i>Acacia hemiteles</i> shrubland		
Habitat	mallee woodland		
Disturbance	none		
Vegetation condition	Excellent	Fire age	not evident
Total veg. cover (%)	60	Tree cover (%)	50
Shrub cover (%)	15	Grass cover (%)	5
Herb cover (%)	1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1	18-Mar-2020	unbounded	Andrew Perkins

Species (11)	Status	Cover (%)	Height (m)
<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i>		40	8
<i>Eucalyptus moderata</i>		10	13
<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>		10	12
<i>Eucalyptus subangusta</i> subsp. <i>cerina</i>		10	4.5
<i>Melaleuca lateriflora</i>		3	2.5
<i>Olearia muelleri</i>		2	0.5
<i>Acacia hemiteles</i>		1	1.5
<i>Dianella revoluta</i> var. <i>divaricata</i>		1	0.9
<i>Westringia cephalantha</i>		1	0.5
<i>Austrostipa</i>		1	0.5
<i>Waitzia acuminata</i> var. <i>acuminata</i>		1	0.1



Site details			
Site	Site006	Position (WGS84)	-31.354806, 118.755083
Slope	negligible	Topography	plain
Soil colour	yellow, grey, whitish	Soil texture	sandy loam
Rock cover (%)	20	Rock type	granite rocks

Observation details - visit 1 (19 Mar 2020)			
Sample description	Woodland of <i>Eucalyptus erythronema</i> subsp. <i>erythronema</i> and <i>Eucalyptus loxophleba</i> subsp. <i>Lissophloia</i> over <i>Eremophila granitica</i> and <i>Melaleuca lateriflora</i> shrubs		
Habitat	mallee woodland		
Disturbance	none		
Vegetation condition	Excellent	Fire age	not evident
Total veg. cover (%)	70	Tree cover (%)	40
Shrub cover (%)	20	Grass cover (%)	10
Herb cover (%)	5		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1	19-Mar-2020	unbounded	Andrew Perkins

Species (21)	Status	Cover (%)	Height (m)
<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i>		30	8
<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>		15	10
<i>Eremophila granitica</i>		5	1.8
<i>Triodia</i> sp.		5	0.5
<i>Borya constricta</i>		5	0.1
<i>Melaleuca lateriflora</i>		2	2.5
<i>Eucalyptus flocktoniae</i>		1	5
<i>Santalum acuminatum</i>		1	3.5
<i>Acacia crenulata</i>	P3 (DBCA list)	1	3.5
<i>Acacia colletioides</i>		1	2.5
<i>Melaleuca hamata</i>		1	1.9
<i>Alyxia buxifolia</i>		1	1.8
<i>Eremophila ionantha</i>		1	1.5
<i>Phebalium tuberculosum</i>		1	1.3
<i>Dianella revoluta</i> var. <i>divaricata</i>		1	1
<i>Acacia hemiteles</i>		1	0.9
<i>Thysanotus manglesianus</i>		1	0.7
<i>Platysace trachymenioides</i>		1	0.5
<i>Austrostipa</i>		1	0.4
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		1	0.3
<i>Waitzia acuminata</i> var. <i>acuminata</i>		1	0.1

Site details			
Site	Site007	Position (WGS84)	-31.3575734, 118.755542
Slope	negligible	Topography	plain
Soil colour	yellow, grey	Soil texture	sand, laterite
Rock cover (%)	5	Rock type	laterite

Observation details - visit 1 ( )			
Sample description	Tall <i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i> shrubland with an occasional <i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i> over <i>Grevillea paradoxa</i> and <i>Grevillea didymobotrya</i> subsp. <i>didymobotrya</i> .		
Habitat	shrubland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	60	Tree cover (%)	40
Shrub cover (%)	19	Grass cover (%)	1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (10)	Status	Cover (%)	Height (m)
<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>		25	4.5
<i>Allocasuarina spinosissima</i>		15	3
<i>Baeckea elderiana</i>		5	2
<i>Grevillea paradoxa</i>		5	1.6
<i>Grevillea didymobotrya</i> subsp. <i>didymobotrya</i>		3	2.2
<i>Thryptomene kochii</i>		2.5	1.8
<i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i>		1	3.5
<i>Calothamnus gilesii</i>		0.5	1.5
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		0.5	0.3
<i>Borya constricta</i>		0.2	0.1

Site details			
Site	Site008	Position (WGS84)	-31.368357, 118.744386
Slope	gentle	Topography	plain
Soil colour	yellow	Soil texture	sand, laterite
Rock cover (%)	1	Rock type	laterite

Observation details - visit 1 ( )			
Sample description	<i>Allocasuarina corniculata</i> shrubland with a mix of <i>Acacia beauverdiana</i> , <i>Thyrsptomene kochii</i> , <i>Hakea meisneriana</i> over <i>Comesperma spinosum</i> , <i>Schoenus hexandrus</i> , and <i>Melaleuca conothamnoides</i> .		
Habitat	shrubland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	55	Tree cover (%)	30
Shrub cover (%)	20	Grass cover (%)	5
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (9)	Status	Cover (%)	Height (m)
<i>Allocasuarina corniculata</i>		15	2.5
<i>Thryptomene kochii</i>		10	1.4
<i>Melaleuca conothamnoides</i>		2	0.9
<i>Hakea meisneriana</i>		1	2.8
<i>Schoenus hexandrus</i>		1	0.3
<i>Euryomyrtus maidenii</i>		0.5	0.5
<i>Comesperma spinosum</i>		0.5	0.3
<i>Acacia beauverdiana</i>		0.5	
<i>Microcybe ambigua</i>		0.2	0.6

Site details			
Site	Site009	Position (WGS84)	-31.36889808, 118.7377635
Slope	negligible	Topography	plain
Soil colour	yellow, whitish	Soil texture	sand
Rock cover (%)	0	Rock type	None

Observation details - visit 1 ( )			
Sample description	Open 'grasslands' of <i>Ecdiceolea monostachya</i> , with scattered <i>Eucalytus rigidula</i> and <i>E. leptopoda</i> subsp. <i>leptopoda</i> and small shrubs of <i>Melaleuca calyptroides</i> over <i>Lepidosperma sanguinolentum</i> .		
Habitat	grassland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	45	Tree cover (%)	2
Shrub cover (%)	2	Grass cover (%)	40
Herb cover (%)	1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (10)	Status	Cover (%)	Height (m)
<i>Ecdeiocolea monostachya</i>		33	0.5
<i>Melaleuca calyptroides</i>		10	0.8
<i>Lepidosperma sanguinolentum</i>		3	0.7
<i>Eucalyptus rigidula</i>		1	3.5
<i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i>		1	3.5
<i>Melaleuca vinnula</i>		1	2.5
<i>Borya constricta</i>		1	0.1
<i>Schoenus calcatus</i>	Range extension	0.5	0.05
<i>Acacia dielsii</i>		0.3	1
<i>Lepidobolus preissianus</i> subsp. <i>volubilis</i>		0.2	0.1



Site details			
Site	Site010	Position (WGS84)	-31.372262, 118.716545
Slope	gentle	Topography	plain
Soil colour	grey, whitish, light-brown	Soil texture	sand, loamy sand
Rock cover (%)	0	Rock type	none

Observation details - visit 1 ( )			
Sample description	Mixed open Eucalyptus woodland of <i>Eucalyptus capillosa</i> , <i>E. salubris</i> and <i>E. salmonophloia</i> , all with a patchy understory of mallees. <i>Melaleuca pauperifolia</i> subsp. <i>fastiagata</i> also present.		
Habitat	woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	40	Tree cover (%)	30
Shrub cover (%)	5	Grass cover (%)	5
Herb cover (%)	0.5		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (19)	Status	Cover (%)	Height (m)
<i>Eucalyptus capillosa</i>		7.5	18
<i>Eucalyptus tephroclada</i>		7	6
<i>Eucalyptus sheathiana</i>		7	6
<i>Eucalyptus salmonophloia</i>		6	18
<i>Eucalyptus salubris</i>		6	12
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		5	0.2
<i>Olearia muelleri</i>		2.5	0.6
<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i>		1	8
<i>Eucalyptus yilgarnensis</i>		1	6
<i>Exocarpos aphyllus</i>		1	1
<i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i>		0.5	3
<i>Santalum acuminatum</i>		0.5	2.5
<i>Alyxia buxifolia</i>		0.5	2
<i>Acacia hemiteles</i>		0.5	0.8
<i>Lomandra effusa</i>		0.5	0.3
<i>Waitzia acuminata</i> var. <i>acuminata</i>		0.3	0.1
<i>Acacia ancistrophylla</i>		0.2	0.8
<i>Acacia erinacea</i>		0.2	0.7
<i>Monachather paradoxus</i>		0.2	0.3

Site details			
Site	Site011A	Position (WGS84)	-31.37124846, 118.7252453
Slope	gentle	Topography	plain
Soil colour	yellow, orange	Soil texture	sand, laterite
Rock cover (%)	1	Rock type	laterite

Observation details - visit 1 ( )			
Sample description	Tall <i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i> shrubland over shrubs of <i>Thryptomene kochii</i> , <i>Baeckea elderiana</i> , <i>Grevillea paradoxa</i> and <i>Amphipogon caricinus</i> var. <i>caricinus</i> .		
Habitat	shrubland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	66	Tree cover (%)	40
Shrub cover (%)	15	Grass cover (%)	1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (7)	Status	Cover (%)	Height (m)
<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>		25	4
<i>Baeckea elderiana</i>		5	2.5
<i>Thryptomene kochii</i>		3	2
<i>Grevillea paradoxa</i>		2.5	2.2
<i>Melaleuca conothamnoides</i>		0.5	0.8
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		0.5	0.2
<i>Acacia neurophylla</i> subsp. <i>erugata</i>		0.3	3

Site details			
Site	Site011B	Position (WGS84)	-31.3716, 118.7242
Slope	gentle	Topography	breakaway
Soil colour	grey, white	Soil texture	sand, rocks
Rock cover (%)	20	Rock type	calcrete, sandstone

Observation details - visit 1 ( )			
Sample description	Whitish calcareous and sandy conglomerates breakaway with open <i>Eucalyptus capillosa</i> woodland, with fringing <i>Callitris columellaris</i> over shrubby <i>Acacia crenulata</i> and <i>Gastrolobium</i> aff. <i>floribundum</i> .		
Habitat	open woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	35	Tree cover (%)	20
Shrub cover (%)	5	Grass cover (%)	4
Herb cover (%)	1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (7)	Status	Cover (%)	Height (m)
<i>Eucalyptus capillosa</i>		15	15
<i>Callitris columellaris</i>		7.5	5
<i>Gastrolobium aff. floribundum</i>		2	1.3
<i>Styphelia serratifolia</i>		2	1
<i>Acacia crenulata</i>	P3 (DBCA list)	1.5	1.9
<i>Phebalium tuberculosum</i>		1	1.4
<i>Amphipogon caricinus var. caricinus</i>		0.5	0.2

Site details			
Site	Site012	Position (WGS84)	-31.360297, 118.811575
Slope	gentle	Topography	plain
Soil colour	red-brown	Soil texture	loam
Rock cover (%)	3	Rock type	quartz, siltstone / mudstone

Observation details - visit 1 ( )			
Sample description	<i>Eucalyptus salmonophloia</i> dominant open woodland, over <i>Pittosporum angustifolium</i> , <i>Santalum acuminatum</i> , over <i>Atriplex vesicaria</i> , <i>Acacia erinacea</i> & <i>Olearia muelleri</i> .		
Habitat	woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	30	Tree cover (%)	20
Shrub cover (%)	5	Grass cover (%)	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (10)	Status	Cover (%)	Height (m)
<i>Eucalyptus salmonophloia</i>		15	22
<i>Atriplex vesicaria</i>		8	0.8
<i>Pittosporum angustifolium</i>		7	3
<i>Santalum acuminatum</i>		2	2.5
<i>Acacia erinacea</i>		2	1.2
<i>Austrostipa elegantissima</i>		0.5	0.7
<i>Senna artemisioides</i> subsp. <i>filifolia</i>		0.3	0.9
<i>Rhagodia preissii</i> subsp. <i>preissii</i>		0.2	0.6
<i>Olearia muelleri</i>		0.2	0.5
<i>Sclerolaena diacantha</i>		0.2	0.1



Site details			
Site	Site013	Position (WGS84)	-31.35366708, 118.8236505
Slope	gentle	Topography	plain
Soil colour	red-brown	Soil texture	clay loam
Rock cover (%)	5	Rock type	basalt

Observation details - visit 1 ( )			
Sample description	Herbland on soft crumbly red brown loam. Small basalt rocks scattered on soil surface. A mixture of annual grasses, <i>Goodeniaceae</i> , <i>Fabaceae</i> & <i>Asteraceae</i> .		
Habitat	herbland / forbland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	15	Tree cover (%)	0
Shrub cover (%)	0	Grass cover (%)	8
Herb cover (%)	7		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (8)	Status	Cover (%)	Height (m)
<i>*Bromus rubens</i>	Weed	13	0.2
<i>Notisia intonsa</i>	P3 (DBCA list)	1	0.05
<i>*Lysimachia arvensis</i>	Weed	0.5	0.1
<i>*Medicago minima</i>	Weed	0.5	0.05
<i>*Centaurea melitensis</i>	Weed	0.4	0.3
<i>Asteridea athrixioides</i>		0.3	0.1
<i>Erodium cygnorum</i>		0.2	0.05
<i>Hydrocotyle corynophora</i>	Range extension	0.1	0.1

Site details			
Site	Site014	Position (WGS84)	-31.36231766, 118.7967193
Slope	gentle	Topography	plain
Soil colour	red-brown	Soil texture	clay loam, loam
Rock cover (%)	3	Rock type	quartz

Observation details - visit 1 ( )			
Sample description	Mixed open woodland with open areas of dark red brown loam soil. Trees consists of <i>Eucalyptus longicornis</i> , <i>Eucalyptus salubris</i> , <i>Eucalyptus salmonophloia</i> , over <i>Santalum acuminatum</i> and <i>Pittosporum angustifolium</i> .		
Habitat	open woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	30	Tree cover (%)	15
Shrub cover (%)	15	Grass cover (%)	0.1
Herb cover (%)	0.5		

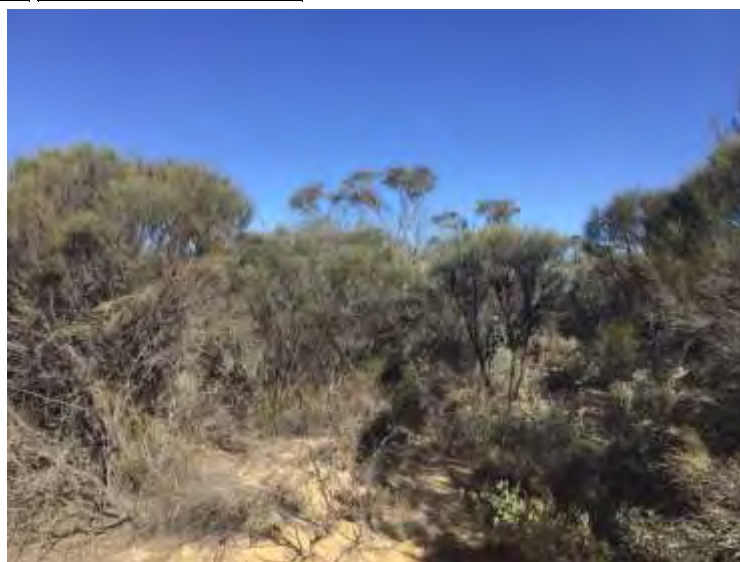


Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (14)	Status	Cover (%)	Height (m)
<i>Eucalyptus longicornis</i>		7.5	25
<i>Eucalyptus salubris</i>		7.5	15
<i>Templetonia ceracea</i>		6	1
<i>Eucalyptus salmonophloia</i>		5	20
<i>Santalum acuminatum</i>		3	2.5
<i>Atriplex vesicaria</i>		3	0.7
<i>Pittosporum angustifolium</i>		1.5	2
<i>Eucalyptus yilgarnensis</i>		0.5	6
<i>Austrostipa elegantissima</i>		0.5	0.6
<i>Haloragis trigonocarpa</i>		0.3	0.1
<i>Ptilotus exaltatus</i>		0.2	0.2
<i>Daucus glochidiatus</i>		0.2	0.2
<i>Sclerolaena diacantha</i>		0.2	0.1
<i>Hydrocotyle corynophora</i>	Range extension	0.1	0.1

Site details			
Site	Site016	Position (WGS84)	-31.36530837, 118.7823615
Slope	negligible	Topography	plain
Soil colour	yellow, whitish	Soil texture	sand
Rock cover (%)	0	Rock type	None

Observation details - visit 1 ( )			
Sample description	A mixed shrubland with <i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i> , <i>A. spinosissima</i> , <i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i> , <i>E. burracoppinensis</i> , over shrubs of <i>Hakea erecta</i> , and <i>Melaleuca conothamnoides</i> .		
Habitat	shrubland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	60	Tree cover (%)	40
Shrub cover (%)	19	Grass cover (%)	1
Herb cover (%)	0.1		

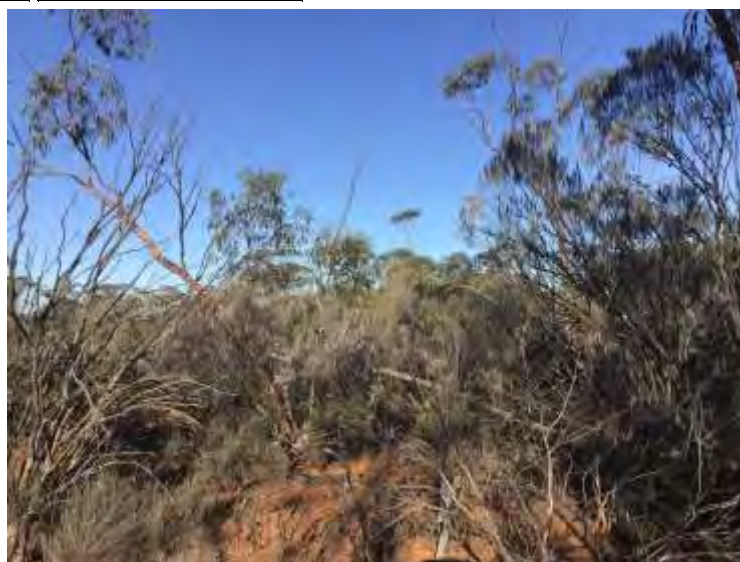


Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (11)	Status	Cover (%)	Height (m)
<i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i>		10	5
<i>Eucalyptus burracoppinensis</i>		10	5
<i>Allocasuarina spinosissima</i>		7.5	3
<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>		7.5	3
<i>Melaleuca conothamnoides</i>		7	0.6
<i>Hakea erecta</i>		3	2.8
<i>Schoenus hexandrus</i>		2	0.2
<i>Lepidosperma sanguinolentum</i>		0.5	0.6
<i>Drummondita hassellii</i>		0.5	0.6
<i>Euryomyrtus maidenii</i>		0.5	0.4
<i>Lepidosperma</i> sp. <i>Bandalup Scabrid</i> (N. Eveleigh 10798)		0.4	0.5

Site details			
Site	Site018	Position (WGS84)	-31.369651, 118.821019
Slope	negligible	Topography	plain
Soil colour	red-brown	Soil texture	loam, rocks
Rock cover (%)	20	Rock type	laterite

Observation details - visit 1 ( )			
Sample description	Mixed mallee woodland with <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> , <i>Allocasuarina campestris</i> and <i>Acacia acuminata</i> , over shrubs of <i>Hibbertia stowardii</i> , over <i>Amphipogon caricinus</i> var. <i>caricinus</i> .		
Habitat	mallee woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	40	Tree cover (%)	20
Shrub cover (%)	20	Grass cover (%)	0.5
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (5)	Status	Cover (%)	Height (m)
<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>		15	6
<i>Allocasuarina campestris</i>		15	3
<i>Hibbertia stowardii</i>		15	1.3
<i>Acacia acuminata</i>		1	3
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		0.5	0.2



Site details			
Site	Site020A	Position (WGS84)	-31.34646102, 118.790439
Slope	negligible	Topography	plain
Soil colour	yellow, whitish	Soil texture	sand, laterite
Rock cover (%)	1	Rock type	laterite

Observation details - visit 1 ( )			
Sample description	<i>Allocasuarina corniculata</i> & <i>Acacia beauverdiana</i> shrubland with occasional <i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i> , over <i>Grevillea paradoxa</i> , <i>Melaleuca conothamnoides</i> and <i>Euryomyrtus maidenii</i> .		
Habitat	shrubland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	60	Tree cover (%)	50
Shrub cover (%)	8	Grass cover (%)	1
Herb cover (%)	1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (12)	Status	Cover (%)	Height (m)
<i>Allocasuarina corniculata</i>		25	3.5
<i>Acacia beauverdiana</i>		15	4
<i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i>		5	5
<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>		5	3
<i>Grevillea paradoxa</i>		3	2
<i>Melaleuca conothamnoides</i>		3	0.7
<i>Euryomyrtus maidenii</i>		3	0.6
<i>Grevillea didymobotrya</i> subsp. <i>didymobotrya</i>		1	2
<i>Drummondita hassellii</i>		1	0.6
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		1	0.3
<i>Styphelia hamulosa</i>		0.5	0.9
<i>Thryptomene kochii</i>		0.3	1.5

Site details			
Site	Site021A	Position (WGS84)	-31.35578002, 118.822
Slope	gentle	Topography	plain
Soil colour	red-brown	Soil texture	clay loam, loam
Rock cover (%)	3	Rock type	quartz

Observation details - visit 1 ( )			
Sample description	<i>Eucalyptus salubris</i> dominant woodland over shrubs of <i>Grevillea acuaris</i> , <i>Acacia eriantha</i> , <i>Santalum acuminatum</i> , <i>Eremophila ionantha</i> & <i>Exocarpus aphyllus</i> , over <i>Austrostipa elegantissima</i> .		
Habitat	woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	45	Tree cover (%)	40
Shrub cover (%)	5	Grass cover (%)	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (14)	Status	Cover (%)	Height (m)
<i>Eucalyptus salubris</i>		35	11
<i>Eucalyptus yilgarnensis</i>		5	7
<i>Grevillea acuaria</i>		5	1
<i>Santalum acuminatum</i>		0.5	2.5
<i>Exocarpos aphyllus</i>		0.3	4
<i>Olearia muelleri</i>		0.3	0.6
<i>Daucus glochidiatus</i>		0.3	0.2
<i>Acacia erinacea</i>		0.2	1.3
<i>Eremophila ionantha</i>		0.2	0.9
<i>Eremophila decipiens</i> subsp. <i>decipiens</i>		0.2	0.6
<i>Austrostipa elegantissima</i>		0.2	0.5
<i>Acacia merrallii</i>		0.2	0.5
<i>Sclerolaena diacantha</i>		0.2	0.2
<i>Asteridea atrixioides</i>		0.1	0.1

Site details			
Site	Site-AP001	Position (WGS84)	-31.34828098, 118.824069
Slope	gentle	Topography	hill top
Soil colour	brown	Soil texture	clay loam, rocks
Rock cover (%)	5	Rock type	quartz, siltstone / mudstone

Observation details - visit 1 ( )			
Sample description	Open <i>Eucalyptus aequioptera</i> woodland with scattered low shrubs of <i>Olearia muelleri</i> and <i>Maireana trichoptera</i> and <i>Austrostipa elegantissima</i> .		
Habitat	open woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	30	Tree cover (%)	28
Shrub cover (%)	1	Grass cover (%)	0.5
Herb cover (%)	0.5		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (10)	Status	Cover (%)	Height (m)
<i>Eucalyptus aequioperta</i>		29	16
<i>Olearia muelleri</i>		0.5	0.5
<i>Austrostipa nitida</i>		0.5	0.5
<i>Maireana trichoptera</i>		0.3	0.2
<i>Senna artemisioides</i> subsp. <i>filifolia</i>		0.2	0.6
<i>Austrostipa elegantissima</i>		0.2	0.5
<i>Roepora apiculata</i>		0.2	0.3
* <i>Bromus rubens</i>	Weed	0.2	0.2
<i>Daucus glochidiatus</i>		0.2	0.2
<i>Scaevola spinescens</i>		0.1	0.4

Site details			
Site	Site-AP002	Position (WGS84)	-31.35719396, 118.810371
Slope	negligible	Topography	plain
Soil colour	red-brown, red-orange	Soil texture	clay loam, loam
Rock cover (%)	3	Rock type	quartz

Observation details - visit 1 ( )			
Sample description	Open woodland dominated by <i>Euclyptus yilgarnensis</i> , mixed with scattered <i>Eucalyptus salmonophloia</i> , over <i>Grevillea actuaria</i> , <i>Eremophila decipiens</i> subsp. <i>decipiens</i> , and <i>Acacia eriancea</i> .		
Habitat	woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	40	Tree cover (%)	35
Shrub cover (%)	5	Grass cover (%)	0.2
Herb cover (%)	0.2		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (11)	Status	Cover (%)	Height (m)
<i>Eucalyptus yilgarnensis</i>		25	0.9
<i>Eucalyptus salmonophloia</i>		10	12
<i>Grevillea acuaria</i>		5	0.7
<i>Santalum acuminatum</i>		0.3	2.8
<i>Acacia erinacea</i>		0.3	1
<i>Olearia muelleri</i>		0.3	0.6
<i>Sclerolaena diacantha</i>		0.3	0.2
<i>Eremophila decipiens</i> subsp. <i>decipiens</i>		0.2	0.8
<i>Atriplex vesicaria</i>		0.2	0.6
<i>Daucus glochidiatus</i>		0.2	0.2
<i>Exocarpos aphyllus</i>		0.1	1



Site details			
Site	Site-AP004	Position (WGS84)	-31.348716, 118.79191
Slope	negligible	Topography	plain
Soil colour	red-brown, light-brown	Soil texture	sandy loam, rocks
Rock cover (%)	3	Rock type	quartz

Observation details - visit 1 ( )			
Sample description	Mixed open woodland with trees of <i>Eucalyptus salmonophloia</i> , <i>Eucalyptus capillosa</i> , <i>Eucalyptus erythronema</i> subsp. <i>erythronema</i> , over <i>Melaleuca pauperifolia</i> subsp. <i>fastigiata</i> and <i>Santalum acuminatum</i> .		
Habitat	open woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	35	Tree cover (%)	30
Shrub cover (%)	5	Grass cover (%)	0.5
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (12)	Status	Cover (%)	Height (m)
<i>Eucalyptus salmonophloia</i>		10	20
<i>Eucalyptus capillosa</i>		10	15
<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i>		8	5
<i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i>		3	4
<i>Acacia crenulata</i>	P3 (DBCA list)	2	3.5
<i>Santalum acuminatum</i>		1	3.8
<i>Acacia hemiteles</i>		0.5	1
<i>Phebalium filifolium</i>		0.5	0.9
<i>Olearia muelleri</i>		0.5	0.6
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		0.3	0.3
<i>Acacia erinacea</i>		0.2	0.7
<i>Acacia merrallii</i>		0.2	0.6

Site details			
Site	Site-AP005	Position (WGS84)	-31.36309097, 118.812442
Slope	gentle	Topography	plain
Soil colour	red-brown	Soil texture	loam
Rock cover (%)	2	Rock type	quartz

Observation details - visit 1 ( )			
Sample description	<i>Eucalyptus salubris</i> dominant open woodland, over <i>Santalum acuminatum</i> , <i>Acacia merrallii</i> , <i>Olearia muelleri</i> , over scattered <i>Sclerolaena diacantha</i> .		
Habitat	open woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	50	Tree cover (%)	45
Shrub cover (%)	5	Grass cover (%)	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (9)	Status	Cover (%)	Height (m)
<i>Eucalyptus salubris</i>		35	12
<i>Olearia muelleri</i>		10	0.8
<i>Santalum acuminatum</i>		3	3
<i>Acacia merrallii</i>		2	0.6
<i>Sclerolaena diacantha</i>		2	0.1
<i>Acacia erinacea</i>		0.2	0.7
<i>Rhagodia preissii</i> subsp. <i>preissii</i>		0.2	0.6
<i>Austrostipa elegantissima</i>		0.2	0.5
<i>Atriplex vesicaria</i>		0.2	0.5

Site details			
Site	Site-AP006	Position (WGS84)	-31.36122901, 118.80597
Slope	gentle	Topography	plain
Soil colour	red-brown, red-orange	Soil texture	clay loam
Rock cover (%)	1	Rock type	quartz, siltstone / mudstone

Observation details - visit 1 ( )			
Sample description	Open winter annual herbland on soft red brown clay loam soil, dominated by * <i>Bromus rubens</i> , <i>Halogoris trigonocarpa</i> , <i>Ptilotus exaltatus</i> & <i>Stellaria filiformis</i> .		
Habitat	herbland / forbland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	15	Tree cover (%)	0
Shrub cover (%)	0.1	Grass cover (%)	10
Herb cover (%)	5		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (11)	Status	Cover (%)	Height (m)
<i>*Bromus rubens</i>	Weed	10	0.1
<i>Haloragis trigonocarpa</i>		2	0.1
<i>*Medicago minima</i>	Weed	1	0.05
<i>Stellaria filiformis</i>		1	0.05
<i>Asteridea athrixioides</i>		0.5	0.1
<i>Aristida holathera</i> var. <i>holathera</i>		0.2	0.5
<i>Ptilotus exaltatus</i>		0.2	0.4
<i>Rytidosperma caespitosum</i>		0.2	0.3
<i>*Centaurea melitensis</i>	Weed	0.2	0.2
<i>Notisia intonsa</i>	P3 (DBCA list)	0.2	0.05
<i>Hydrocotyle corynophora</i>	Range extension	0.1	0.1

Site details			
Site	Site-AP007	Position (WGS84)	-31.36152598, 118.805999
Slope	gentle	Topography	plain
Soil colour	red-brown	Soil texture	loam
Rock cover (%)	4	Rock type	quartz

Observation details - visit 1 ( )			
Sample description	Open mallee/mallet woodland dominated by <i>Eucalyptus yilgarnensis</i> with the occasional <i>Eucalyptus salmonophloia</i> , over <i>Acacia hemiteles</i> , <i>Acacia merrallii</i> , and <i>Eremophila decipiens</i> subsp. <i>decipiens</i> .		
Habitat	mallee woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	30	Tree cover (%)	25
Shrub cover (%)	5	Grass cover (%)	0.5
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (11)	Status	Cover (%)	Height (m)
<i>Eucalyptus yilgarnensis</i>		20	12
<i>Eucalyptus salmonophloia</i>		5	16
<i>Acacia hemiteles</i>		3	1.9
<i>Acacia merrallii</i>		2	0.7
<i>Acacia erinacea</i>		0.5	1
<i>Austrostipa elegantissima</i>		0.5	0.6
<i>Rytidosperma caespitosum</i>		0.3	0.3
<i>Sclerolaena diacantha</i>		0.3	0.1
<i>Eremophila decipiens</i> subsp. <i>decipiens</i>		0.2	1
<i>Daucus glochidiatus</i>		0.2	0.2
<i>Ptilotus exaltatus</i>		0.2	0.1



Site details			
Site	Site-AP008	Position (WGS84)	-31.367662, 118.7702
Slope	gentle	Topography	plain
Soil colour	grey, whitish, light-brown	Soil texture	sand, loamy sand
Rock cover (%)	2	Rock type	laterite

Observation details - visit 1 ( )			
Sample description	Mixed eucalyptus woodland with emergent trees of mostly <i>Eucalyptus salmonophloia</i> and occasional <i>Eucalyptus tephroclada</i> , with a dominant mallee understory of <i>Eucalyptus sheathiana</i> , over the occasional <i>Grevillea huegelii</i> .		
Habitat	woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	45	Tree cover (%)	40
Shrub cover (%)	5	Grass cover (%)	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (10)	Status	Cover (%)	Height (m)
<i>Eucalyptus sheathiana</i>		25	5
<i>Eucalyptus salmonophloia</i>		10	20
<i>Olearia muelleri</i>		3	0.6
<i>Eucalyptus tephroclada</i>		2.5	4
<i>Acacia merrallii</i>		1.5	1
<i>Grevillea huegelii</i>		1	1.6
<i>Phebalium filifolium</i>		0.5	1
<i>Acacia colletioides</i>		0.2	2.4
<i>Acacia erinacea</i>		0.2	0.8
<i>Alyxia buxifolia</i>		0.1	1

Site details			
Site	Site-AP009	Position (WGS84)	-31.37820404, 118.729003
Slope	negligible	Topography	plain
Soil colour	whitish, brown-grey, light-brown	Soil texture	sandy clay, sandy loam
Rock cover (%)	0	Rock type	None

Observation details - visit 1 ( )			
Sample description	Open woodland with <i>Eucalyptus salubris</i> & <i>Eucalyptus salmonophloia</i> as the emergents, over dense clump of <i>Melaleuca pauperifolia</i> subsp. <i>fastiagata</i> , over scattered shrubs of <i>Santalum acuminatum</i> .		
Habitat	woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	40	Tree cover (%)	35
Shrub cover (%)	5	Grass cover (%)	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (16)	Status	Cover (%)	Height (m)
<i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i>		15	4
<i>Eucalyptus salmonophloia</i>		12.5	18
<i>Eucalyptus salubris</i>		12.5	15
<i>Acacia ancistrophylla</i>		5	1
<i>Olearia muelleri</i>		2.5	0.6
<i>Santalum acuminatum</i>		2	2.5
<i>Templetonia ceracea</i>		1.5	0.7
<i>Exocarpos aphyllus</i>		1	3
* <i>Lysimachia arvensis</i>	Weed	0.3	1.5
<i>Austrostipa elegantissima</i>		0.25	0.7
<i>Acacia hemiteles</i>		0.2	0.8
<i>Acacia erinacea</i>		0.2	0.6
<i>Rytidosperma caespitosum</i>		0.2	0.2
<i>Sclerolaena diacantha</i>		0.2	0.1
<i>Maireana trichoptera</i>		0.2	0.1
<i>Atriplex vesicaria</i>		0.1	0.7

Site details			
Site	Site-AP010	Position (WGS84)	-31.379042, 118.797921
Slope	negligible	Topography	plain
Soil colour	yellow, light-brown	Soil texture	sand, loamy sand
Rock cover (%)	1	Rock type	laterite, None

Observation details - visit 1 ( )			
Sample description	<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i> dominant shrubland with scattered mallee of <i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i> and <i>Hakea multilineata</i> , over <i>Thryptomene kochii</i> and <i>Melaleuca hamata</i> .		
Habitat	shrubland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	75	Tree cover (%)	30
Shrub cover (%)	40	Grass cover (%)	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (10)	Status	Cover (%)	Height (m)
<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>		50	3.5
<i>Thryptomene kochii</i>		15	1.9
<i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i>		5	4.5
<i>Hakea multilineata</i>		5	4
<i>Allocasuarina corniculata</i>		5	2.5
<i>Grevillea paradoxa</i>		2	1.8
<i>Melaleuca hamata</i>		1	1.8
<i>Melaleuca conothamnoides</i>		1	0.6
<i>Euryomyrtus maidenii</i>		1	0.5
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		0.5	0.2

Site details			
Site	Site-AP011	Position (WGS84)	-31.37982602, 118.78915
Slope	negligible	Topography	plain
Soil colour	yellow, grey, whitish	Soil texture	sand
Rock cover (%)	0	Rock type	none

Observation details - visit 1 ( )			
Sample description	<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i> shrubland with scattered mallee of <i>Eucalyptus burracopinensis</i> , over shrubs of <i>Hakea multilineata</i> , <i>Melaleuca conothamnoides</i> , <i>Schoenus hexandrus</i> , and <i>Phebalium filifolium</i> .		
Habitat	shrubland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	60	Tree cover (%)	40
Shrub cover (%)	20	Grass cover (%)	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (14)	Status	Cover (%)	Height (m)
<i>Allocasuarina spinosissima</i>		20	3
<i>Eucalyptus burracoppinensis</i>		10	3.5
<i>Melaleuca conothamnoides</i>		10	0.6
<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>		5	3
<i>Allocasuarina corniculata</i>		5	2.5
<i>Hakea multilineata</i>		2.5	3.5
<i>Hakea erecta</i>		2.5	2
<i>Schoenus hexandrus</i>		2.2	0.2
<i>Lepidosperma sanguinolentum</i>		2	0.7
<i>Comesperma spinosum</i>		1	0.2
<i>Styphelia serratifolia</i>		0.7	
<i>Phebalium filifolium</i>		0.5	0.6
<i>Schoenus calcatus</i>	Range extension	0.3	0.05
<i>Santalum acuminatum</i>		0.2	1.8



Site details			
Site	Site-AP012	Position (WGS84)	-31.38060302, 118.782991
Slope	negligible	Topography	plain
Soil colour	yellow, light-brown	Soil texture	sand, sandy loam
Rock cover (%)	0	Rock type	None

Observation details - visit 1 ( )			
Sample description	'Grassland' dominated by <i>Ecdiocola monostachya</i> , in association with small shrubs of <i>Melaleuca conothamnoides</i> , <i>Lepidosperma sanguinolentum</i> , <i>Schoenus hexandra</i> , and scattered shrubs of <i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i> .		
Habitat	grassland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	50	Tree cover (%)	5
Shrub cover (%)	15	Grass cover (%)	30
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (14)	Status	Cover (%)	Height (m)
<i>Ecdeiocolea monostachya</i>		25	0.8
<i>Melaleuca conothamnoides</i>		5	0.6
<i>Schoenus hexandrus</i>		5	0.2
<i>Melaleuca calyptroides</i>		3	0.8
<i>Eucalyptus burracoppinensis</i>		2.5	3
<i>Lepidosperma sanguinolentum</i>		2	0.6
<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>		1	3
<i>Allocasuarina corniculata</i>		1	2.8
<i>Styphelia hamulosa</i>		0.3	0.5
<i>Lepidobolus preissianus</i> subsp. <i>volubilis</i>		0.3	0.1
<i>Grevillea didymobotrya</i> subsp. <i>didymobotrya</i>		0.2	2
<i>Baeckea muricata</i>		0.2	0.9
<i>Euryomyrtus maidenii</i>		0.2	0.4
<i>Schoenus calcatus</i>	Range extension	0.2	0.05

Site details			
Site	Site-AP013	Position (WGS84)	-31.376689, 118.811771
Slope	gentle	Topography	plain
Soil colour	whitish, light-brown	Soil texture	sandy loam, loamy sand
Rock cover (%)	0	Rock type	None

Observation details - visit 1 ( )			
Sample description	Mixed eucalyptus woodland consisting of emergent trees of <i>Eucalyptus capillosa</i> with dominant mallee consisting of <i>E. tephroclada</i> & <i>E. sheathiana</i> , all over scattered shrubs of <i>Olearia muelleri</i> , and <i>Phebalium tuberosum</i> .		
Habitat	woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	41	Tree cover (%)	35
Shrub cover (%)	5	Grass cover (%)	1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (8)	Status	Cover (%)	Height (m)
<i>Eucalyptus tephroclada</i>		20	4.5
<i>Eucalyptus capillosa</i>		10	18
<i>Eucalyptus sheathiana</i>		5	5
<i>Olearia muelleri</i>		3	0.6
<i>Phebalium tuberosum</i>		2	1.6
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		1	0.3
<i>Waitzia acuminata</i> var. <i>acuminata</i>		0.2	0.1
<i>Dianella revoluta</i> var. <i>divaricata</i>		0.1	0.6

Site details			
Site	Site-AP014	Position (WGS84)	-31.377033, 118.810919
Slope	gentle	Topography	plain
Soil colour	whitish, brown-grey, light-brown	Soil texture	sandy clay, loamy sand
Rock cover (%)	1	Rock type	chert

Observation details - visit 1 ( )			
Sample description	Woodland with scattered emerging trees and Mallets of <i>Eucalyptus</i> ssp., over large dense clumps of <i>Melaleuca pauperifolia</i> subsp. <i>fastiagata</i> , over occasional <i>Olearia muelleri</i> .		
Habitat	woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	36	Tree cover (%)	35
Shrub cover (%)	0.8	Grass cover (%)	0.1
Herb cover (%)	0.1		

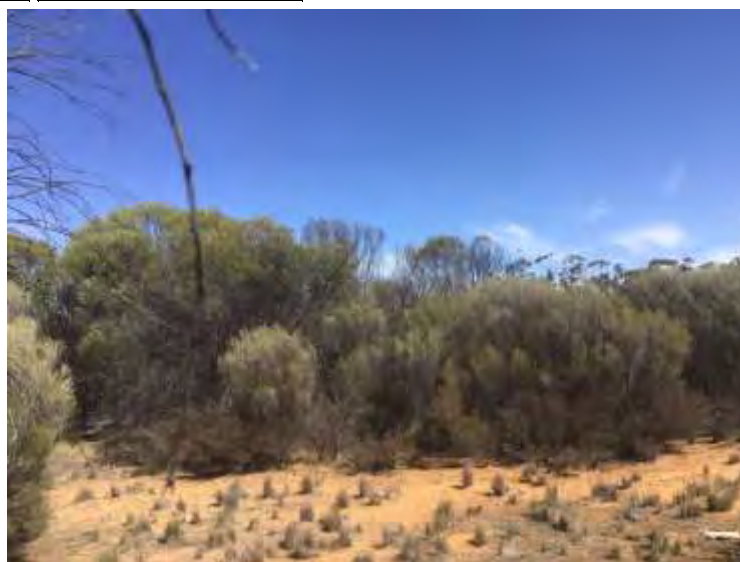


Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (7)	Status	Cover (%)	Height (m)
<i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i>		20	3.5
<i>Eucalyptus moderata</i>		10	15
<i>Eucalyptus calycogona</i> subsp. <i>miraculum</i>		3	4.5
<i>Eucalyptus sheathiana</i>		1	5
<i>Eucalyptus tephroclada</i>		1	3
<i>Olearia muelleri</i>		0.5	0.5
<i>Alyxia buxifolia</i>		0.1	0.6

Site details			
Site	Site-AP015	Position (WGS84)	-31.376379, 118.808711
Slope	negligible	Topography	plain
Soil colour	light-brown, orange	Soil texture	sand, sandy loam, rocks
Rock cover (%)	5	Rock type	granite - outcropping

Observation details - visit 1 ( )			
Sample description	<i>Acacia acuminata</i> dominant shrubland mixed with <i>Thryptomene kochii</i> and occasional <i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i> , over shrubs of small leaves myrtles, over <i>Amphipogon caricinus</i> var. <i>carcinus</i> .		
Habitat	shrubland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	60	Tree cover (%)	50
Shrub cover (%)	5	Grass cover (%)	5
Herb cover (%)	0.5		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (9)	Status	Cover (%)	Height (m)
<i>Acacia acuminata</i>		30	4
<i>Hysterobaeckea setifera</i> subsp. <i>meridionalis</i>		15	3
<i>Rinzia carnosa</i>		5	1.6
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		4	0.2
<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>		2.5	4
<i>Allocasuarina campestris</i>		2.5	3.5
<i>Stylidium dielsianum</i>		1	0.02
<i>Ericomyrtus serpyllifolia</i>		0.5	0.9
<i>Waitzia acuminata</i> var. <i>acuminata</i>		0.2	0.1



Site details			
Site	Site-AP016	Position (WGS84)	-31.368233, 118.82176
Slope	gentle	Topography	plain
Soil colour	red-brown	Soil texture	clay loam, loam
Rock cover (%)	1	Rock type	quartz

Observation details - visit 1 ( )			
Sample description	<i>Eucalyptus salubris</i> and <i>E. salmonophloia</i> woodland over sparse shrubs of <i>Olearia muelleri</i> , <i>Acacia merrallii</i> and <i>Templetonia ceracea</i> .		
Habitat	woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	45	Tree cover (%)	42.5
Shrub cover (%)	2.5	Grass cover (%)	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (8)	Status	Cover (%)	Height (m)
<i>Eucalyptus salubris</i>		42	13
<i>Acacia merrallii</i>		1.5	0.5
<i>Olearia muelleri</i>		1	0.5
<i>Eutaxia lasiocalyx</i>	Range extension	1	0.2
<i>Templetonia ceracea</i>		0.8	0.6
<i>Eucalyptus salmonophloia</i>		0.5	16
<i>Santalum acuminatum</i>		0.3	2.5
<i>Asteridea athrixioides</i>		0.2	0.1

Site details			
Site	Site-AP017	Position (WGS84)	-31.368298, 118.82283
Slope	negligible	Topography	plain
Soil colour	red-brown	Soil texture	clay loam
Rock cover (%)	3	Rock type	calcrete, quartz

Observation details - visit 1 ( )			
Sample description	Herbland on soft, crumbly, red brown clay loam soil. Vegetation dominated by winter annuals, occasional low shrubs of <i>Grevillea acuarria</i> . An occasional, isolated <i>Eucalyptus salubris</i> tree within the herb field.		
Habitat	herbland / forbland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	15	Tree cover (%)	0.5
Shrub cover (%)	4	Grass cover (%)	10
Herb cover (%)	1		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (11)	Status	Cover (%)	Height (m)
<i>*Bromus rubens</i>	Weed	7.5	0.1
<i>Haloragis trigonocarpa</i>		2	0.1
<i>*Lysimachia arvensis</i>	Weed	1	0.1
<i>Grevillea acuarria</i>		0.5	0.6
<i>*Medicago minima</i>	Weed	0.5	0.05
<i>Asteridea athrixioides</i>		0.3	0.05
<i>Daucus glochidiatus</i>		0.2	0.2
<i>Notisia intonsa</i>	P3 (DBCA list)	0.2	0.02
<i>Eucalyptus salubris</i>		0.1	12
<i>*Centaurea melitensis</i>	Weed	0.1	0.3
<i>Hydrocotyle corynophora</i>	Range extension	0.1	0.1

Site details			
Site	Site-AP018	Position (WGS84)	-31.371751, 118.721665
Slope	gentle	Topography	plain
Soil colour	red-brown, orange	Soil texture	sand
Rock cover (%)	90	Rock type	granite - outcropping

Observation details - visit 1 ( )			
Sample description	Granite outcrops with <i>Borya constricts</i> dominant, with patches of mostly Myrtaceous shrubs, <i>Acacia coolgardiensis</i> , <i>Dodonaea adenophora</i> , and <i>Hibbertia glomerosa</i> var. <i>glomerosa</i> over various herbs.		
Habitat	rockshelf		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	40	Tree cover (%)	5
Shrub cover (%)	10	Grass cover (%)	1
Herb cover (%)	24		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (12)	Status	Cover (%)	Height (m)
<i>Borya constricta</i>		20	0.05
<i>Hysterobaeckea petraea</i>		4	2.5
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		1.5	0.2
<i>Dodonaea adenophora</i>		0.5	0.8
<i>Waitzia acuminata</i> var. <i>acuminata</i>		0.4	0.1
<i>Acacia coolgardiensis</i>		0.3	2.5
<i>Melaleuca radula</i>		0.3	1.4
<i>Goodenia havilandii</i>		0.3	0.1
<i>Aristida contorta</i>		0.2	1
<i>Ericomyrtus serpyllifolia</i>		0.2	0.8
<i>Dianella revoluta</i> var. <i>divaricata</i>		0.2	0.8
<i>Hibbertia glomerosa</i> var. <i>glomerosa</i>		0.2	0.3

Site details			
Site	Site-AP019B	Position (WGS84)	-31.375697, 118.723349
Slope	gentle	Topography	plain
Soil colour	grey, whitish	Soil texture	sand
Rock cover (%)	0	Rock type	None

Observation details - visit 1 ( )			
Sample description	Open <i>Eucalyptus capillosa</i> woodland over occasional <i>Melaleuca hamata</i> , <i>Acacia acuminata</i> , <i>Dodonaea viscosa</i> subsp. <i>spathulata</i> , over <i>Lomandra collina</i> , <i>Borya constricta</i> , and <i>Amphipogon caricinus</i> var. <i>caricinus</i> .		
Habitat	open woodland		
Disturbance	None evident		
Vegetation condition	Excellent	Fire age	
Total veg. cover (%)	35	Tree cover (%)	20
Shrub cover (%)	1	Grass cover (%)	8
Herb cover (%)	7		



Sample and effort summary				
Sample method	Visit	Sample date	Dimensions	Observer
Relevé	1		unbounded	Andrew Perkins

Species (16)	Status	Cover (%)	Height (m)
<i>Eucalyptus capillosa</i>		25	20
<i>Borya constricta</i>		10	0.05
<i>Lomandra collina</i>		3	0.3
<i>Amphipogon caricinus</i> var. <i>caricinus</i>		2.5	0.2
<i>Acacia acuminata</i>		0.5	4
<i>Phebalium filifolium</i>		0.5	1.7
<i>Lomandra effusa</i>		0.5	0.3
<i>Dodonaea viscosa</i> subsp. <i>spatulata</i>		0.3	1.8
<i>Waitzia acuminata</i> var. <i>acuminata</i>		0.3	0.1
<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>		0.2	4
<i>Melaleuca hamata</i>		0.2	3
<i>Santalum acuminatum</i>		0.2	2
<i>Acacia colletioides</i>		0.2	1.9
<i>Rinzia carnosa</i>		0.2	1
<i>Dianella revoluta</i> var. <i>divaricata</i>		0.2	0.8
<i>Austrostipa trichophylla</i>		0.2	0.2



Appendix 2 NVIS hierarchy

Western Australia Current Practice			National Standard		
Hierarchy of terms	Brief description in WA	Indicative scale	NVIS Level	Description	NVIS structural/floristic components required
Vegetation formation	Structure and growth form – e.g. Forest, Woodland.	1:5 000 000	I	Class	Dominant growth form for the ecologically or structurally dominant stratum.
Vegetation sub-formation	Structural and dominant vegetation layer - Eucalypt Forest, Banksia Woodland.	1:2 500 000 I	II	Structural Formation	Dominant growth form, cover and height for the ecologically or structurally dominant stratum.
Vegetation association	Structural form and dominant species – e.g. Medium woodland; York gum ( <i>Eucalyptus loxophleba</i> ) & Wandoo.	1:1 000 000 to 1:250 000	III	Broad Floristic Formation	Dominant growth form, cover, height and dominant land cover genus for the uppermost or dominant stratum.
Vegetation complex	Structural and floristic description linked to geomorphology – e.g. Quindalup Complex.	1:250 000 to 1:100 000	IV	Sub-Formation	Dominant growth form, cover, height and dominant genus and Family for the three traditional strata. (i.e. Upper, Mid and Ground).
Vegetation type	Floristic definition by strata with structural detail. Often represented with a code and floristic description.	1:100 000 to 1:10 000	V	Association	Dominant growth form, height, cover and up to three species for the three traditional strata. (i.e. Upper, Mid and Ground).
Plant community	Basic unit of vegetation classification, site specific and highly localised with detailed floristics for each stratum.	1:10 000	VI	Sub-Association	Dominant growth form, height, cover and up to five species for all layers/ strata.
Floristic Community Type	Floristic composition definition; e.g. Northern banksia woodlands over herb rich shrublands on the Swan Coastal Plain.	No absolute scale			

### Appendix 3 Summary and Key to identification of Eucalypt woodlands of the Western Australian Wheatbelt TEC

Description based on (Department of the Environment 2015a): The Eucalypt Woodlands of the Western Australian Wheatbelt TEC is composed of eucalypt woodlands dominated by a complex mosaic of eucalypt species with a single tree or mallet form over an understorey that is highly variable in structure and composition. A mallet habit refers to a eucalypt with a single, slender trunk and steep-angled branches that give rise to a dense crown. Many eucalypt species are considered iconic within the Wheatbelt landscape, for example, *Eucalyptus salmonophloia* (salmon gum), *E. loxophleba* subsp. *loxophleba* (York gum), *Eucalyptus rudis* subsp. *rudis*, *E. salubris* (gimlet), *E. wandoo* (wandoo) and the mallet group of species. Associated species may include *Acacia acuminata* (jam), *Corymbia calophylla* (marri) and *Eucalyptus marginata* (jarrah). The understorey structures are often bare to sparse, herbaceous, shrub or heath, chenopod-dominated, thickets (*Melaleuca* spp.) and saline areas with *Tecticornia* spp. The main diagnostic features include location, minimum crown cover of the tree canopy of 10% in a mature woodland, presence of key species and a minimum condition according to scale of Keighery (1994) that depends on size of a patch, weed cover and presence of mature trees. A patch is defined as a discrete and mostly continuous area of the ecological community and may include small-scale variations and disturbances, such as tracks or breaks, watercourses/drainage lines or localised changes in vegetation that do not act as a permanent barrier or significantly alter its overall functionality. Each patch of the community includes a buffer zone, an area that lies immediately outside the edge of a patch but is not part of the ecological community. The buffer zone is designed to minimise this risk to the ecological community.

Woodland vegetation with a very sparse eucalypt tree canopy and woodlands dominated by mallee forms characterised by multiple stems of similar size arising at or near ground level are not part of the ecological community. The ecological community is not likely to be present if it is dominated by non-eucalypt species in the tree canopy, for instance *Acacia acuminata* (jam) or *Allocasuarina huegeliana* (rock sheoak) even though these species may be present as an understorey or minor canopy component.

The community occupies a transitional zone between the wetter forests associated with the Darling Range and the southwest coast, and the low woodlands and shrublands of the semi-arid to arid interior. The Wheatbelt region where the ecological community occurs mostly encompasses two IBRA2 subregions: Avon Wheatbelt subregion AVW01 Merredin and Avon Wheatbelt subregion AVW02 Katanning. Patches of the ecological community may extend into adjacent areas of the primary Wheatbelt bioregions, such as the easternmost parts of the Jarrah Forest bioregion forming an extension of the Avon Wheatbelt landscape in that they comprise areas subject to similar climate, landscape and threats. These outlier patches generally occur south of Northam, extending around the vicinity of localities such as Wandering, Williams, Kojonup and Mount Barker (All locations south of Perth), and are limited to areas that are not on the Darling range, receive less than 600 mm mean annual rainfall and overlie the Yilgarn Craton geology. A third IBRA2 subregion includes Mallee subregion MAL02 Western Mallee and is located south of Perth. The ecological community is generally associated with the flatter, undulating relief, including drainage lines and saline areas.

The WA Wheatbelt woodlands ecological community potentially corresponds to 45 Beard (Shepherd et al. 2002) vegetation associations. The most likely equivalents are with the 37 associations that are dominant or unique within the Wheatbelt regions.

#### Diagnostic 1 Location

Survey location occurs within one of the following three regions:

- Avon Wheatbelt bioregion - subregions AVW01 Merredin and AVW02 Katanning
- Mallee bioregion - MAL02 Western Mallee only

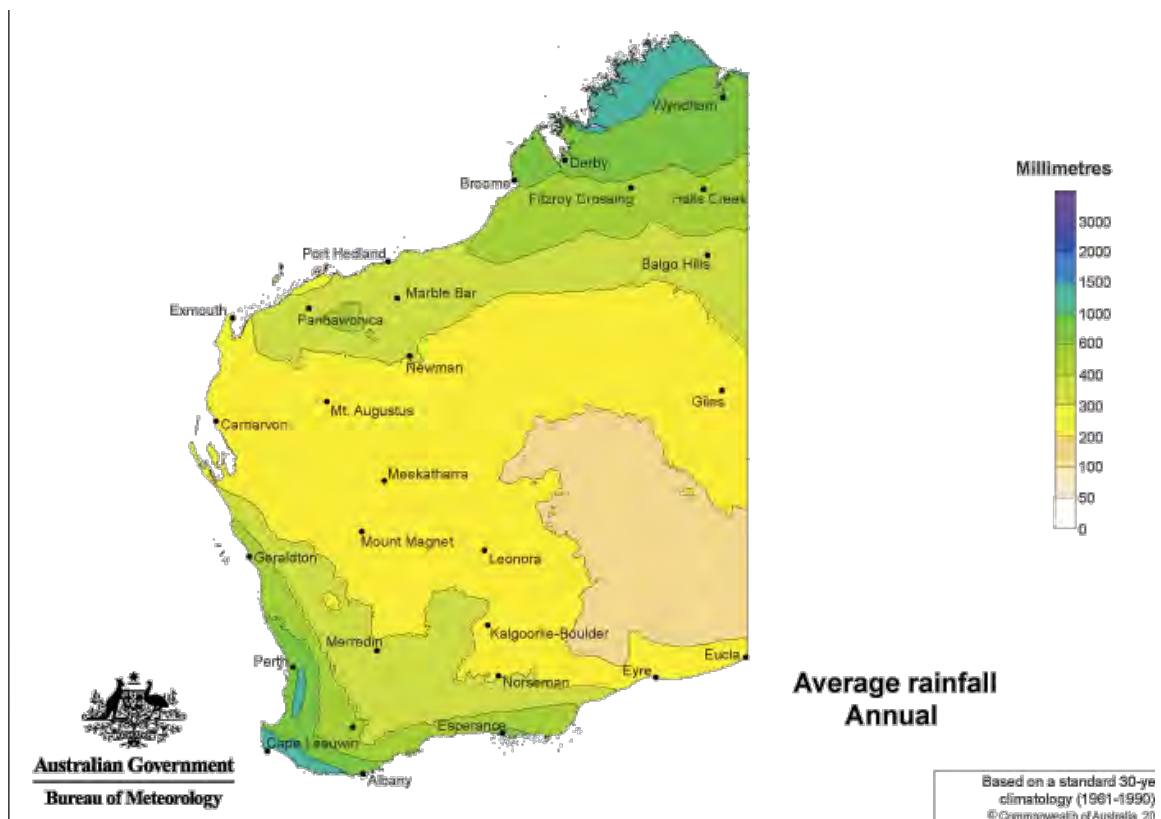
- Jarrah Forest bioregion – outlying patches in the eastern parts of JAF01 Northern Jarrah Forests and JAF02 Jarrah Forests adjacent to the Avon Wheatbelt, and are effectively an extension of the Avon Wheatbelt landscape. Within the Jarrah Forest bioregion, the ecological community occurs on landscapes that fall below 600 mm mean annual rainfall (Figure 1), are off the Darling Range, associated with the Yilgarn Craton geology and are generally heavily cleared. This covers the eastern to southeastern-most parts of the bioregion. The ecological community generally falls within the 300 to 600 mm average annual rainfall isohyets. The isohyets based on the latest 30-year average between 1976 to 2005 (BoM 2016) are most applicable to the current climatic regime.

.....2

Survey location occurs within region:

- Jarrah Forest bioregion – outlying patches in the eastern parts of JAF01 Northern Jarrah Forests and JAF02 Jarrah Forests adjacent to the Avon Wheatbelt. Within the Jarrah Forest bioregion, the ecological community occurs on landscapes that ARE ABOVE the 600 mm isohyet, are ON the Darling Range, NOT associated with the Yilgarn Craton geology and are NOT generally heavily cleared. This covers the eastern to southeastern-most parts of the bioregion. It generally DOES NOT fall within the 300 to 600 mm average annual rainfall isohyets. The isohyets based on the latest 30-year average between 1976 to 2005 (BoM 2016) are most applicable to the current climatic regime.

.....NOT TEC



**Figure 1 Isohyets of Western Australia (BoM 2016)**

### Diagnostic 2 Minimum crown canopy

The structure of the ecological community is a woodland in which the minimum crown cover of the tree canopy in a mature eucalypt woodland is 10% (crowns measured as if they are opaque). The maximum tree canopy cover usually is up to 40%. It may be higher in certain circumstances, for instance trees with a mallet growth form (multi-stemmed upper canopy) may be more densely spaced, or disturbances such as fire may result in an increased cover of canopy species during regeneration.

.....3

Crown cover of trees less than 10% but area recently disturbed (e.g. fire), presence of seedlings and/or saplings.

.....3

Crown cover of trees less than 10%, no evidence of recent disturbance, no presence of seedlings or saplings.

.....NOT TEC

### Diagnostic 3 Dominant Eucalyptus tree canopy

One or more of the key tree species in Table 1 are dominant or co-dominant, the trees are predominantly single trunked, not mallee (multi-stemmed).

.....4

Other species are present in the tree canopy (e.g. species in Table 2 or other taxa) but these collectively do not occur as dominants in the tree canopy.

.....4

Dominant woodlands with a mallee subcanopy (lower tree layer of mallee or non-eucalypt tree species). Upper eucalypt tree canopy must be present dominated by key woodland species in Table 2 and have cover of 10% or more.

.....4

Other species are present in the tree canopy (e.g. species in Table 2 or other taxa) and these collectively do occur as dominants in the tree canopy.

.....NOT TEC

**Table 1 Key eucalypt species. One or more of these species are dominant or co-dominant within a given patch of the ecological community**

Scientific name	Common name/s
<i>Eucalyptus accedens</i>	powder-bark; powder-bark wandoo
<i>Eucalyptus aequioperta</i>	Welcome Hill gum
<i>Eucalyptus alipes</i>	Hyden mallet
<i>Eucalyptus astringens</i> subsp. <i>astringens</i>	brown mallet
<i>Eucalyptus capillosa</i>	wheatbelt wandoo
<i>Eucalyptus densa</i> subsp. <i>densa</i>	narrow-leaved blue mallet
<i>Eucalyptus extensa</i>	yellow mallet
<i>Eucalyptus falcata</i>	silver mallet
<i>Eucalyptus gardneri</i> subsp. <i>gardneri</i>	blue mallet
<i>Eucalyptus goniocarpa</i>	Lake King mallet

Scientific name	Common name/s
<i>Eucalyptus kondininensis</i>	Kondinin blackbutt
<i>Eucalyptus longicornis</i>	red morrel
<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	York gum
<i>Eucalyptus melanoxydon</i>	black morrel
<i>Eucalyptus mimica</i> subsp. <i>continens</i>	hooded mallet
<i>Eucalyptus mimica</i> subsp. <i>mimica</i>	Newdegate mallet
<i>Eucalyptus myriadena</i>	small-fruited gum; blackbutt
<i>Eucalyptus occidentalis</i>	flat-topped yate
<i>Eucalyptus ornata</i>	ornamental silver mallet; ornate mallet
<i>Eucalyptus recta</i>	Mt Yule silver mallet; Cadoux mallet
<i>Eucalyptus rudis</i> subsp. <i>rudis</i>	flooded gum
<i>Eucalyptus salicola</i>	salt gum; salt salmon gum
<i>Eucalyptus salmonophloia</i>	salmon gum
<i>Eucalyptus salubris</i>	gimlet
<i>Eucalyptus sargentii</i> subsp. <i>sargentii</i>	salt river gum
<i>Eucalyptus singularis</i>	ridge-top mallet
<i>Eucalyptus spathulata</i> subsp. <i>spathulata</i>	swamp mallet
<i>Eucalyptus spathulata</i> subsp. <i>salina</i>	Salt River mallet
<i>Eucalyptus urna</i>	merrit
<i>Eucalyptus wandoo</i> subsp. <i>pulverea</i>	wandoo
<i>Eucalyptus wandoo</i> subsp. <i>wandoo</i>	wandoo

**Table 2 Associated canopy species that may be present within the ecological community but are not dominant or co-dominant<sup>1</sup>**

Scientific name	Common name/s
<i>Acacia acuminata</i>	jam
<i>Allocasuarina huegeliana</i>	rock sheoak
<i>Corymbia calophylla</i>	marri
<i>Eucalyptus annulata</i>	prickly-fruited mallee
<i>Eucalyptus arachnaea</i> subsp. <i>arachnaea</i>	black-stemmed mallee
<i>Eucalyptus arachnaea</i> subsp. <i>arrecta</i>	black-stemmed mallet
<i>Eucalyptus armillata</i>	flanged mallee
<i>Eucalyptus calycogona</i> subsp. <i>calycogona</i>	square-fruited mallee
<i>Eucalyptus camaldulensis</i> subsp. <i>arida</i>	river red gum
<i>Eucalyptus celastroides</i> subsp. <i>virella</i>	wheatbelt mallee
<i>Eucalyptus cylindriflora</i>	Goldfields white mallee
<i>Eucalyptus decipiens</i>	redheart; moit
<i>Eucalyptus drummondii</i>	Drummond's mallee
<i>Eucalyptus eremophila</i>	sand mallee
<i>Eucalyptus erythronema</i> subsp. <i>erythronema</i>	red-flowered mallee
<i>Eucalyptus erythronema</i> subsp. <i>inornata</i>	yellow-flowered mallee
<i>Eucalyptus eudesmioides</i>	Kalbarri mallee
<i>Eucalyptus flocktoniae</i> subsp. <i>flocktoniae</i>	Flockton's mallee

Scientific name	Common name/s
<i>Eucalyptus gittinsii</i> subsp. <i>illucida</i>	northern sandplain mallee
<i>Eucalyptus incrassata</i>	ridge-fruited mallee
<i>Eucalyptus kochii</i> subsp. <i>plenissima</i>	Traying mallee
<i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i>	Merredin mallee; Tammin mallee
<i>Eucalyptus loxophleba</i> subsp. <i>gratiae</i>	Lake Grace mallee
<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>	smooth-barked York gum
<i>Eucalyptus loxophleba</i> subsp. <i>supralaevis</i>	blackbutt York gum
<i>Eucalyptus macrocarpa</i>	mottlecah
<i>Eucalyptus marginata</i>	jarrah
<i>Eucalyptus moderata</i>	redwood mallee
<i>Eucalyptus obtusiflora</i>	Dongara mallee
<i>Eucalyptus olivina</i>	olive-leaved mallee
<i>Eucalyptus orthostemon</i>	diverse mallee
<i>Eucalyptus perangusta</i>	fine-leaved mallee
<i>Eucalyptus phaenophylla</i>	common southern mallee
<i>Eucalyptus phenax</i> subsp. <i>phenax</i>	white mallee
<i>Eucalyptus pileata</i>	capped mallee
<i>Eucalyptus platypus</i> subsp. <i>platypus</i>	moort
<i>Eucalyptus polita</i>	Parker Range mallet
<i>Eucalyptus sheathiana</i>	ribbon-barked mallee
<i>Eucalyptus sporadica</i>	Burngup mallee
<i>Eucalyptus subangusta</i> subsp. <i>subangusta</i>	grey mallee

The list is not comprehensive and presents the more common taxa encountered.

#### Diagnostic 4 Native understorey

A native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs. A list of key species is summarised in Table 3. Any one of the structural understorey categories may or may not be present.

Bare to sparse understorey (e.g. under some mallet woodlands).

.....5

Herbaceous understorey – a ground layer of forbs and/or graminoids though a few, scattered shrubs may be present.

.....5

Scrub or heath understorey – comprises a mixture of diverse shrubs of variable height and cover. A ground layer of herbs and grasses is present to variable extent.

.....5

Chenopod-dominated understorey – a subset of the scrub category in which the prominent species present are saltbushes, bluebushes and related taxa (e.g. *Atriplex*, *Enchylaena*, *Maireana*, *Rhagodia* and *Sclerolaena*).

.....5

Thickets of taller shrub species understorey (e.g. *Melaleuca pauperiflora*, *M. acuminata*, *M. uncinata*, *M. lanceolata*, *M. sheathiana*, *M. adnata*, *M. cucullata* and/or *M. lateriflora*, *Allocasuarina campestris*

with *Melaleuca hamata* or *M. scalena*). A range of other shrub and ground layer species may occur among or below the thickets.

.....5

Salt tolerant species understorey (e.g. samphire, *Tecticornia* spp.).

.....5

Shrublands or herblands in which the tree canopy layer is very sparse to absent, either naturally or maintained so through long-term disturbance. Native vegetation where a tree canopy was formerly present is often referred to as 'derived' or 'secondary' vegetation. These sites would fall below the 10 per cent minimum canopy cover threshold for a woodland.

.....NOT TEC

**Table 3 Understorey species**

Scientific name	Common name/s
<b>Shrubs</b>	
<i>Acacia acuaria</i>	
<i>Acacia colletioides</i>	wait-a-while
<i>Acacia erinacea</i>	
<i>Acacia hemiteles</i>	
<i>Acacia lasiocalyx</i>	silver wattle
<i>Acacia lasiocarpa</i>	panjang
<i>Acacia leptospermoides</i>	
<i>Acacia mackeyana</i>	
<i>Acacia merrallii</i>	
<i>Acacia microbotrya</i>	manna wattle
<i>Acacia pulchella</i>	prickly moses
<i>Allocasuarina acutivalvis</i>	
<i>Allocasuarina campestris</i>	
<i>Allocasuarina humilis</i>	dwarf sheoak
<i>Allocasuarina lehmanniana</i>	dune sheoak
<i>Allocasuarina microstachya</i>	
<i>Argyrolottis turbinata</i>	
<i>Astroloma epacridis</i>	
<i>Banksia armata</i>	prickly dryandra
<i>Banksia sessilis</i>	parrot bush
<i>Beyeria brevifolia</i>	
<i>Bossiaea divaricata</i>	
<i>Bossiaea eriocarpa</i>	common brown pea
<i>Bossiaea halophila</i>	
<i>Callistemon phoeniceus</i>	lesser bottlebrush
<i>Calothamnus quadrifidus</i>	one-sided bottlebrush
<i>Calothamnus quadrifidus</i> subsp. <i>asper</i>	one-sided bottlebrush
<i>Comesperma integerrimum</i>	
<i>Conostylis setigera</i>	
<i>Dampiera lavandulacea</i>	
<i>Darwinia</i> sp. <i>Karonie</i>	
<i>Daviesia nematophylla</i>	
<i>Daviesia triflora</i>	
<i>Dodonaea bursariifolia</i>	
<i>Dodonaea inaequifolia</i>	
<i>Dodonaea pinifolia</i>	

Scientific name	Common name/s
<i>Dodonaea viscosa</i>	sticky hopbush
<i>Eremophila decipiens</i>	slender fuchsia
<i>Eremophila ionantha</i>	violet-flowered eremophila
<i>Eremophila oppositifolia</i>	weeooka
<i>Eremophila scoparia</i>	broom bush
<i>Exocarpos aphyllus</i>	leafless ballart
<i>Gastrolobium microcarpum</i>	sandplain poison
<i>Gastrolobium parviflorum</i>	
<i>Gastrolobium spinosum</i>	prickly poison
<i>Gastrolobium tricuspdatum</i>	
<i>Gastrolobium trilobum</i>	bullock poison
<i>Grevillea acuaria</i>	
<i>Grevillea huegelii</i>	
<i>Grevillea tenuiflora</i>	tassel grevillea
<i>Hakea laurina</i>	pincushion hakea
<i>Hakea lissocarpha</i>	honey bush
<i>Hakea multilineata</i>	grass-leaf hakea
<i>Hakea petiolaris</i>	sea urchin hakea
<i>Hakea preissii</i>	needle tree
<i>Hakea varia</i>	variable-leaved hakea
<i>Hibbertia commutata</i>	
<i>Hibbertia exasperata</i>	
<i>Hibbertia hypericoides</i>	yellow buttercups
<i>Hovea chorizemifolia</i>	holly-leaved hovea
<i>Hypocalymma angustifolium</i>	white myrtle
<i>Leptomeria preissiana</i>	
<i>Leptospermum erubescens</i>	roadside teatree
<i>Lycium australe</i>	
<i>Australian boxthorn</i>	
<i>Melaleuca acuminata</i>	
<i>Melaleuca adnata</i>	
<i>Melaleuca atroviridis</i>	
<i>Melaleuca brophyi</i>	
<i>Melaleuca cucullata</i>	
<i>Melaleuca cuticularis</i>	saltwater paperbark
<i>Melaleuca halmaturorum</i>	
<i>Melaleuca hamata</i>	
<i>Melaleuca hamulosa</i>	
<i>Melaleuca lanceolata</i>	
<i>Rottneest teatree</i>	
<i>Melaleuca lateriflora</i>	gorada
<i>Melaleuca marginata</i>	
<i>Melaleuca pauperiflora</i>	boree
<i>Melaleuca radula</i>	graceful honeymyrtle
<i>Melaleuca raphiophylla</i>	swamp paperbark
<i>Melaleuca scalena</i>	
<i>Melaleuca strobophylla</i>	
<i>Melaleuca teuthidoides</i>	
<i>Melaleuca thyoides</i>	
<i>Melaleuca uncinata group</i>	broom bush
<i>Melaleuca viminea</i>	mohan



Scientific name	Common name/s
<i>Olearia muelleri</i>	
Goldfields daisy	
<i>Olearia</i> sp. Kennedy Range	
<i>Petrophile divaricata</i>	
<i>Petrophile shuttleworthiana</i>	
<i>Petrophile squamata</i>	
<i>Petrophile striata</i>	
<i>Phebalium filifolium</i>	slender phebalium
<i>Phebalium lepidotum</i>	
<i>Phebalium microphyllum</i>	
<i>Phebalium tuberosum</i>	
<i>Pimelea argentea</i>	silvery-leaved pimelea
<i>Pittosporum angustifolium</i>	
<i>Platysace maxwellii</i>	karno
<i>Rhadinothamnus rudis</i>	
<i>Santalum acuminata</i>	quandong
<i>Santalum spicatum</i>	sandalwood
<i>Scaevola spinescens</i>	currant bush
<i>Senna artemisioides</i>	
<i>Styphelia tenuiflora</i>	common pinheath
<i>Templetonia sulcata</i>	centipede bush
<i>Trymalium elachophyllum</i>	
<i>Trymalium ledifolium</i>	
<i>Westringia cephalantha</i>	
<i>Xanthorrhoea drummondii</i>	
Chenopods	
<i>Atriplex acutibractea</i>	toothed saltbush
<i>Atriplex paludosa</i>	marsh saltbush
<i>Atriplex semibaccata</i>	berry saltbush
<i>Atriplex stipitata</i>	mallee saltbush
<i>Atriplex vesicaria</i>	bladder saltbush
<i>Enchylaena lanata / tomentosa complex</i>	barrier saltbush
<i>Maireana brevifolia</i>	small-leaf bluebush
<i>Maireana erioclada</i>	
<i>Maireana marginata</i>	
<i>Maireana trichoptera</i>	downy bluebush
<i>Rhagodia drummondii</i>	
<i>Rhagodia preissii</i>	
<i>Sclerolaena diacantha</i>	grey copperburr
<i>Tecticornia</i> spp.	samphire
<i>Threlkeldia diffusa</i>	coast bonefruit
Forbs	
<i>Actinobole uliginosum</i>	flannel cudweed
<i>Asteridea athrixoides</i>	
<i>Blennospora drummondii</i>	
<i>Borya nitida</i>	pincushions
<i>Borya sphaerocephala</i>	pincushions
<i>Brachyscome ciliaris</i>	
<i>Brachyscome lineariloba</i>	
<i>Caesia micrantha</i>	pale fringe-lily
<i>Caladenia flava</i>	cowslip orchid

Scientific name	Common name/s
<i>Calandrinia calyptata</i>	pink purslane
<i>Calandrinia eremaea</i>	twining purslane
<i>Calotis hispidula</i>	bindy eye
<i>Carpobrotus modestus</i>	inland pigface
<i>Centipeda crateriformis</i> subsp. <i>crateriformis</i>	
<i>Chamaescilla corymbosa</i>	blue squill
<i>Chamaexeros serra</i>	little fringe-leaf
<i>Cotula coronopifolia</i>	waterbuttons
<i>Crassula colorata</i>	dense stonecrop
<i>Crassula exserta</i>	
<i>Dampiera juncea</i>	rush-like dampiera
<i>Dampiera lindleyi</i>	
<i>Daucus glochidiatus</i>	Australian carrot
<i>Dianella brevicaulis</i>	
<i>Dichopogon capillipes</i>	
<i>Disphyma crassifolium</i>	round-leaved pigface
<i>Drosera macrantha</i>	bridal rainbow
<i>Erodium cygnorum</i>	blue heronsbill
<i>Gilberta tenuifolia</i>	
<i>Gnephosis drummondii</i>	
<i>Gnephosis tenuissima</i>	
<i>Gnephosis tridens</i>	
<i>Gonocarpus nodulosus</i>	
<i>Goodenia berardiana</i>	
<i>Helichrysum leucopsidium</i>	
<i>Helichrysum luteoalbum</i>	Jersey cudweed
<i>Lagenophora huegelii</i>	
<i>Lawrencella rosea</i>	
<i>Lepidium rotundum</i>	veined peppergrass
<i>Podolepis capillaris</i>	wiry podolepis
<i>Podolepis lessonii</i>	
<i>Podotheca angustifolia</i>	sticky longheads
<i>Poranthera microphylla</i>	small poranthera
<i>Pterostylis sanguinea</i>	
<i>Ptilotus spathulatus</i>	
<i>Rhodanthe laevis</i>	
<i>Senecio glossanthus</i>	slender groundsel
<i>Spergularia marina</i>	
<i>Stylidium calcaratum</i>	book triggerplant
<i>Thysanotus patersonii</i>	
<i>Trachymene cyanopetala</i>	
<i>Trachymene ornata</i>	spongefruit
<i>Trachymene pilosa</i>	native parsnip
<i>Velleia cynopotamica</i>	
<i>Waitzia acuminata</i>	orange immortelle
<i>Zygophyllum ovatum</i>	dwarf twinleaf
<b>Graminoids</b>	
<i>Amphipogon caricinus - strictus complex</i>	greybeard grass
<i>Austrostipa elegantissima</i>	
<i>Austrostipa hemipogon</i>	
<i>Austrostipa nitida</i>	

Scientific name	Common name/s
<i>Austrostipa trichophylla</i>	
<i>Centrolepis polygyna</i>	wiry centrolepis
<i>Desmocladus asper</i>	
<i>Desmocladus flexuosus</i>	
<i>Gahnia ancistrophylla</i>	hook-leaf saw sedge
<i>Gahnia australis</i>	
<i>Harperia lateriflora</i>	
<i>Juncus bufonius</i>	toad rush
<i>Lachnagrostis filiformis</i>	blowgrass
<i>Lepidosperma leptostachyum</i>	
<i>Lepidosperma resinosum</i>	
<i>Lepidosperma sp. aff. tenue</i>	
<i>Lepidosperma tenue</i>	
<i>Lepidosperma viscidum</i>	sticky sword sedge
<i>Lomandra effusa</i>	scented matrush
<i>Lomandra micrantha</i> subsp. <i>micrantha</i>	small-flower matrush
<i>Lomandra nutans</i>	
<i>Meeboldina coangustata</i>	
<i>Mesomelaena preissii</i>	
<i>Neurachne alopecuroides</i>	foxtail mulga grass
<i>Rytidosperma caespitosum</i>	
<i>Rytidosperma setaceum</i> group	
<i>Schoenus nanus</i>	tiny bog-rush
<i>Schoenus sculptus</i>	gimlet bog-rush
<i>Schoenus subfascicularis</i>	

### Diagnostic 5 Vegetation condition

Minimum condition for patches of the WA Wheatbelt Woodlands ecological community. For each category, both the weed cover and mature tree presence criteria must apply plus one of either patch size or patch width, depending on whether the patch is a roadside remnant or not.

#### Category A:

Patch corresponds to a condition of pristine / excellent / very good (Keighery, 1994) or a high RCV (RCC, 2014).

Exotic plant species account for 0 to 30% of total vegetation cover in the understorey layers (i.e. below the tree canopy).

Mature trees (diameter at breast height (dbh) of 30 cm or above) may be present or absent.

Patch size (non-roadside) 2 ha or more with no gap in native vegetation cover exceeding 50 m width.

.....TEC

**Patch width roadside only** (based on the native understorey component not width of the tree canopy)  
5 m or more.

.....TEC

Patch corresponds to a condition of pristine / excellent / very good (Keighery, 1994) or a high RCV (RCC, 2014).

Exotic plant species account for 0 to 30% of total vegetation cover in the understorey layers (i.e. below the tree canopy).

Mature trees (diameter at breast height (dbh) of 30 cm or above) may be present or absent.

Patch size (non-roadside) less than 2 ha.

.....NOT TEC

**Patch width roadside only** (based on the native understorey component not width of the tree canopy) less than 5 m.

.....NOT TEC

**Category B:**

Patch corresponds to a condition of good (Keighery, 1994) or a medium-high RCV (RCC, 2014).

Exotic plant species account for more than 30, to 50% of total vegetation cover in the understorey layers (i.e. below the tree canopy).

Mature trees are present with at least 5 trees per 0.5 ha.

Patch size (non-roadside) 2 ha or more with no gap in native vegetation cover exceeding 50 m width.

.....TEC

**Patch width roadside only** (based on the native understorey component not width of the tree canopy) 5 m or more.

.....TEC

Patch corresponds to a condition of good (Keighery, 1994) or a medium-high RCV (RCC, 2014), AND retains important habitat features.

Exotic plant species account for more than 30, to 50% of total vegetation cover in the understorey layers (i.e. below the tree canopy).

Mature trees are present with at least 5 trees per 0.5 ha.

Patch size (non-roadside) less than 2 ha.

.....NOT TEC

**Patch width roadside only** (based on the native understorey component not width of the tree canopy) less than 5 m.

.....NOT TEC

**Category C:**

Patch corresponds to a condition of good (Keighery, 1994) or a medium-high RCV (RCC, 2014), AND retains important habitat features.

Exotic plant species account for more than 30, to 50% of total vegetation cover in the understorey layers (i.e. below the tree canopy).

Less than 5 mature trees per 0.5 ha are present.

Minimum patch size (non-roadside) 5 ha or more.

.....TEC

Patch size (non- roadside) less than 5 ha

.....NOT TEC

**Category D:**

Patch corresponds to a condition of degraded to good (Keighery, 1994) or a medium-Low to medium-high RCV (RCC, 2014).

Exotic plant species account for more than 50 to 70% of total vegetation cover in the understorey layers (i.e. below the tree canopy).

Mature trees are present with at least 5 trees per 0.5 ha.

Minimum patch size (non-roadside) 5 ha or more.

.....TEC

**Patch width roadside only** (based on the native understorey component not width of the tree canopy)  
5 m or more

.....TEC

Patch corresponds to a condition of degraded to good (Keighery, 1994) or a medium-low to medium-high RCV (RCC, 2014).

Exotic plant species account for more than 50 to 70% of total vegetation cover in the understorey layers (i.e. below the tree canopy).

Less than 5 mature trees per 0.5 ha are present.

.....NOT TEC

**Appendix 4 Terrestrial fauna survey site descriptions**

**Flora and Fauna Assessment of Lot 1416 for the Parker Range Project**  
**Prepared for Mineral Resources Ltd**

Site details			
<b>Site</b>	003	<b>Position (WGS84)</b>	-31.353666, 118.752557
<b>Topography</b>	hill slope	<b>Soil texture</b>	sandy loam
<b>Slope</b>	negligible	<b>Rock type</b>	granite - outcropping
<b>Soil colour</b>	not recorded	<b>Rock cover (%)</b>	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	11 Mar 2020	11 Mar 2020

Site description - visit 1 (11 Mar 2020)				
Open low salmon gum eucalyptus woodland over <i>Santalum</i> , <i>Acacia</i> , <i>Melaleuca</i> and <i>Eremophila</i> shrubs over sparse tussock grass over sparse <i>Borya</i> herbs on thin layer of red brown sandy loam on granite outcropping.				
<b>Habitat</b>	open woodland			
<b>Disturbance</b>	none			
<b>Vegetation condition</b>	Excellent	<b>Fire age</b>	moderate (>5 years)	
<b>Total veg. cover (%)</b>	60	<b>Litter distribution</b>	scattered	
<b>Tree cover (%)</b>	40	<b>Litter depth(cm)</b>	0	
<b>Shrub cover (%)</b>	15	<b>Litter cover (%)</b>	0	
<b>Grass cover (%)</b>	5			
<b>Herb cover (%)</b>	2			



**Flora and Fauna Assessment of Lot 1416 for the Parker Range Project**  
**Prepared for Mineral Resources Ltd**

Site details			
<b>Site</b>	005	<b>Position (WGS84)</b>	-31.354, 118.755989
<b>Topography</b>	hill slope	<b>Soil texture</b>	sandy loam, laterite
<b>Slope</b>	negligible	<b>Rock type</b>	none
<b>Soil colour</b>	not recorded	<b>Rock cover (%)</b>	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.60	11 Mar 2020	11 Mar 2020
1	Site description	0.00	11 Mar 2020	11 Mar 2020

**Site description - visit 1 (11 Mar 2020)**

Open low mallee woodland with tall mulga trees over *Acacia*, *Allocasuarina*, *Melaleuca* and other mixed shrubs over tussock grass and some scattered *Triodia* and sparse herbs on whitish grey sandy loam with patches of leaf litter

<b>Habitat</b>	open woodland		
<b>Disturbance</b>			
<b>Vegetation condition</b>	Excellent	<b>Fire age</b>	moderate (>5 years)
<b>Total veg. cover (%)</b>	80	<b>Litter distribution</b>	under vegetation
<b>Tree cover (%)</b>	60	<b>Litter depth(cm)</b>	0
<b>Shrub cover (%)</b>	30	<b>Litter cover (%)</b>	0
<b>Grass cover (%)</b>	5		
<b>Herb cover (%)</b>	1		





**Flora and Fauna Assessment of Lot 1416 for the Parker Range Project**  
**Prepared for Mineral Resources Ltd**

Site details			
<b>Site</b>	010	<b>Position (WGS84)</b>	-31.375771, 118.738928
<b>Topography</b>	plain	<b>Soil texture</b>	sandy loam
<b>Slope</b>	negligible	<b>Rock type</b>	none
<b>Soil colour</b>	not recorded	<b>Rock cover (%)</b>	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Birding	0.35	12 Mar 2020	12 Mar 2020
1	Foraging	0.17	12 Mar 2020	12 Mar 2020
1	Site description	0.00	12 Mar 2020	12 Mar 2020

**Site description - visit 1 (12 Mar 2020)**

Open Mallee woodland over shrubs of *Allocasuarina*, *Hakea*, *Grevillea* and other shrubs over sedges with some herb cover on yellow white sandy loam with rare leaf litter

<b>Habitat</b>	mallee woodland		
<b>Disturbance</b>	none		
<b>Vegetation condition</b>	Excellent	<b>Fire age</b>	moderate (>5 years)
<b>Total veg. cover (%)</b>	55	<b>Litter distribution</b>	under vegetation
<b>Tree cover (%)</b>	20	<b>Litter depth(cm)</b>	0
<b>Shrub cover (%)</b>	10	<b>Litter cover (%)</b>	0
<b>Grass cover (%)</b>	30		
<b>Herb cover (%)</b>	5		



**Flora and Fauna Assessment of Lot 1416 for the Parker Range Project**  
**Prepared for Mineral Resources Ltd**

Site details			
<b>Site</b>	024	<b>Position (WGS84)</b>	-31.363379, 118.771389
<b>Topography</b>	undulating plain	<b>Soil texture</b>	sandy loam
<b>Slope</b>	negligible	<b>Rock type</b>	none
<b>Soil colour</b>	not recorded	<b>Rock cover (%)</b>	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.53	12 Mar 2020	12 Mar 2020
1	Site description	0.00	12 Mar 2020	12 Mar 2020

Site description - visit 1 (12 Mar 2020)			
Mallee woodland over Mallee shrubs over <i>Triodia</i> grass on yellow orange sandy loam with continuous leaf litter			
<b>Habitat</b>	mallee woodland		
<b>Disturbance</b>			
<b>Vegetation condition</b>	Excellent	<b>Fire age</b>	moderate (>5 years)
<b>Total veg. cover (%)</b>	65	<b>Litter distribution</b>	even/continuous
<b>Tree cover (%)</b>	40	<b>Litter depth(cm)</b>	0
<b>Shrub cover (%)</b>	15	<b>Litter cover (%)</b>	0
<b>Grass cover (%)</b>	40		
<b>Herb cover (%)</b>	1		



Flora and Fauna Assessment of Lot 1416 for the Parker Range Project  
Prepared for Mineral Resources Ltd

Site details			
Site	040	Position (WGS84)	-31.354081, 118.751512
Topography		Soil texture	sandy loam
Slope	gentle	Rock type	granite - outcropping, granite - roc
Soil colour	not recorded	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.55	13 Mar 2020	13 Mar 2020
1	Site description	0.00	13 Mar 2020	13 Mar 2020

**Site description - visit 1 (13 Mar 2020)**

*Melaleuca-Allocasuarina* tall shrubland with some low Mallee and *Santalum* over *Acacia*, Myrtaceae and other shrubs over tussock and sedge grasses over *Borya* herbs on salmon orange sandy loam rising gently from granite outcropping patchy leaf litter

Habitat	shrubland		
Disturbance			
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	75	Litter distribution	under vegetation
Tree cover (%)	50	Litter depth(cm)	0
Shrub cover (%)	30	Litter cover (%)	0
Grass cover (%)	5		
Herb cover (%)	5		



Flora and Fauna Assessment of Lot 1416 for the Parker Range Project  
Prepared for Mineral Resources Ltd

Site details			
Site	041	Position (WGS84)	
Topography	breakaway	Soil texture	sand, rock
Slope	gentle	Rock type	granite - outcropping, granite - roc
Soil colour	not recorded	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.40	13 Mar 2020	13 Mar 2020

**Site description - visit 1 (13 Mar 2020)**

Tall *Melaleuca* shrubland with Mallee, *Acacia* tall shrubs over Myrtaceae dominant with some *Santalum* shrubs over tussock grass and some herbs on breakaway granite outcropping. Patchy leaf litter, some rock holes and crevices.

Habitat	woodland		
Disturbance			
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	80	Litter distribution	
Tree cover (%)	60	Litter depth(cm)	0
Shrub cover (%)		Litter cover (%)	0
Grass cover (%)	5		
Herb cover (%)	1		



Flora and Fauna Assessment of Lot 1416 for the Parker Range Project  
Prepared for Mineral Resources Ltd

Site details			
Site	MF001	Position (WGS84)	-31.364642, 118.768863
Topography	hill slope	Soil texture	sandy loam, laterite
Slope	negligible	Rock type	none
Soil colour	not recorded	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.08	11 Mar 2020	11 Mar 2020

**Site description - visit 1 (11 Mar 2020)**

Shrubland with tall *Allocasuarina* shrubs over Myrtaceae dominant shrubs over sparse tussock and sporadic sedge grass on yellow sandy loam with continuous leaf litter

Habitat	shrubland		
Disturbance	historic operations, litter, vehicle tracks		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	65	Litter distribution	even/continuous
Tree cover (%)	40	Litter depth(cm)	1
Shrub cover (%)	35	Litter cover (%)	90
Grass cover (%)	5		
Herb cover (%)	0		



Flora and Fauna Assessment of Lot 1416 for the Parker Range Project  
Prepared for Mineral Resources Ltd

Site details			
Site	MF002	Position (WGS84)	-31.362385, 118.768916
Topography	hill slope	Soil texture	sandy loam, laterite
Slope	negligible	Rock type	none
Soil colour	not recorded	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.23	11 Mar 2020	11 Mar 2020

**Site description - visit 1 (11 Mar 2020)**

Shrubland with tall *Allocasuarina* shrubs over Myrtaceae dominant shrubs over sparse tussock and sporadic sedge grass on yellow sandy loam with continuous leaf litter

Habitat	shrubland		
Disturbance	historic operations, litter, vehicle tracks		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	65	Litter distribution	even/continuous
Tree cover (%)	40	Litter depth(cm)	1
Shrub cover (%)	35	Litter cover (%)	90
Grass cover (%)	5		
Herb cover (%)	0		



Flora and Fauna Assessment of Lot 1416 for the Parker Range Project  
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Site details			
Site	MF003	Position (WGS84)	-31.359601, 118.769059
Topography	hill slope	Soil texture	sandy loam
Slope	negligible	Rock type	none
Soil colour	red-orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.07	11 Mar 2020	11 Mar 2020

**Site description - visit 1 (11 Mar 2020)**

Mallee over *Allocasuarina* shrubland over Myrtaceae dominant and other shrubs over sedge and tussock grasses over negligible herb on red-orange sandy loam with patchy leaf litter

Habitat	shrubland		
Disturbance	none		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	80	Litter distribution	under vegetation
Tree cover (%)	40	Litter depth(cm)	1
Shrub cover (%)	50	Litter cover (%)	25
Grass cover (%)	15		
Herb cover (%)	1		



Flora and Fauna Assessment of Lot 1416 for the Parker Range Project  
Prepared for Mineral Resources Ltd

Site details			
Site	MF004	Position (WGS84)	-31.35805, 118.769577
Topography	hill slope	Soil texture	sandy loam, laterite
Slope	negligible	Rock type	none
Soil colour	yellow	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.12	11 Mar 2020	11 Mar 2020

**Site description - visit 1 (11 Mar 2020)**

Mallee shrubland with tall *Allocasuarina*, *Melaleuca*, *Hakea* over Myrtaceae dominant shrubs over sparse tussock and negligible herb on yellow whitish sandy loam with some laterite patchy leaf litter

Habitat	shrubland		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	85	Litter distribution	under vegetation
Tree cover (%)	70	Litter depth(cm)	1
Shrub cover (%)	50	Litter cover (%)	40
Grass cover (%)	2		
Herb cover (%)	1		





Flora and Fauna Assessment of Lot 1416 for the Parker Range Project  
Prepared for Mineral Resources Ltd

Site details			
Site	MF005	Position (WGS84)	-31.374886, 118.739539
Topography	plain	Soil texture	sandy loam
Slope	negligible	Rock type	none
Soil colour	not recorded	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	2.80	12 Mar 2020	12 Mar 2020

**Site description - visit 1 (12 Mar 2020)**

Open Mallee woodland over shrubs of *Allocasuarina*, *Hakea*, *Grevillea* and other shrubs over sedges with some herb cover on yellow whitish sandy loam with patchy leaf litter

Habitat	mallee woodland		
Disturbance	none		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	55	Litter distribution	under vegetation
Tree cover (%)	20	Litter depth(cm)	1
Shrub cover (%)	10	Litter cover (%)	35
Grass cover (%)	30		
Herb cover (%)	5		



Flora and Fauna Assessment of Lot 1416 for the Parker Range Project  
Prepared for Mineral Resources Ltd

Site details			
Site	MF006	Position (WGS84)	-31.353326, 118.740154
Topography	hill slope	Soil texture	sandy loam
Slope	negligible	Rock type	none
Soil colour	yellow	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.07	12 Mar 2020	12 Mar 2020

**Site description - visit 1 (12 Mar 2020)**

Mallee-*Allocasuarina* shrubland over Myrtaceae dominant low shrubs over tussock grasses over negligible herbs on yellow sandy loam with patchy leaf litter

Habitat	shrubland		
Disturbance	evidence of feral animals, litter, vehicle tracks		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	65	Litter distribution	under vegetation
Tree cover (%)	40	Litter depth(cm)	1
Shrub cover (%)	30	Litter cover (%)	20
Grass cover (%)	10		
Herb cover (%)	1		



Flora and Fauna Assessment of Lot 1416 for the Parker Range Project  
Prepared for Mineral Resources Ltd

Site details			
Site	MF007	Position (WGS84)	-31.355302, 118.741596
Topography	hill slope	Soil texture	sandy loam
Slope	negligible	Rock type	none
Soil colour	not recorded	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.03	12 Mar 2020	12 Mar 2020

**Site description - visit 1 (12 Mar 2020)**

Mallee-*Allocasuarina* shrubland over Myrtaceae dominant low shrubs over tussock grasses over negligible herbs on yellow sandy loam with patchy leaf litter

Habitat	shrubland		
Disturbance	evidence of feral animals, litter, vehicle tracks		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	65	Litter distribution	scattered
Tree cover (%)	40	Litter depth(cm)	1
Shrub cover (%)	30	Litter cover (%)	20
Grass cover (%)	10		
Herb cover (%)	1		



Flora and Fauna Assessment of Lot 1416 for the Parker Range Project  
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Site details			
Site	MF008	Position (WGS84)	-31.357985, 118.743649
Topography	hill slope	Soil texture	sandy loam
Slope	negligible	Rock type	none
Soil colour	not recorded	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.43	12 Mar 2020	12 Mar 2020

**Site description - visit 1 (12 Mar 2020)**

Mallee-*Allocasuarina* shrubland over Myrtaceae dominant low shrubs over tussock grasses over negligible herbs on yellow sandy loam with patchy leaf litter

Habitat	shrubland		
Disturbance	evidence of feral animals, litter, vehicle tracks		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	65	Litter distribution	scattered
Tree cover (%)	40	Litter depth(cm)	1
Shrub cover (%)	30	Litter cover (%)	20
Grass cover (%)	10		
Herb cover (%)	1		



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Site details			
Site	MF009	Position (WGS84)	-31.359577, 118.745893
Topography	hill slope	Soil texture	sandy loam
Slope	negligible	Rock type	none
Soil colour	not recorded	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	2.07	12 Mar 2020	12 Mar 2020

**Site description - visit 1 (12 Mar 2020)**

Mallee-*Allocasuarina* shrubland over Myrtaceae dominant low shrubs over tussock grasses over negligible herbs on yellow sandy loam with patchy leaf litter

Habitat	shrubland		
Disturbance	evidence of feral animals, litter, vehicle tracks		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	65	Litter distribution	scattered
Tree cover (%)	40	Litter depth(cm)	1
Shrub cover (%)	30	Litter cover (%)	25
Grass cover (%)	10		
Herb cover (%)	1		



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Site details			
Site	MF010	Position (WGS84)	-31.363828, 118.771217
Topography	undulating plain	Soil texture	sandy loam
Slope	negligible	Rock type	none
Soil colour	yellow-orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	2.13	12 Mar 2020	12 Mar 2020

Site description - visit 1 (12 Mar 2020)				
Mallee woodland over Mallee shrubs over <i>Triodia</i> grass on yellow-orange sandy loam with patchy leaf litter				
Habitat	mallee woodland			
Disturbance	evidence of feral animals, litter, vehicle tracks			
Vegetation condition	Excellent	Fire age	moderate (>5 years)	
Total veg. cover (%)	65	Litter distribution	scattered	
Tree cover (%)	40	Litter depth(cm)	1	
Shrub cover (%)	15	Litter cover (%)	15	
Grass cover (%)	40			
Herb cover (%)	1			



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Site details			
Site	MF011	Position (WGS84)	-31.359216, 118.755244
Topography	hill slope	Soil texture	sandy loam, laterite
Slope	negligible	Rock type	none
Soil colour	yellow-whitish	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.05	12 Mar 2020	12 Mar 2020

**Site description - visit 1 (12 Mar 2020)**

*Allocasuarina* shrubland over Myrtaceae dominant shrubs on creamy yellow lateritic sandy loam with continuous leaf litter

Habitat	shrubland		
Disturbance	evidence of feral animals		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	85	Litter distribution	even/continuous
Tree cover (%)	80	Litter depth(cm)	1
Shrub cover (%)	50	Litter cover (%)	80
Grass cover (%)	0		
Herb cover (%)	0		



Flora and Fauna Assessment of Lot 1416 for the Parker Range Project  
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Site details			
Site	MF012	Position (WGS84)	-31.358236, 118.752046
Topography	undulating plain	Soil texture	sandy loam
Slope	negligible	Rock type	none
Soil colour	yellow-whitish	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.07	12 Mar 2020	12 Mar 2020

**Site description - visit 1 (12 Mar 2020)**

Mallee, *Allocasuarina* shrubland with *Callitris* over Myrtaceae, *Eremophila* and other shrubs over tussock grass on whitish grey sandy loam with patchy leaf litter

Habitat	shrubland		
Disturbance	evidence of feral animals		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	80	Litter distribution	under vegetation
Tree cover (%)	60	Litter depth(cm)	1
Shrub cover (%)	30	Litter cover (%)	25
Grass cover (%)	5		
Herb cover (%)	1		





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Site details			
Site	MF013	Position (WGS84)	-31.356896, 118.752408
Topography	undulating plain	Soil texture	granite rocks
Slope	negligible	Rock type	none
Soil colour	red-orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	-7.77	12 Mar 2020	12 Mar 2020

Site description - visit 1 (12 Mar 2020)			
<i>Borya</i> herbland on granite outcropping with the outer edge of granite dominated by Myrtaceae and other shrubs			
Habitat	herbland / forbland		
Disturbance	evidence of feral animals		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	90	Litter distribution	none
Tree cover (%)	0	Litter depth(cm)	0
Shrub cover (%)	1	Litter cover (%)	0
Grass cover (%)	5		
Herb cover (%)	90		



Flora and Fauna Assessment of Lot 1416 for the Parker Range Project  
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Site details			
Site	MF014	Position (WGS84)	-31.371118, 118.757996
Topography	undulating plain	Soil texture	sandy loam, loam, laterite
Slope	negligible	Rock type	none
Soil colour	red-orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.18	13 Mar 2020	13 Mar 2020

**Site description - visit 1 (13 Mar 2020)**

Mallee, *Acacia* and *Melaleuca* shrubland over Myrtaceae dominant shrubs and other mixed low shrubs lateritic yellow sandy loam with patchy leaf litter

Habitat	shrubland		
Disturbance	evidence of feral animals, vehicle tracks		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	85	Litter distribution	scattered
Tree cover (%)	65	Litter depth(cm)	1
Shrub cover (%)	30	Litter cover (%)	30
Grass cover (%)	0		
Herb cover (%)	0		



**Flora and Fauna Assessment of Lot 1416 for the Parker Range Project**  
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Site details			
Site	MF015	Position (WGS84)	-31.370733, 118.759294
Topography	undulating plain	Soil texture	sandy loam, laterite
Slope	negligible	Rock type	none
Soil colour	red-orange-whitish	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.05	13 Mar 2020	13 Mar 2020

**Site description - visit 1 (13 Mar 2020)**

Mallee woodland over tall melaleuca over mixed low shrubland dominant myrtacea with sporadic herbs on salmon colored lateritic sandy loam with patchy leaf litter

Habitat	mallee woodland		
Disturbance	none		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	70	Litter distribution	under vegetation
Tree cover (%)	60	Litter depth(cm)	1
Shrub cover (%)	15	Litter cover (%)	40
Grass cover (%)	0		
Herb cover (%)	1		



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Site details			
Site	MF016	Position (WGS84)	-31.368321, 118.760733
Topography	undulating plain	Soil texture	sandy loam
Slope	negligible	Rock type	none
Soil colour	yellow-whitish	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.10	13 Mar 2020	13 Mar 2020

**Site description - visit 1 (13 Mar 2020)**

Mallee woodland over tall *Melaleuca* shrubs over Myrtaceae and *Acacia* shrubs on whitish-salmon sandy loam with patchy leaf litter

Habitat	mallee woodland		
Disturbance	none		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	65	Litter distribution	scattered
Tree cover (%)	65	Litter depth(cm)	1
Shrub cover (%)	20	Litter cover (%)	35
Grass cover (%)	0		
Herb cover (%)	0		



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Site details			
Site	MF017	Position (WGS84)	-31.367341, 118.760527
Topography	undulating plain	Soil texture	sandy loam, laterite
Slope	negligible	Rock type	none
Soil colour	red-orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.05	13 Mar 2020	13 Mar 2020

**Site description - visit 1 (13 Mar 2020)**

Allocasurina woodland over melaleuca, Mallee and other myrtacea shrubs on yellow lateritic sandy loam with continuous leaf litter

Habitat	woodland		
Disturbance	evidence of feral animals, vehicle tracks		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	70	Litter distribution	even/continuous
Tree cover (%)	65	Litter depth(cm)	2
Shrub cover (%)	15	Litter cover (%)	80
Grass cover (%)	0		
Herb cover (%)	0		



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Site details			
Site	MF018	Position (WGS84)	-31.366446, 118.759382
Topography	undulating plain	Soil texture	sandy loam, laterite
Slope	negligible	Rock type	none
Soil colour	red-orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.07	13 Mar 2020	13 Mar 2020

**Site description - visit 1 (13 Mar 2020)**

*Allocasuarina* woodland over mallee, *Melaleuca* and other Myrtaceae shrubs on yellow lateritic sandy loam with continuous leaf litter

Habitat	woodland		
Disturbance	evidence of feral animals, vehicle tracks		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	70	Litter distribution	even/continuous
Tree cover (%)	65	Litter depth(cm)	2
Shrub cover (%)	15	Litter cover (%)	75
Grass cover (%)	0		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
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Site details			
Site	SITE001	Position (WGS84)	-31.368536, 118.744509
Topography	hill slope	Soil texture	ALUV
Slope	gentle	Rock type	ferrous - ironstone
Soil colour	BLK	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.78	28 Mar 2021	28 Mar 2021

**Site description - visit 1 (28 Mar 2021)**

Mixed low-mid shrubland of *Allocasuarina*, *Acacia*, misc Myrtaceae and very few small mallees over tussocky sedges on gentle slope of sand and laterite

Habitat			
Disturbance	Evidence of feral animals, Historic clearing,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	60	Litter distribution	under vegetation
Tree cover (%)	2	Litter depth(cm)	
Shrub cover (%)	55	Litter cover (%)	0.1
Grass cover (%)	1		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
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Site details			
Site	SITE002	Position (WGS84)	-31.369313, 118.73824
Topography	plain	Soil texture	sand, sandy loam
Slope	negligible	Rock type	none
Soil colour	yellow	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.30	28 Mar 2021	28 Mar 2021

**Site description - visit 1 (28 Mar 2021)**

Low open mallee woodland over open *Allocasuarina* and mixed shrubs over sedges, *Borya* and moss.

Habitat			
Disturbance	None evident,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	60	Litter distribution	transported
Tree cover (%)	20	Litter depth(cm)	1
Shrub cover (%)	30	Litter cover (%)	10
Grass cover (%)	10		
Herb cover (%)	0		





Targeted fauna survey of Lot 1416 and adjacent reserves  
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Site details			
Site	SITE003	Position (WGS84)	-31.371746, 118.725411
Topography	plain	Soil texture	sandy loam, laterite
Slope	negligible	Rock type	ferrous - ironstone
Soil colour	yellow, grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	28 Mar 2021	28 Mar 2021

Site description - visit 1 (28 Mar 2021)				
Tall open <i>Allocasuarina</i> shrubland with sparsely scattered mallees over mid-tall small-leaf Myrtaceae				
Habitat				
Disturbance				
Vegetation condition	Excellent	Fire age	moderate (>5 years)	
Total veg. cover (%)	70	Litter distribution	under vegetation	
Tree cover (%)	50	Litter depth(cm)	1	
Shrub cover (%)	20	Litter cover (%)	40	
Grass cover (%)	0			
Herb cover (%)	0			



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Site details			
Site	SITE004	Position (WGS84)	-31.371898, 118.724484
Topography	breakaway	Soil texture	sand, sandy loam
Slope	gentle	Rock type	ferrous - ironstone, granite - outcropping, granite - rocks
Soil colour	grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	28 Mar 2021	28 Mar 2021

Site description - visit 1 (28 Mar 2021)

Low breakaway of weathered granite with grey mallee woodland and *Callitris*; *Allocasuarina* upslope, copper-barked *Euc. salubris* down to W

Habitat			
Disturbance	Historic clearing,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	50	Litter distribution	under vegetation
Tree cover (%)	45	Litter depth(cm)	2
Shrub cover (%)	10	Litter cover (%)	30
Grass cover (%)	0		
Herb cover (%)	0		



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Site details			
Site	SITE005	Position (WGS84)	-31.357523, 118.75618
Topography	plain	Soil texture	sand, sandy loam
Slope	negligible	Rock type	ferrous - ironstone
Soil colour	yellow	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	28 Mar 2021	28 Mar 2021

Site description - visit 1 (28 Mar 2021)				
Tall <i>Allocasuarina</i> shrubs over semi-closed mid-tall myrtaceous shrubland on yellow sand				
Habitat				
Disturbance				
Vegetation condition	Excellent	Fire age	moderate (>5 years)	
Total veg. cover (%)	70	Litter distribution	under vegetation	
Tree cover (%)	50	Litter depth(cm)	1	
Shrub cover (%)	30	Litter cover (%)	80	
Grass cover (%)	0			
Herb cover (%)	0			



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Site details			
Site	SITE006	Position (WGS84)	-31.365103, 118.781524
Topography	plain	Soil texture	sand
Slope	negligible	Rock type	none
Soil colour	yellow	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	28 Mar 2021	28 Mar 2021

**Site description - visit 1 (28 Mar 2021)**

Patch of mallees over semi-closed mid shrubland of *Allocasuarina*, *Acacia* and mixed Myrtaceae over tussocky sedges

Habitat			
Disturbance			
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	60	Litter distribution	under vegetation
Tree cover (%)	50	Litter depth(cm)	2
Shrub cover (%)	20	Litter cover (%)	30
Grass cover (%)	5		
Herb cover (%)	0		



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Site details			
Site	SITE007	Position (WGS84)	-31.354244, 118.823698
Topography	plain	Soil texture	sandy loam
Slope	negligible	Rock type	quartz
Soil colour	grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	29 Mar 2021	29 Mar 2021

Site description - visit 1 (29 Mar 2021)

Open mixed Eucalypt forest over *Santalum* small trees and mixed low-mid open shrubland over tussock grasses and herbs, adjacent to treeless herbland patch on reddish cracking clay

Habitat			
Disturbance	Historic clearing, Litter,		
Vegetation condition	Very Good	Fire age	moderate (>5 years)
Total veg. cover (%)	60	Litter distribution	even/continuous
Tree cover (%)	30	Litter depth(cm)	1
Shrub cover (%)	30	Litter cover (%)	20
Grass cover (%)	20		
Herb cover (%)	2		



Targeted fauna survey of Lot 1416 and adjacent reserves  
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Site details			
Site	SITE008	Position (WGS84)	-31.348437, 118.824012
Topography	hill slope	Soil texture	sandy loam, rocks
Slope	gentle	Rock type	calcrete, granite - rocks
Soil colour	grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	29 Mar 2021	29 Mar 2021

**Site description - visit 1 (29 Mar 2021)**

Rough-barked Eucalypt open forest over sparse patchy grasses, herbs and moss on grey-brown soil with abundant rounded calcrete pebbles and angular fragments of granite, quartzite, quartz.

Habitat			
Disturbance	Historic clearing, Litter, Vehicle tracks,		
Vegetation condition	Good	Fire age	moderate (>5 years)
Total veg. cover (%)	60	Litter distribution	under vegetation
Tree cover (%)	60	Litter depth(cm)	1
Shrub cover (%)	1	Litter cover (%)	20
Grass cover (%)	1		
Herb cover (%)	1		



Targeted fauna survey of Lot 1416 and adjacent reserves  
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Site details			
Site	SITE009	Position (WGS84)	-31.355901, 118.821791
Topography	hill slope	Soil texture	sandy loam
Slope	gentle	Rock type	granite - rocks, quartz
Soil colour	red-brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	29 Mar 2021	29 Mar 2021

Site description - visit 1 (29 Mar 2021)

Mixed Eucalypt open forest (mostly *E. salubris*) over scattered tall shrubs (*Santalum*, *Exocarpus*, cf. *Melaleuca*) over patchy low shrubs and grasses

Habitat			
Disturbance	Historic clearing,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	60	Litter distribution	even/continuous
Tree cover (%)	60	Litter depth(cm)	1
Shrub cover (%)	10	Litter cover (%)	50
Grass cover (%)	2		
Herb cover (%)	1		



Targeted fauna survey of Lot 1416 and adjacent reserves  
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Site details			
Site	SITE010	Position (WGS84)	-31.356499, 118.809202
Topography	hill slope	Soil texture	sandy loam, rocks
Slope	gentle	Rock type	granite - outcropping, granite - rocks, quartz
Soil colour	red-orange, brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	29 Mar 2021	29 Mar 2021

Site description - visit 1 (29 Mar 2021)

Eucalypt forest (mostly rough-barked, multi-stemmed) over *Santalum* and miscellaneous scattered low-mid shrubs, patches of grass and herbs

Habitat			
Disturbance	Historic clearing, Vehicle tracks,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	40	Litter distribution	even/continuous
Tree cover (%)	40	Litter depth(cm)	1
Shrub cover (%)	2	Litter cover (%)	40
Grass cover (%)	1		
Herb cover (%)	1		





Targeted fauna survey of Lot 1416 and adjacent reserves  
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Site details			
Site	SITE011	Position (WGS84)	-31.346952, 118.79021
Topography	hill top	Soil texture	sandy loam
Slope	negligible	Rock type	ferrous - ironstone, quartz
Soil colour	yellow, grey, whitish	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	29 Mar 2021	29 Mar 2021

Site description - visit 1 (29 Mar 2021)				
<i>Allocasuarina</i> tall shrubland over mixed low-mid shrubs, scattered mallee overstorey				
Habitat				
Disturbance				
Vegetation condition	Excellent	Fire age	moderate (>5 years)	
Total veg. cover (%)	60	Litter distribution	under vegetation	
Tree cover (%)	50	Litter depth(cm)	1	
Shrub cover (%)	20	Litter cover (%)	50	
Grass cover (%)	1			
Herb cover (%)	0			



Targeted fauna survey of Lot 1416 and adjacent reserves  
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Site details			
Site	SITE012	Position (WGS84)	-31.34866, 118.791087
Topography	hill slope	Soil texture	clay loam
Slope	gentle	Rock type	granite - rocks, quartz
Soil colour	light-brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	29 Mar 2021	29 Mar 2021

**Site description - visit 1 (29 Mar 2021)**

Woodland of mixed *Eucalyptus* trees and mallees over patchy tall *Allocasuarina* and mid myrtaceous shrubs over patchy tussock grasses, pinkish brown soil (clay and grit, not sand)

Habitat			
Disturbance	Vehicle tracks,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	50	Litter distribution	under vegetation
Tree cover (%)	30	Litter depth(cm)	2
Shrub cover (%)	30	Litter cover (%)	30
Grass cover (%)	10		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
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Site details			
Site	SITE013	Position (WGS84)	-31.360475, 118.811149
Topography	hill slope	Soil texture	sandy loam
Slope	gentle	Rock type	granite - rocks, quartz
Soil colour	brown, orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

Site description - visit 1 (30 Mar 2021)

Salmon Gum woodland/open forest (~5% other Eucs) over scattered *Santalum*, *Exocarpos* etc mid-tall shrubs over *Atriplex*, *Senna?* and misc low-mid open shrubland

Habitat			
Disturbance	Historic clearing,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	60	Litter distribution	even/continuous
Tree cover (%)	30	Litter depth(cm)	2
Shrub cover (%)	40	Litter cover (%)	50
Grass cover (%)	0.1		
Herb cover (%)	2		



Targeted fauna survey of Lot 1416 and adjacent reserves  
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Site details			
Site	SITE014	Position (WGS84)	-31.361919, 118.81195
Topography	foot slope	Soil texture	sandy loam
Slope	negligible	Rock type	ferrous - ironstone, quartz
Soil colour	brown, orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

Site description - visit 1 (30 Mar 2021)				
<i>Euc ?salubris</i> woodland over open low-mid shrubland of <i>Atriplex</i> and misc other species at foot of slope				
Habitat				
Disturbance	Historic clearing, Litter,			
Vegetation condition	Excellent	Fire age	moderate (>5 years)	
Total veg. cover (%)	60	Litter distribution	even/continuous	
Tree cover (%)	50	Litter depth(cm)	2	
Shrub cover (%)	20	Litter cover (%)	60	
Grass cover (%)	1			
Herb cover (%)	5			



Targeted fauna survey of Lot 1416 and adjacent reserves  
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Site details			
Site	SITE015	Position (WGS84)	-31.362133, 118.805622
Topography	undulating plain	Soil texture	sandy clay
Slope	gentle	Rock type	quartz
Soil colour	red-brown, brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

**Site description - visit 1 (30 Mar 2021)**

*Euc. yilgarnensis* mallee woodland with scattered *Euc salubris* and Salmon gums and open patches of herbland or *Acacia* mid shrubs on clay, cracking in parts, and scattered granite low outcrops

Habitat			
Disturbance			
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	50	Litter distribution	under vegetation
Tree cover (%)	40	Litter depth(cm)	1
Shrub cover (%)	10	Litter cover (%)	40
Grass cover (%)	1		
Herb cover (%)	20		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE016	Position (WGS84)	-31.363167, 118.797259
Topography	undulating plain	Soil texture	sandy loam
Slope	gentle	Rock type	granite - rocks, quartz
Soil colour	red-orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

Site description - visit 1 (30 Mar 2021)			
Habitat			
Disturbance			
Vegetation condition		Fire age	
Total veg. cover (%)		Litter distribution	
Tree cover (%)		Litter depth(cm)	
Shrub cover (%)		Litter cover (%)	
Grass cover (%)			
Herb cover (%)			

**Site description - visit 1 (30 Mar 2021)**

Patchy woodland of *Euc. salubris*, *salmonophloia* and rough-barked sp. over *Santalum*, *Exocarpus*, *Acacia*, *Atriplex* low-mid shrubland over herbs and sparse tussock grasses

<b>Habitat</b>			
<b>Disturbance</b>			
<b>Vegetation condition</b>		<b>Fire age</b>	moderate (>5 years)
<b>Total veg. cover (%)</b>	40	<b>Litter distribution</b>	under vegetation
<b>Tree cover (%)</b>	30	<b>Litter depth(cm)</b>	1
<b>Shrub cover (%)</b>	20	<b>Litter cover (%)</b>	30
<b>Grass cover (%)</b>	1		
<b>Herb cover (%)</b>	2		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE017	Position (WGS84)	-31.366795, 118.799259
Topography	hill slope	Soil texture	sandy loam
Slope	gentle	Rock type	ferrous - ironstone, quartz
Soil colour	red-orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

**Site description - visit 1 (30 Mar 2021)**

Rough-barked grey Eucalypt woodland with some *Euc salubris* mainly in narrow N-S strip, over mid-tall open shrubland of ?*Melaleuca*, *Santalum*, *Exocarpus* over mixed low shrubs

Habitat			
Disturbance			
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	60	Litter distribution	under vegetation
Tree cover (%)	40	Litter depth(cm)	2
Shrub cover (%)	20	Litter cover (%)	40
Grass cover (%)	0		
Herb cover (%)	2		





Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE018	Position (WGS84)	-31.365528, 118.795788
Topography	ridgeline	Soil texture	clay loam, rocks
Slope	gentle	Rock type	ferrous - ironstone, granite - outcropping, granite - rocks, quartz
Soil colour	red-brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

Site description - visit 1 (30 Mar 2021)

Open patchy woodland with big *Euc salmonophloia* and smaller *salubris* over mixed *Santalum* etc., *Melaleuca* etc. over low-mid shrubs

Habitat			
Disturbance			
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	50	Litter distribution	under vegetation
Tree cover (%)	25	Litter depth(cm)	1
Shrub cover (%)	40	Litter cover (%)	20
Grass cover (%)	0		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE019	Position (WGS84)	-31.36583, 118.794447
Topography	hill top	Soil texture	clay loam, rocks
Slope	moderate	Rock type	granite - outcropping
Soil colour	brown, grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

**Site description - visit 1 (30 Mar 2021)**

Various smooth *Eucalyptus* species over open mid-tall shrubland of *Allocasuarina*, *Hakea/Grevillea* long-spine, mixed small-leaf shrubs on weathered granite outcrop and rubble

Habitat			
Disturbance			
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	60	Litter distribution	under vegetation
Tree cover (%)	40	Litter depth(cm)	2
Shrub cover (%)	30	Litter cover (%)	20
Grass cover (%)	0		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE020	Position (WGS84)	-31.367757, 118.768817
Topography	breakaway	Soil texture	rocks, clay loam and laterite
Slope	gentle	Rock type	ferrous - ironstone, granite - outcropping, granite - rocks
Soil colour	yellow, whitish, orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

Site description - visit 1 (30 Mar 2021)

Very gradual eroded breakaway with mid-tall shrubland of *Acacia*, *Allocasuarina*, spiny *Grevillea* and small-leaved Myrtaceae above, mixed Euc woodland over similar shrubs below to east

Habitat			
Disturbance	Litter, Vehicle tracks,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	50	Litter distribution	under vegetation
Tree cover (%)	40	Litter depth(cm)	2
Shrub cover (%)	20	Litter cover (%)	30
Grass cover (%)	0		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE021	Position (WGS84)	-31.370033, 118.769542
Topography	hill slope	Soil texture	sandy loam
Slope	gentle	Rock type	ferrous - ironstone
Soil colour	grey, whitish	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

**Site description - visit 1 (30 Mar 2021)**

Smooth-barked *Eucalyptus* sp. to dbh 50 mm and *Callitris* mid trees over tall open shrubland of *Allocasuarina* and *Melaleuca* over misc low-mid shrubs

Habitat			
Disturbance	Historic clearing,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	60	Litter distribution	under vegetation
Tree cover (%)	50	Litter depth(cm)	1
Shrub cover (%)	30	Litter cover (%)	30
Grass cover (%)	0		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE022	Position (WGS84)	-31.371069, 118.772145
Topography	drainage line	Soil texture	sandy loam
Slope	gentle	Rock type	granite - rocks, quartz
Soil colour	whitish, light-brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

Site description - visit 1 (30 Mar 2021)			
Habitat			
Disturbance			
Vegetation condition		Fire age	
Total veg. cover (%)		Litter distribution	
Tree cover (%)		Litter depth(cm)	
Shrub cover (%)		Litter cover (%)	
Grass cover (%)			
Herb cover (%)			

Site description - visit 1 (30 Mar 2021)			
Mixed smooth <i>Eucalyptus</i> woodland over scattered and patchy low-mid shrubs			
<b>Habitat</b>			
<b>Disturbance</b>	Historic clearing,		
<b>Vegetation condition</b>	Excellent	<b>Fire age</b>	moderate (>5 years)
<b>Total veg. cover (%)</b>	60	<b>Litter distribution</b>	under vegetation
<b>Tree cover (%)</b>	50	<b>Litter depth(cm)</b>	2
<b>Shrub cover (%)</b>	20	<b>Litter cover (%)</b>	50
<b>Grass cover (%)</b>	0		
<b>Herb cover (%)</b>	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE023	Position (WGS84)	-31.367368, 118.771768
Topography	drainage line	Soil texture	sandy loam
Slope	gentle	Rock type	granite - rocks, quartz
Soil colour	light-brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

Site description - visit 1 (30 Mar 2021)			
Mixed smooth <i>Eucalyptus</i> woodland over scattered and patchy low-mid shrubs			
Habitat			
Disturbance			
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	0	Litter distribution	
Tree cover (%)	0	Litter depth(cm)	
Shrub cover (%)	0	Litter cover (%)	0
Grass cover (%)	0		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE024	Position (WGS84)	-31.377302, 118.728429
Topography	hill slope	Soil texture	sandy loam
Slope	gentle	Rock type	ferrous - ironstone
Soil colour	yellow, grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

**Site description - visit 1 (30 Mar 2021)**

Open woodland of tall *Euc. salmonophloia* over tall open *Melaleuca* shrubland over *Santalum* and mixed low-mid shrubs

Habitat			
Disturbance	Historic clearing, Vehicle tracks,		
Vegetation condition	Very Good	Fire age	moderate (>5 years)
Total veg. cover (%)	40	Litter distribution	transported
Tree cover (%)	30	Litter depth(cm)	2
Shrub cover (%)	20	Litter cover (%)	40
Grass cover (%)	0		
Herb cover (%)	0		





Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE025	Position (WGS84)	-31.379338, 118.732131
Topography	hill slope	Soil texture	sandy loam
Slope	gentle	Rock type	ferrous - ironstone
Soil colour	light-brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

Site description - visit 1 (30 Mar 2021)				
Mixed <i>Eucalyptus</i> tree and mallee woodland over mixed scattered low shrubs and patchy tussock grasses				
Habitat				
Disturbance	Litter, Vehicle tracks,			
Vegetation condition	Excellent	Fire age	moderate (>5 years)	
Total veg. cover (%)	60	Litter distribution	under vegetation	
Tree cover (%)	40	Litter depth(cm)	1	
Shrub cover (%)	5	Litter cover (%)	40	
Grass cover (%)	10			
Herb cover (%)	0			



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE026	Position (WGS84)	-31.379313, 118.733636
Topography	plain	Soil texture	sandy loam, loam, clay loam and laterite
Slope	negligible	Rock type	ferrous - ironstone
Soil colour	yellow, grey, orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	30 Mar 2021	30 Mar 2021

**Site description - visit 1 (30 Mar 2021)**

Salmon gums, mixed other *Eucalyptus* and tree *Hakea* scattered over *Allocasuarina* and *Melaleuca* mid-tall shrubland over low myrtaceous shrubs and scattered tussocky sedges

Habitat			
Disturbance			
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	70	Litter distribution	even/continuous
Tree cover (%)	50	Litter depth(cm)	2
Shrub cover (%)	40	Litter cover (%)	70
Grass cover (%)	0		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE027	Position (WGS84)	-31.379091, 118.797956
Topography	undulating plain	Soil texture	sandy loam
Slope	negligible	Rock type	ferrous - ironstone
Soil colour	yellow, light-brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	31 Mar 2021	31 Mar 2021

Site description - visit 1 (31 Mar 2021)				
Scattered mallees over mid-tall shrubland of <i>Allocasuarina</i> , small-leaf cf. <i>Melaleuca</i> , spiny <i>Grevillea</i>				
Habitat				
Disturbance	Firebreak,			
Vegetation condition	Excellent	Fire age	moderate (>5 years)	
Total veg. cover (%)	80	Litter distribution	under vegetation	
Tree cover (%)	30	Litter depth(cm)	1	
Shrub cover (%)	70	Litter cover (%)	80	
Grass cover (%)	0			
Herb cover (%)	0			



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE028	Position (WGS84)	-31.378042, 118.796873
Topography	plain	Soil texture	sandy loam
Slope	negligible	Rock type	ferrous - ironstone
Soil colour	yellow, grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	31 Mar 2021	31 Mar 2021

Site description - visit 1 (31 Mar 2021)

Mixed stand of mallees over *Callitris* and *Allocasuarina* tall shrubland (with *Hakea* and *Grevillea*) over cf. *Melaleuca* and *Acacia* mid shrubs, few patches of sedge tussocks

Habitat			
Disturbance			
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	70	Litter distribution	under vegetation
Tree cover (%)	50	Litter depth(cm)	1
Shrub cover (%)	30	Litter cover (%)	40
Grass cover (%)	0.1		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE029	Position (WGS84)	-31.380084, 118.789035
Topography	plain	Soil texture	sand, sandy loam
Slope	negligible	Rock type	none
Soil colour	yellow	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	31 Mar 2021	31 Mar 2021

Site description - visit 1 (31 Mar 2021)				
Scattered low mallees over <i>Allocasuarina</i> and <i>Hakea</i> mid-tall shrubland over mixed low shrubs and sedges				
Habitat				
Disturbance	Firebreak,			
Vegetation condition	Excellent	Fire age	moderate (>5 years)	
Total veg. cover (%)	70	Litter distribution	under vegetation	
Tree cover (%)	50	Litter depth(cm)	1	
Shrub cover (%)	30	Litter cover (%)	70	
Grass cover (%)	5			
Herb cover (%)	0			



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE030	Position (WGS84)	-31.380476, 118.788356
Topography	plain	Soil texture	sand, sandy loam
Slope	negligible	Rock type	none
Soil colour	yellow, grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	31 Mar 2021	31 Mar 2021

Site description - visit 1 (31 Mar 2021)

*Allocasuarina*, *Hakea* and *Grevillea* mid shrubland over mixed low shrubs, sedges and mosses; scattered mallees >50 m away

Habitat			
Disturbance	Firebreak,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	60	Litter distribution	under vegetation
Tree cover (%)	5	Litter depth(cm)	1
Shrub cover (%)	50	Litter cover (%)	30
Grass cover (%)	5		
Herb cover (%)	2		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE031	Position (WGS84)	-31.380651, 118.782796
Topography	plain	Soil texture	sand, sandy loam
Slope	negligible	Rock type	none
Soil colour	yellow, grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	31 Mar 2021	31 Mar 2021

Site description - visit 1 (31 Mar 2021)			
Habitat			
Disturbance			
Vegetation condition		Fire age	
Total veg. cover (%)		Litter distribution	
Tree cover (%)		Litter depth(cm)	
Shrub cover (%)		Litter cover (%)	
Grass cover (%)			
Herb cover (%)			

**Site description - visit 1 (31 Mar 2021)**

Scattered low mallees and tall *Allocasuarina* shrubs over mixed low shrubs and sedges

<b>Habitat</b>			
<b>Disturbance</b>	Firebreak,		
<b>Vegetation condition</b>	Excellent	<b>Fire age</b>	moderate (>5 years)
<b>Total veg. cover (%)</b>	70	<b>Litter distribution</b>	under vegetation
<b>Tree cover (%)</b>	20	<b>Litter depth(cm)</b>	1
<b>Shrub cover (%)</b>	30	<b>Litter cover (%)</b>	25
<b>Grass cover (%)</b>	30		
<b>Herb cover (%)</b>	0		





Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE032	Position (WGS84)	-31.376229, 118.812111
Topography	plain	Soil texture	sand, sandy loam
Slope	negligible	Rock type	ferrous - ironstone
Soil colour	yellow, grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	31 Mar 2021	31 Mar 2021

Site description - visit 1 (31 Mar 2021)				
<i>Allocasuarina</i> tall shrubland over low-mid spiny <i>Grevillea</i>				
Habitat				
Disturbance				
Vegetation condition	Excellent	Fire age	moderate (>5 years)	
Total veg. cover (%)	80	Litter distribution	under vegetation	
Tree cover (%)	60	Litter depth(cm)	1	
Shrub cover (%)	30	Litter cover (%)	30	
Grass cover (%)	0			
Herb cover (%)	0			



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE033	Position (WGS84)	-31.376314, 118.81186
Topography	breakaway	Soil texture	sandy clay
Slope	gentle	Rock type	ferrous - ironstone, granite - outcropping, granite - rocks
Soil colour	yellow, grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	31 Mar 2021	31 Mar 2021

Site description - visit 1 (31 Mar 2021)

Mixed *Eucalyptus* trees and mallees on slight slope of breakaway, over *Callitris*, *Acacia* and mixed low-mid shrubs

Habitat			
Disturbance	Firebreak,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	50	Litter distribution	under vegetation
Tree cover (%)	40	Litter depth(cm)	1
Shrub cover (%)	20	Litter cover (%)	40
Grass cover (%)	1		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE034	Position (WGS84)	-31.376643, 118.811314
Topography	plain	Soil texture	sand, sandy loam
Slope	negligible	Rock type	ferrous - ironstone
Soil colour	grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	31 Mar 2021	31 Mar 2021

**Site description - visit 1 (31 Mar 2021)**

Mixed mallee and *Melaleuca* low woodland with sparse low-mid mixed shrubs and patchy tussock grass/sedge

Habitat			
Disturbance			
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	50	Litter distribution	transported
Tree cover (%)	50	Litter depth(cm)	1
Shrub cover (%)	5	Litter cover (%)	25
Grass cover (%)	3		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE035	Position (WGS84)	-31.376898, 118.809887
Topography	depression	Soil texture	clay loam
Slope	gentle	Rock type	granite - outcropping, quartz
Soil colour	brown-grey, light-brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	31 Mar 2021	31 Mar 2021

**Site description - visit 1 (31 Mar 2021)**

Tall and mid *Hakea/Grevillea/Melaleuca* shrubland over tussock grasses on flats surrounding low granite dome

Habitat			
Disturbance			
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	60	Litter distribution	under vegetation
Tree cover (%)	30	Litter depth(cm)	2
Shrub cover (%)	20	Litter cover (%)	20
Grass cover (%)	20		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE036	Position (WGS84)	-31.375396, 118.810354
Topography	undulating plain	Soil texture	sandy loam
Slope	gentle	Rock type	ferrous - ironstone, quartz
Soil colour	red-orange, brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	31 Mar 2021	31 Mar 2021

**Site description - visit 1 (31 Mar 2021)**

Salmon gums and *Euc salubris* tall mallees over patchy tall *Melaleuca* shrubland over *Exocarpus*, *Santalum* and mixed low-mid shrubs

Habitat			
Disturbance	Historic clearing,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	50	Litter distribution	under vegetation
Tree cover (%)	30	Litter depth(cm)	2
Shrub cover (%)	30	Litter cover (%)	40
Grass cover (%)	0		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE037	Position (WGS84)	-31.368984, 118.822107
Topography	hill slope	Soil texture	sandy loam
Slope	gentle	Rock type	ferrous - ironstone, quartz
Soil colour	red-brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	31 Mar 2021	31 Mar 2021

Site description - visit 1 (31 Mar 2021)

*Euc salubris* with some *salmonophloia* and other *Eucalyptus* spp. over patchy low shrubs and tussocks

Habitat			
Disturbance	Historic clearing, Litter,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	50	Litter distribution	under vegetation
Tree cover (%)	40	Litter depth(cm)	2
Shrub cover (%)	20	Litter cover (%)	40
Grass cover (%)	5		
Herb cover (%)	2		



Targeted fauna survey of Lot 1416 and adjacent reserves

Prepared for Mineral Resources Ltd

Site details			
Site	SITE038	Position (WGS84)	-31.368389, 118.818887
Topography	hill slope	Soil texture	sandy clay, sandy loam
Slope	gentle	Rock type	ferrous - ironstone, quartz
Soil colour	red-orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	31 Mar 2021	31 Mar 2021

Site description - visit 1 (31 Mar 2021)			
Habitat			
Disturbance			
Vegetation condition		Fire age	
Total veg. cover (%)		Litter distribution	
Tree cover (%)		Litter depth(cm)	
Shrub cover (%)		Litter cover (%)	
Grass cover (%)			
Herb cover (%)			

**Site description - visit 1 (31 Mar 2021)**

Grey spotted *Eucalyptus* sp. over open tall *Allocasuarina* shrubs over low-mid *Acacia*, *Grevillea* and misc shrubs over patchy tussock grass

<b>Habitat</b>			
<b>Disturbance</b>			
<b>Vegetation condition</b>	Excellent	<b>Fire age</b>	moderate (>5 years)
<b>Total veg. cover (%)</b>	50	<b>Litter distribution</b>	under vegetation
<b>Tree cover (%)</b>	40	<b>Litter depth(cm)</b>	2
<b>Shrub cover (%)</b>	20	<b>Litter cover (%)</b>	40
<b>Grass cover (%)</b>	1		
<b>Herb cover (%)</b>	0		





Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE039	Position (WGS84)	-31.370534, 118.822559
Topography	undulating plain	Soil texture	sand, sandy loam
Slope	gentle	Rock type	ferrous - ironstone
Soil colour	brown, yellow	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	31 Mar 2021	31 Mar 2021

Site description - visit 1 (31 Mar 2021)				
Scattered mallees and tall <i>Allocasuarina</i> over mixed low-mid shrubs and patchy tussock grass				
Habitat				
Disturbance	Firebreak, Vehicle tracks,			
Vegetation condition	Excellent	Fire age	moderate (>5 years)	
Total veg. cover (%)	70	Litter distribution	under vegetation	
Tree cover (%)	40	Litter depth(cm)	2	
Shrub cover (%)	30	Litter cover (%)	40	
Grass cover (%)	10			
Herb cover (%)	0			



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE040	Position (WGS84)	-31.372255, 118.716546
Topography	plain	Soil texture	sandy loam
Slope	negligible	Rock type	granite - rocks, quartz
Soil colour	light-brown, white	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	01 Apr 2021	01 Apr 2021

**Site description - visit 1 (01 Apr 2021)**

*Euc. capillosa*, *salmonophloia* and *salubris* trees and mallees over mid-tall patchy shrubland of *Melaleuca*, *Santalum*, *Exocarpus* over patchy low shrubs and tussocks

Habitat			
Disturbance	Historic clearing, Litter, Vehicle tracks,		
Vegetation condition	Very Good	Fire age	moderate (>5 years)
Total veg. cover (%)	40	Litter distribution	under vegetation
Tree cover (%)	30	Litter depth(cm)	2
Shrub cover (%)	5	Litter cover (%)	40
Grass cover (%)	10		
Herb cover (%)	1		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE041	Position (WGS84)	-31.369499, 118.715881
Topography	plain	Soil texture	clay loam
Slope	negligible	Rock type	granite - rocks
Soil colour	grey, light-brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	01 Apr 2021	01 Apr 2021

Site description - visit 1 (01 Apr 2021)				
<i>Melaleuca</i> and <i>Allocasuarina</i> mid-tall shrubland over sedge tussocks and <i>Borya</i>				
Habitat				
Disturbance				
Vegetation condition	Excellent	Fire age	moderate (>5 years)	
Total veg. cover (%)	70	Litter distribution	under vegetation	
Tree cover (%)	20	Litter depth(cm)	1	
Shrub cover (%)	60	Litter cover (%)	20	
Grass cover (%)	10			
Herb cover (%)	2			



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE042	Position (WGS84)	-31.368802, 118.711653
Topography	drainage line	Soil texture	clay loam
Slope	gentle	Rock type	granite - rocks, quartz
Soil colour	grey, light-brown, orange	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	01 Apr 2021	01 Apr 2021

**Site description - visit 1 (01 Apr 2021)**

*Euc capillosa*, *salmonophloia* and *salubris* open woodland over tall open *Melaleuca* and *Santalum* over scattered low myrtaceous shrubs

Habitat			
Disturbance			
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	50	Litter distribution	transported
Tree cover (%)	30	Litter depth(cm)	2
Shrub cover (%)	20	Litter cover (%)	20
Grass cover (%)	0		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE043	Position (WGS84)	-31.37031, 118.710168
Topography	plain	Soil texture	sandy loam
Slope	negligible	Rock type	quartz
Soil colour	grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	01 Apr 2021	01 Apr 2021

**Site description - visit 1 (01 Apr 2021)**

*Euc capillosa* up to 120 mm dbh over *Callitris*, *Santalum*, scattered *Melaleuca* tall shrubs over mid *Acacia* wattle

Habitat			
Disturbance	Historic clearing,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	70	Litter distribution	under vegetation
Tree cover (%)	60	Litter depth(cm)	1
Shrub cover (%)	10	Litter cover (%)	70
Grass cover (%)	0.1		
Herb cover (%)	0		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE044	Position (WGS84)	-31.371276, 118.709311
Topography	plain	Soil texture	clay loam, rocks
Slope	negligible	Rock type	granite - outcropping, granite - rocks
Soil colour	grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	01 Apr 2021	01 Apr 2021

Site description - visit 1 (01 Apr 2021)				
<i>Callitris, Melaleuca, Allocasuarina</i> and <i>Acacia</i> wattle tall shrubland on and around flat-top granite outcrop				
Habitat				
Disturbance				
Vegetation condition	Excellent	Fire age	moderate (>5 years)	
Total veg. cover (%)	70	Litter distribution	under vegetation	
Tree cover (%)	70	Litter depth(cm)	1	
Shrub cover (%)	1	Litter cover (%)	50	
Grass cover (%)	1			
Herb cover (%)	0			



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE045	Position (WGS84)	-31.371916, 118.708394
Topography	hill slope	Soil texture	clay loam, loam, clay loam and laterite
Slope	gentle	Rock type	ferrous - ironstone, granite - rocks, quartz
Soil colour	yellow, grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	01 Apr 2021	01 Apr 2021

Site description - visit 1 (01 Apr 2021)				
?Borrow pit rehabbed with mixed low-mid shrubs and tussocks (?weird Triodia)				
Habitat				
Disturbance	Excavation, Large-scale clearing, Revegetation,			
Vegetation condition	Good	Fire age	moderate (>5 years)	
Total veg. cover (%)	40	Litter distribution	under vegetation	
Tree cover (%)	20	Litter depth(cm)	1	
Shrub cover (%)	10	Litter cover (%)	10	
Grass cover (%)	10			
Herb cover (%)	0			



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE046	Position (WGS84)	-31.372058, 118.721321
Topography	hill top	Soil texture	clay loam, rocks
Slope	gentle	Rock type	granite - outcropping, granite - rocks
Soil colour	grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	01 Apr 2021	01 Apr 2021

**Site description - visit 1 (01 Apr 2021)**

Granite outcrop with *Borya* patches flanked by *Acacia acuminata*, *Allocasuarina*, *Melaleuca* mid-tall shrubland over tussock grasses

Habitat			
Disturbance	Historic clearing, Litter,		
Vegetation condition	Very Good	Fire age	moderate (>5 years)
Total veg. cover (%)	60	Litter distribution	under vegetation
Tree cover (%)	20	Litter depth(cm)	1
Shrub cover (%)	20	Litter cover (%)	10
Grass cover (%)	10		
Herb cover (%)	10		





Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE047	Position (WGS84)	-31.375517, 118.723368
Topography	hill slope	Soil texture	sand, sandy loam
Slope	gentle	Rock type	quartz
Soil colour	yellow, grey, light-brown	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	01 Apr 2021	01 Apr 2021

**Site description - visit 1 (01 Apr 2021)**

*Euc capillosa* open woodland over sparse (mostly dead) *Allocasuarina* tall shrubs over scattered low-mid mixed shrubs over spinifex, tussock grasses and *Borya*

Habitat			
Disturbance	Historic clearing, Litter,		
Vegetation condition	Excellent	Fire age	moderate (>5 years)
Total veg. cover (%)	40	Litter distribution	even/continuous
Tree cover (%)	30	Litter depth(cm)	1
Shrub cover (%)	1	Litter cover (%)	50
Grass cover (%)	10		
Herb cover (%)	10		



Targeted fauna survey of Lot 1416 and adjacent reserves  
Prepared for Mineral Resources Ltd

Site details			
Site	SITE048	Position (WGS84)	-31.37387, 118.725135
Topography	breakaway	Soil texture	sandy loam
Slope	moderate	Rock type	granite - rocks
Soil colour	grey	Rock cover (%)	0

Sample and effort summary				
Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	01 Apr 2021	01 Apr 2021

Site description - visit 1 (01 Apr 2021)				
Top of breakaway <i>Callitris</i> and <i>Allocasuarina</i> tall shrubland, <i>Euc capillosa</i> open woodland over <i>Acacia acuminata</i> and <i>Melaleuca</i> tall shrubs on and below slope, <i>Callitris</i> again further down				
Habitat				
Disturbance	Historic clearing,			
Vegetation condition	Excellent	Fire age	moderate (>5 years)	
Total veg. cover (%)	50	Litter distribution	under vegetation	
Tree cover (%)	40	Litter depth(cm)	2	
Shrub cover (%)	20	Litter cover (%)	50	
Grass cover (%)	0			
Herb cover (%)	0			



Appendix 5 Vertebrate fauna desktop and field survey results

Family	Species	Common name	Status	Introduced	Desktop sources <sup>1</sup>							Haul Road	This survey
					NMap	Birdata	TPFA	PMST	KLA 09	Eco 12	Biota 14		
<b>AMPHIBIANS</b>													
<b>Limnodynastidae</b>	<i>Heleioporus albopunctatus</i>	Western Spotted Frog			•								
	<i>Neobatrachus albipes</i>	White-footed Trilling Frog			•								
	<i>Neobatrachus kunapalari</i>	Kunapalari Frog			•				•	•		•	
	<i>Neobatrachus pelobatoides</i>	Humming Frog											
<b>Myobatrachidae</b>	<i>Pseudophryne guentheri</i>	Crawling Toadlet			•								
	<i>Pseudophryne occidentalis</i>	Western Toadlet											
<b>REPTILES</b>													
<b>Agamidae</b>	<i>Ctenophorus cristatus</i>	Crested Dragon			•				•		•	•	•
	<i>Ctenophorus isolepis citrinus</i>	Military Dragon			•				•				
	<i>Ctenophorus maculatus griseus</i>	Spotted Military Dragon			•						•		•
	<i>Ctenophorus ornatus</i>	Ornate Crevice Dragon			•								
	<i>Ctenophorus reticulatus</i>	Western Netted Dragon			•								
	<i>Ctenophorus salinarum</i>	Claypan Dragon									•		
	<i>Ctenophorus scutulatus</i>	Lozenge-marked Dragon								•		•	•
	<i>Moloch horridus</i>	Thorny Devil			•						•	•	•
	<i>Pogona minor minor</i>	Western Bearded Dragon			•			•	•	•	•		
	<i>Tympanocryptis cephalus</i>	Pebble Dragon											
<b>Gekkonidae</b>	<i>Christinus marmoratus</i>	Marbled Gecko			•								
	<i>Gehyra variegata</i>	Common Dtella			•				•	•	•	•	
	<i>Heteronotia binoei</i>	Bynoe's Prickly Gecko			•				•	•		•	•
<b>Carphodactylidae</b>	<i>Nephrurus stellatus</i>	Stellate Knob-tailed Gecko									•		

Family	Species	Common name	Status	Introduced	Desktop sources <sup>1</sup>							Haul Road	This survey	
					NMap	Birddata	TPFA	PMST	KLA 09	Eco 12	Biota 14			WW 17
	<i>Underwoodisaurus milii</i>	Barking Gecko			•						•	•	•	
<b>Diplodactylidae</b>	<i>Crenadactylus ocellatus</i>	Clawless Gecko			•						•	•	•	
	<i>Diplodactylus calcicolus</i>	South Coast Gecko										•		
	<i>Diplodactylus granariensis</i>	Western Stone Gecko			•						•	•	•	
	<i>Diplodactylus pulcher</i>	Fine-faced Gecko			•						•			
	<i>Hesperoedura reticulata</i>	Reticulated Velvet Gecko						•			•	•	•	
	<i>Lucasium maini</i>	Main's Ground Gecko						•			•	•	•	
	<i>Strophurus assimilis</i>	Goldfields Spiny-tail Gecko							•					
	<i>Strophurus spinigerus</i>	Soft Spiny-tailed Gecko						•				•		
<b>Pygopodidae</b>	<i>Delma australis</i>	Southern (Marble-faced) Delma									•	•		
	<i>Delma butleri</i>	Butler's Delma												
	<i>Delma fraseri</i>	Fraser's Delma			•							•		
	<i>Lialis burtonis</i>	Burton's Legless lizard			•									
	<i>Pygopus lepidopus</i>	Common Scaly-foot			•			•				•		
<b>Scincidae</b>	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink									•	•		
	<i>Cryptoblepharus plagiocephalus</i>	Peron's Snake-eyed Skink			•								•	
	<i>Ctenotus atlas</i>	Southern Mallee Ctenotus										•		
	<i>Ctenotus impar</i>	Southwest Odd-striped Ctenotus										•		
	<i>Ctenotus leonhardii</i>	Leonhard's Ctenotus			•									
	<i>Ctenotus mimetes</i>	Checker-sided Ctenotus							•			•	•	
	<i>Ctenotus pantherinus</i>	Leopard Ctenotus												
	<i>Ctenotus schomburgkii</i>	Barred Wedge-snout Ctenotus										•	•	
	<i>Ctenotus uber uber</i>	Spotted Ctenotus			•						•	•	•	

Family	Species	Common name	Status	Introduced	Desktop sources <sup>1</sup>							Haul Road	This survey	
					NMap	Birddata	TPFA	PMST	KLA 09	Eco 12	Biota 14			WW 17
	<i>Ctenotus xenopleura</i>	Wide-striped Ctenotus								•				
	<i>Cyclodomorphus melanops</i>	Spinifex Slender Bluetongue									•			
	<i>Egernia depressa</i>	Southern Pygmy Spiny-tail Skink												
	<i>Egernia formosa</i>	Goldfields Crevice skink									•			
	<i>Egernia richardi</i>	Bright Crevice Skink			•			•				•		
	<i>Eremiascincus richardsonii</i>	Broad-banded Sandswimmer									•			
	<i>Hemiergus initialis</i>	Southwestern Earless Skink										•	•	
	<i>Lerista distinguenda</i>	Southwestern Orange-tailed Slider										•		
	<i>Lerista gerrardii</i>	Bold-striped Robust Slider											•	
	<i>Lerista kingi</i>	King's Lerista			•					•	•	•	•	
	<i>Lerista macropisthopus</i>	Unpatterned Robust Slider									•			
	<i>Lerista timida</i>	Timid Slider									•			•
	<i>Liopholis inornata</i>	Desert Skink						•						
	<i>Liopholis multiscutata</i>	Bull Skink			•							•	•	
	<i>Menetia greyii</i>	Common Dwarf Skink			•			•		•	•	•	•	
	<i>Morethia butleri</i>	Woodland Morethia Skink			•			•		•	•	•	•	
	<i>Morethia obscura</i>	Shrubland Morethia Skink									•			
	<i>Tiliqua occipitalis</i>	Western Bluetongue								•	•	•	•	
	<i>Tiliqua rugosa rugosa</i>	Bobtail								•		•	•	•
<b>Varanidae</b>	<i>Varanus giganteus</i>	Perentie									•			
	<i>Varanus gouldii</i>	Gould's Sand Monitor			•					•		•	•	•
	<i>Varanus rosenbergi</i>	Heath Monitor										•		
	<i>Varanus tristis</i>	Black-tailed Monitor								•	•		•	

Family	Species	Common name	Status	Introduced	Desktop sources <sup>1</sup>							Haul Road	This survey	
					NMap	Birdata	TPFA	PMST	KLA 09	Eco 12	Biota 14			WW 17
<b>Typhlopidae</b>	<i>Anilius australis</i>	Southern Blindsnake										•		
	<i>Anilius bicolor</i>	Dark-spined Blindsnake			•									
	<i>Anilius bituberculatus</i>	Prong-snouted Blindsnake									•			
	<i>Anilius hamatus</i>	Pale-headed Blindsnake									•			
<b>Pythonidae</b>	<i>Aspidites ramsayi</i>	Woma (southwest)	P1 (DBC list)		•		•							
	<i>Morelia spilota imbricata</i>	Southwestern Carpet Python			•									
<b>Elapidae</b>	<i>Brachyuropsis semifasciatus</i>	Southern Shovel-snout			•						•			
	<i>Furina ornata</i>	Moon Snake									•			
	<i>Paroplocephalus atriceps</i>	Lake Cronin Snake	P3 (DBC list)				•							
	<i>Pseudechis australis</i>	Mulga Snake, King Brown			•			•			•			
	<i>Pseudonaja a. affinis</i>	Dugite (mainland)			•							•		
	<i>Pseudonaja mengdeni</i>	Gwardar, Western Brown Snake			•									
	<i>Pseudonaja modesta</i>	Ringed Brown Snake			•									
	<i>Simoselaps bertholdi</i>	Jan's Banded Snake			•						•	•		
	<i>Suta gouldii</i>	Gould's Hooded Snake			•									
	<i>Suta monachus</i>	Monk Snake									•			
	<i>Suta fasciata</i>	Rosen's Snake			•									
<b>BIRDS</b>														
<b>Casuariidae</b>	<i>Dromaius novaehollandiae</i>	Emu			•	•			•			•	•	
<b>Megapodiidae</b>	<i>Leipoa ocellata</i>	Malleefowl	VU (EPBC & BC Acts)		•	•	•	•	•		•	•	•	•
<b>Phasianidae</b>	* <i>Pavo cristatus</i>	Indian Peafowl											•	
<b>Anatidae</b>	<i>Tadorna tadornoides</i>	Australian Shelduck				•								
	<i>Chenonetta jubata</i>	Australian Wood Duck			•	•								

Family	Species	Common name	Status	Introduced	Desktop sources <sup>1</sup>							Haul Road	This survey	
					NMap	Birdata	TPFA	PMST	KLA 09	Eco 12	Biota 14			WW 17
	<i>Anas gracilis</i>	Grey Teal				•						•		
	<i>Anas superciliosus</i>	Pacific Black Duck				•								
	<i>Malacorhynchus membranaceus</i>	Pink-eared Duck				•								
	<i>Aythya australis</i>	Hardhead				•								
<b>Podicipedidae</b>	<i>Tachybaptus novaehollandiae</i>	Australasian Grebe				•								
	<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe				•								
<b>Columbidae</b>	* <i>Columba livia</i>	Rock Dove, Feral Pigeon				•		•						
	* <i>Streptopelia senegalensis</i>	Laughing Dove				•		•						
	<i>Phaps chalcoptera</i>	Common Bronzewing			•	•					•	•	•	•
	<i>Phaps elegans</i>	Brush Bronzewing										•		
	<i>Ocyphaps lophotes</i>	Crested Pigeon			•	•					•		•	•
<b>Podargidae</b>	<i>Podargus strigoides</i>	Tawny Frogmouth			•	•					•	•	•	
<b>Eurostopodidae</b>	<i>Eurostopodus argus</i>	Spotted Nightjar			•	•		•			•	•		
<b>Aegothelidae</b>	<i>Aegotheles cristatus</i>	Australian Owlet Nightjar			•	•					•			
<b>Apodidae</b>	<i>Apus pacificus</i>	Fork-tailed Swift	Mig. (EPBC & BC Acts)					•						
<b>Phalacrocoracidae</b>	<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant				•								
<b>Ardeidae</b>	<i>Egretta novaehollandiae</i>	White-faced Heron				•								
	<i>Ardea ibis</i>	Cattle Egret						•						
	<i>Ardea modesta</i>	Great Egret						•						
<b>Accipitridae</b>	<i>Elanus caeruleus</i>	Black-shouldered Kite			•	•								
	<i>Hamirostra isura</i>	Square-tailed Kite			•	•						•		
	<i>Hamirostra melanosternon</i>	Black-breasted Buzzard			•									
	<i>Haliastur sphenurus</i>	Whistling Kite								•	•	•		

Family	Species	Common name	Status	Introduced	Desktop sources <sup>1</sup>							Haul Road	This survey	
					NMap	Birdata	TPFA	PMST	KLA 09	Eco 12	Biota 14			WW 17
	<i>Milvus migrans</i>	Black Kite				•								
	<i>Accipiter fasciatus</i>	Brown Goshawk				•					•			
	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk				•						•	•	
	<i>Circus assimilis</i>	Spotted Harrier			•	•								
	<i>Aquila audax</i>	Wedge-tailed Eagle			•	•			•			•	•	•
	<i>Hieraeetus morphnoides</i>	Little Eagle			•	•						•		
<b>Falconidae</b>	<i>Falco cenchroides</i>	Nankeen Kestrel			•	•							•	
	<i>Falco berigora</i>	Brown Falcon			•	•			•		•	•	•	•
	<i>Falco hypoleucos</i>	Grey Falcon	VU (EPBC & BC Acts)					•						
	<i>Falco longipennis</i>	Australian Hobby			•	•							•	
	<i>Falco peregrinus</i>	Peregrine Falcon	OS (BC Act)			•	•				•	•	•	
<b>Rallidae</b>	<i>Fulica atra</i>	Eurasian Coot				•								
	<i>Tribonyx ventralis</i>	Black-tailed Native-hen				•								
<b>Otididae</b>	<i>Ardeotis australis</i>	Australian Bustard											•	
<b>Recurvirostridae</b>	<i>Cladorhynchus leucocephalus</i>	Banded Stilt				•								
	<i>Himantopus himantopus</i>	Black-winged Stilt				•								
	<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet				•								
<b>Charadriidae</b>	<i>Charadrius ruficapillus</i>	Red-capped Plover				•								
	<i>Elsyornis melanops</i>	Black-fronted Dotterel				•								
	<i>Thinornis rubricollis</i>	Hooded Plover	P4 (DBCA list)				•	•						
	<i>Vanellus tricolor</i>	Banded Lapwing				•								
<b>Scolopacidae</b>	<i>Actitis hypoleucos</i>	Common Sandpiper	Mig. (EPBC & BC Acts)			•		•						



Family	Species	Common name	Status	Introduced	Desktop sources <sup>1</sup>								Haul Road	This survey
					NMap	Birdata	TPFA	PMST	KLA 09	Eco 12	Biota 14	WW 17		
	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mig. (EPBC & BC Acts)					•						
	<i>Calidris ferruginea</i>	Curlew Sandpiper (CR)	CR/Mig. (EPBC & BC Acts)					•						
	<i>Calidris melanotos</i>	Pectoral Sandpiper	Mig. (EPBC & BC Acts)					•						
	<i>Tringa nebularia</i>	Common Greenshank	Mig. (EPBC & BC Acts)			•	•							
<b>Turnicidae</b>	<i>Turnix varia</i>	Painted Button-quail										•		
	<i>Turnix velox</i>	Little Button-quail					•							
<b>Laridae</b>	<i>Larus novaehollandiae</i>	Silver Gull					•							
<b>Cacatuidae</b>	<i>Calyptorhynchus banksii</i>	Red-tailed Black Cockatoo				•				•			•	
	<i>Cacatua leadbeateri</i>	Major Mitchell's Cockatoo				•	•				•		•	
	<i>Cacatua roseicapilla</i>	Galah				•			•	•			•	•
	<i>Cacatua sanguinea</i>	Little Corella					•							
	<i>Nymphicus hollandicus</i>	Cockatiel					•							
<b>Psittaculidae</b>	<i>Parvipsitta porphyrocephala</i>	Purple-crowned Lorikeet					•				•	•	•	
	<i>Pezoporus occidentalis</i>	Night Parrot	EN (EPBC)/CR (BC Act)					•						
	<i>Polytelis anthopeplus</i>	Regent Parrot				•	•					•		
	<i>Platycercus icterotis xanthogenys</i>	Western Rosella (inland)	P4 (DBC list)			•			•			•		
	<i>Platycercus zonarius</i>	Australian Ringneck				•	•		•	•	•	•	•	•
	<i>Platycercus varius</i>	Mulga Parrot					•						•	
	<i>Melopsittacus undulatus</i>	Budgerigar					•							•
	<i>Neophema elegans</i>	Elegant Parrot					•		•			•		

Family	Species	Common name	Status	Introduced	Desktop sources <sup>1</sup>							Haul Road	This survey	
					NMap	Birdata	TPFA	PMST	KLA 09	Eco 12	Biota 14			WW 17
	<i>Neophema splendida</i>	Scarlet-chested Parrot												
<b>Cuculidae</b>	<i>Chrysococcyx basalis</i>	Horsfield's Bronze-Cuckoo				•			•		•	•		
	<i>Chrysococcyx lucidus</i>	Shining Bronze-Cuckoo				•								
	<i>Chrysococcyx osculans</i>	Black-eared Cuckoo						•			•			•
	<i>Cacomantis pallidus</i>	Pallid Cuckoo					•							
	<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo			•	•						•		
<b>Strigidae</b>	<i>Ninox boobook</i>	Southern Boobook						•			•			
<b>Tytonidae</b>	<i>Tyto alba</i>	Barn Owl												
<b>Halcyonidae</b>	<i>Todiramphus pyrrhopygia</i>	Red-backed Kingfisher			•	•					•			
	<i>Todiramphus sanctus</i>	Sacred Kingfisher				•								
<b>Meropidae</b>	<i>Merops ornatus</i>	Rainbow Bee-eater			•	•		•		•	•	•	•	•
<b>Climacteridae</b>	<i>Climacteris rufa</i>	Rufous Treecreeper				•					•	•	•	
<b>Maluridae</b>	<i>Malurus splendens</i>	Splendid Fairy-wren			•								•	
	<i>Malurus lamberti</i>	Variiegated Fairy-wren				•					•			
	<i>Malurus leucopterus</i>	White-winged Fairy-wren			•	•								
	<i>Malurus pulcherrimus</i>	Blue-breasted Fairy-wren			•	•		•			•	•	•	•
<b>Acanthizidae</b>	<i>Sericornis frontalis</i>	White-browed Scrubwren										•		
	<i>Hylacola cauta</i>	Shy Heathwren (western)			•	•						•		
	<i>Pyrrholaemus brunneus</i>	Redthroat			•	•		•		•	•	•	•	•
	<i>Smicronis brevirostris</i>	Weebill			•	•		•		•	•	•	•	•
	<i>Gerygone fusca</i>	Western Gerygone			•	•					•			•
	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill			•	•					•	•		
	<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill									•			

Family	Species	Common name	Status	Introduced	Desktop sources <sup>1</sup>							Haul Road	This survey
					NMap	Birdata	TPFA	PMST	KLA 09	Eco 12	Biota 14		
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill			•	•			•		•		
	<i>Acanthiza apicalis</i>	Broad-tailed (Inland) Thornbill			•	•			•		•	•	
	<i>Aphelocephala leucopsis</i>	Southern Whiteface			•	•							
<b>Pardalotidae</b>	<i>Pardalotus punctatus</i>	Spotted Pardalote				•					•		
	<i>Pardalotus striatus</i>	Striated Pardalote			•	•			•		•	•	•
<b>Meliphagidae</b>	<i>Certhionyx variegatus</i>	Pied Honeyeater				•							
	<i>Gavicalis virescens</i>	Singing Honeyeater				•			•	•	•	•	•
	<i>Nesoptilotis leucotis</i> (ex Lich.)	White-eared Honeyeater			•	•			•	•	•	•	•
	<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater				•					•		
	<i>Ptilotula ornata</i>	Yellow-plumed Honeyeater				•			•		•	•	
	<i>Purnella albifrons</i>	White-fronted Honeyeater			•	•			•		•	•	
	<i>Manorina flavigula</i>	Yellow-throated Miner			•	•			•	•	•	•	•
	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater			•	•				•	•	•	•
	<i>Anthochaera carunculata</i>	Red Wattlebird			•	•			•	•	•	•	•
	<i>Epthianura albifrons</i>	White-fronted Chat			•	•							
	<i>Sugomel niger</i>	Black Honeyeater			•	•							
	<i>Glyciphila melanops</i>	Tawny-crowned Honeyeater			•	•				•		•	•
	<i>Lichmera indistincta</i>	Brown Honeyeater			•	•			•	•	•	•	
	<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater			•	•			•		•	•	
<b>Pomatostomidae</b>	<i>Pomatostomus superciliosus</i>	White-browed Babbler			•	•			•	•	•	•	•
<b>Cinclosomatidae</b>	<i>Cinclosoma clarum</i>	Copperback Quail-thrush				•					•	•	•
<b>Neosittidae</b>	<i>Daphoenositta chrysoptera</i>	Varied Sittella			•	•			•		•	•	•
<b>Campephagidae</b>	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike			•	•			•		•	•	•

Family	Species	Common name	Status	Introduced	Desktop sources <sup>1</sup>							Haul Road	This survey	
					NMap	Birdata	TPFA	PMST	KLA 09	Eco 12	Biota 14			WW 17
	<i>Lalage tricolor</i>	White-winged Triller				•					•	•		
<b>Pachycephalidae</b>	<i>Pachycephala inornata</i>	Gilbert's Whistler			•	•					•	•	•	
	<i>Pachycephala occidentalis</i>	Western Golden Whistler				•				•		•		
	<i>Pachycephala rufiventris</i>	Rufous Whistler			•	•			•	•	•		•	•
	<i>Colluricincla harmonica</i>	Grey Shrike-thrush			•	•			•	•	•	•	•	•
	<i>Oreoica gutturalis</i>	Crested Bellbird			•	•			•	•	•	•	•	•
<b>Artamidae</b>	<i>Artamus personatus</i>	Masked Woodswallow				•								
	<i>Artamus cinereus</i>	Black-faced Woodswallow			•	•								
	<i>Artamus cyanopterus</i>	Dusky Woodswallow			•	•					•	•	•	
	<i>Artamus minor</i>	Little Woodswallow									•		•	
<b>Cracticidae</b>	<i>Cracticus torquatus</i>	Grey Butcherbird			•	•				•	•	•	•	
	<i>Cracticus nigrogularis</i>	Pied Butcherbird			•	•			•		•		•	•
	<i>Cracticus tibicen</i>	Australian Magpie			•	•					•		•	•
	<i>Strepera versicolor</i>	Grey Currawong			•	•			•		•	•	•	•
<b>Rhipiduridae</b>	<i>Rhipidura albiscapa</i>	Grey Fantail			•	•			•				•	
	<i>Rhipidura leucophrys</i>	Willie Wagtail			•	•				•	•	•	•	
<b>Corvidae</b>	<i>Corvus coronoides</i>	Australian Raven			•	•			•	•	•	•	•	•
	<i>Corvus bennetti</i>	Little Crow			•	•					•		•	
	<i>Corvus orru</i>	Torresian Crow			•	•								
<b>Monarchidae</b>	<i>Grallina cyanoleuca</i>	Magpie-Lark			•	•				•				
	<i>Myiagra inquieta</i>	Restless Flycatcher										•		
<b>Petroicidae</b>	<i>Microeca fascinans</i>	Jacky Winter			•	•					•	•	•	
	<i>Petroica boodang</i>	Scarlet Robin				•								

Family	Species	Common name	Status	Introduced	Desktop sources <sup>1</sup>							Haul Road	This survey	
					NMap	Birdata	TPFA	PMST	KLA 09	Eco 12	Biota 14			WW 17
	<i>Petroica goodenovii</i>	Red-capped Robin			•	•			•		•	•	•	•
	<i>Melanodryas cucullata</i>	Hooded Robin				•						•		•
	<i>Eopsaltria australis griseogularis</i>	Western Yellow Robin			•	•			•			•		
	<i>Drymodes brunneopygia</i>	Southern Scrub-robin			•	•			•			•	•	
<b>Megaluridae</b>	<i>Megalurus mathewsi</i>	Rufous Songlark				•								
<b>Timaliidae</b>	<i>Zosterops lateralis</i>	Silvereye			•	•				•				
<b>Hirundinidae</b>	<i>Cheramoeca leucosterna</i>	White-backed Swallow			•	•						•	•	•
	<i>Hirundo neoxena</i>	Welcome Swallow			•	•						•	•	
	<i>Petrochelidon nigricans</i>	Tree Martin			•	•					•	•		
<b>Nectariniidae</b>	<i>Dicaeum hirundinaceum</i>	Mistletoebird				•						•		
<b>Estrildidae</b>	<i>Taeniopygia guttata</i>	Zebra Finch			•	•							•	•
<b>Motacillidae</b>	<i>Anthus australis</i>	Australasian Pipit				•						•		
	<i>Motacilla cinerea</i>	Grey Wagtail	Mig. (EPBC & BC Acts)					•						
<b>MAMMALS</b>														
<b>Tachyglossidae</b>	<i>Tachyglossus aculeatus</i>	Echidna, Short-beaked Echidna								•		•	•	•
<b>Dasyuridae</b>	<i>Dasyurus geoffroii</i>	Chuditch, Western Quoll	VU (EPBC & BC Acts)		•		•					•	•	•
	<i>Ningauia yvonnae</i>	Southern Ningauia										•		
	<i>Phascogale calura</i>	Red-tailed Phascogale, Keengoor	EN (EPBC)/CD (BC Act)		•		•							
	<i>Sminthopsis dolichura</i>	Little Long-tailed Dunnart			•				•		•	•		
	<i>Sminthopsis gilberti</i>	Gilbert's Dunnart										•		
	<i>Sminthopsis granulipes</i>	White-tailed Dunnart			•							•		

Family	Species	Common name	Status	Introduced	Desktop sources <sup>1</sup>							Haul Road	This survey	
					NMap	Birddata	TPFA	PMST	KLA 09	Eco 12	Biota 14			WW 17
	<i>Sminthopsis ooldea</i>	Ooldea Dunnart										•		
<b>Myrmecobiidae</b>	<i>Myrmecobius fasciatus</i>	Numbat, Walpurti	EN (EPBC & BC Acts)				•							
<b>Thylacomyidae</b>	<i>Macrotis lagotis</i>	Bilby	VU (EPBC & BC Acts)		•		•							
<b>Peramelidae</b>	<b>Isodon sp.</b>	Bandicoot sp.											•	
<b>Potoroidae</b>	<i>Bettongia lesueur graii</i>	Boodie (inland)	EX (EPBC & BC Acts)		•						•			
<b>Macropodidae</b>	<i>Macropus fuliginosus</i>	Western Grey Kangaroo						•	•		•	•	•	
	<i>Notamacropus irma</i>	Western Brush Wallaby	P4 (DBC list)				•				•			
	<i>Osphranter robustus erubescens</i>	Euro, Biggada (mainland)			•									
	<i>Osphranter rufus</i>	Red Kangaroo, Marlu											•	
	<i>Petrogale lateralis lateralis</i>	Black-flanked Rock-wallaby	EN (EPBC & BC Acts)				•							
<b>Burramyidae</b>	<i>Cercartetus concinnus</i>	Southwestern Pygmy Possum			•			•		•	•			
<b>Molossidae</b>	<i>Ozimops kitcheneri</i> ("sp. 4")	Southwestern Freetail-bat						•			•			
	<i>Ozimops petersi</i> ("sp. 3")	Inland Freetail-bat								•				
	<i>Austronomus australis</i>	White-striped Freetail-bat						•		•	•			
<b>Vespertilionidae</b>	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat			•			•		•	•			
	<i>Chalinolobus morio</i>	Chocolate Wattled Bat						•		•				
	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat						?		•				
	<i>Nyctophilus major tor</i>	Southern Long-eared Bat						?						
	<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat						•		•	•			
	<i>Vespadelus baverstocki</i>	Inland Forest Bat						?		•	•			
	<i>Vespadelus regulus</i>	Southern Forest Bat						?		•	•			

Family	Species	Common name	Status	Introduced	Desktop sources <sup>1</sup>							Haul Road	This survey	
					NMap	Birdata	TPFA	PMST	KLA 09	Eco 12	Biota 14			WW 17
<b>Muridae</b>	<i>Leporillus sp.</i>	Stick-nest Rat	EX (EPBC & BC Acts) or VU (EPBC)/CD (BC Act)								•		•	
	<i>Notomys mitchelli</i>	Mitchell's Hopping-mouse			•				•		•	•	•	
	<i>Pseudomys albocinereus</i>	Ash-grey Mouse										•		
	<i>Pseudomys bolami</i>	Bolam's Mouse									•			
	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse									•			
	* <i>Mus musculus</i>	House Mouse		•	•			•	•		•			
<b>Leporidae</b>	* <i>Oryctolagus cuniculus</i>	Rabbit		•				•	•	•	•	•	•	•
<b>Bovidae</b>	* <i>Bos taurus</i>	Domestic Cattle		•								•	•	•
	* <i>Capra hircus</i>	Goat		•				•						
	* <i>Ovis aries</i>	Sheep		•					•				•	•
<b>Suidae</b>	* <i>Sus scrofa</i>	Pig		•				•						
<b>Equidae</b>	* <i>Equus asinus</i>	Donkey		•				•					•	
	* <i>Equus caballus</i>	Horse		•				•						
<b>Canidae</b>	* <i>Canis lupus familiaris</i>	Dog/Dingo		•				•	•	•		•	•	•
	* <i>Vulpes vulpes</i>	Red Fox		•				•	•	•		•	•	•
<b>Felidae</b>	* <i>Felis catus</i>	Domestic Cat		•				•	•	•		•	•	•

<sup>1</sup> Sources: NatureMap (DBCA 2019a), BirdData (Birdlife Australia 2020), Threatened and Priority Fauna Database (DBCA 2019b), Protected Matters Search Tool (DoEE 2020), KLA (2009), Ecoscape (2012), Western Wildlife (2017).





**APPENDIX B – WA ENVIRONMENTAL OFFSETS TABLE**

WA ENVIRONMENTAL OFFSETS TABLE					
EXISTING ENVIRONMENT / IMPACT	MITIGATION			SIGNIFICANT RESIDUAL IMPACT OF PROJECT	OFFSET CALCULATION METHODOLOGY
	AVOID / MINIMISE	REHABILITATION TYPE	LIKELY REHABILITATION SUCCESS		
Clearing of up to 173 ha of remnant vegetation	<p><b>Avoid</b></p> <ul style="list-style-type: none"> <li>Use of existing disturbance has occurred to avoid remnant vegetation impacts, where possible</li> </ul> <p><b>Minimise</b></p> <ul style="list-style-type: none"> <li>Bituminisation of road will minimise dust emissions during operations</li> <li>Dust suppression will occur during construction</li> <li>Surface water controls will be implemented to minimise erosion and sedimentation</li> <li>Vehicle weed hygiene procedure to be implemented</li> <li>Workplace inspections to identify any weeds</li> </ul>	<p>Rehabilitation of vegetation communities may occur if the Shire of Yilgarn and Department of Primary Industries and Regional Development (DPIRD) do not accept a transfer of ownership upon closure.</p>	<p>Can the environmental values be rehabilitated/Evidence?</p> <ul style="list-style-type: none"> <li>Yes, rehabilitation evidence is available.</li> </ul> <p>Operator experience in undertaking rehabilitation?</p> <ul style="list-style-type: none"> <li>Mineral Resources has significant experience in undertaking rehabilitation at other operations.</li> </ul> <p>What is the type of vegetation being rehabilitated?</p> <ul style="list-style-type: none"> <li>All vegetation communities</li> </ul> <p>Time lag?</p> <ul style="list-style-type: none"> <li>10 years</li> </ul> <p>Credibility of the rehabilitation proposed (evidence of demonstrated success)?</p> <ul style="list-style-type: none"> <li>High credibility of success</li> </ul>	<p><b>Extent</b></p> <ul style="list-style-type: none"> <li>173 ha of remnant vegetation will be cleared</li> </ul> <p><b>Quality</b></p> <ul style="list-style-type: none"> <li>Vegetation quality ranged from Degraded to Pristine</li> </ul> <p><b>Conservation Significance</b></p> <ul style="list-style-type: none"> <li>No restricted vegetation communities were identified</li> <li>Restricted communities associated with the PEC are DBCA-P3</li> </ul> <p><b>Land Tenure</b></p> <ul style="list-style-type: none"> <li>Mining tenure</li> </ul> <p><b>Time Scale</b></p> <ul style="list-style-type: none"> <li>Project operation will be six years</li> </ul> <p>According to the agreed significance framework, residual impact is not considered to be significant because the impacted vegetation communities are widely distributed and impacts to PEC restricted communities are &lt; 0.1 % to the current mapped community.</p>	Offsets not required
Clearing of Conservation Significant Flora Taxa	<p><b>Avoid</b></p> <ul style="list-style-type: none"> <li>Use of existing disturbance has occurred to avoid remnant vegetation impacts, where possible</li> </ul> <p><b>Minimise</b></p> <ul style="list-style-type: none"> <li>Bituminisation of road will minimise dust emissions during operations</li> <li>Dust suppression will occur during construction</li> <li>Surface water controls will be implemented to minimise erosion and sedimentation</li> <li>Vehicle weed hygiene procedure to be implemented</li> <li>Workplace inspections to identify any weeds</li> </ul>	<p>It is unlikely that rehabilitation of Priority Flora will be undertaken. Some species may be included in seed mixes, if considered viable, however uncertainty exists regarding rehabilitation success of all species.</p>	Not applicable	<p><b>Extent</b></p> <ul style="list-style-type: none"> <li>Direct impacts to Priority flora species are not significant</li> <li>Potential for indirect impacts are considered low given bituminisation of haul road and design of suitable surface water controls.</li> </ul> <p><b>Quality</b></p> <ul style="list-style-type: none"> <li>Vegetation quality ranged from Degraded to Pristine</li> </ul> <p><b>Conservation Significance</b></p> <ul style="list-style-type: none"> <li>No listed 'Threatened' species protected under the EPBC Act or BC Act were identified.</li> <li>Flora species recorded range from DBCA-P1 to DBCA-P4, as well as undescribed species.</li> </ul> <p><b>Land Tenure</b></p> <ul style="list-style-type: none"> <li>Mining tenure</li> </ul> <p><b>Time Scale</b></p> <ul style="list-style-type: none"> <li>Project operation will be approximately six years</li> </ul> <p>According to the agreed significance framework, residual impact is not considered to be significant because the direct impacts are not likely to change the conservation ranking of a species. Species are known to occur outside of the Project area. Indirect impacts will be minimised through bituminisation of the haul road.</p>	Offsets not required

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WA ENVIRONMENTAL OFFSETS TABLE																								
EXISTING ENVIRONMENT / IMPACT	MITIGATION			SIGNIFICANT RESIDUAL IMPACT OF PROJECT	OFFSET CALCULATION METHODOLOGY																			
	AVOID / MINIMISE	REHABILITATION TYPE	LIKELY REHABILITATION SUCCESS																					
Clearing of up to 173 ha of Malleefowl and Chuditch habitat and potential direct impact to individuals	<p><b>Avoid</b></p> <ul style="list-style-type: none"> <li>Use of existing disturbance has occurred where possible to avoid fauna habitats</li> <li>Preclearance surveys during breeding season to identify active mounds and dens and avoidance to occur if identified, unless otherwise agreed by the CEO</li> </ul> <p><b>Minimise</b></p> <ul style="list-style-type: none"> <li>Haul road route follows current linear infrastructure to minimise further habitat fragmentation</li> <li>Fauna spotter onsite for any clearing activities, to identify active dens or mounds, deter fauna and provide emergency care</li> <li>Clearing activities to only occur during daylight hours</li> <li>Decreased speed limits within proximity to any active mounds or dens</li> <li>Workplace inspections to identify any injuries or mortalities</li> <li>Bituminisation of road will minimise dust emissions during operations</li> <li>Dust suppression will occur during construction</li> <li>Surface water controls will be implemented to minimise erosion and sedimentation</li> <li>Vehicle weed hygiene procedure to be implemented</li> <li>Workplace inspections to identify any weeds</li> </ul>	Rehabilitation of fauna habitat may occur if a relevant Government authority or other appropriate body do not accept a transfer of ownership upon closure.	<p>Can the environmental values be rehabilitated/Evidence?</p> <ul style="list-style-type: none"> <li>Yes, rehabilitation evidence is available</li> </ul> <p>Operator experience in undertaking rehabilitation?</p> <ul style="list-style-type: none"> <li>Mineral Resources has significant experience in undertaking rehabilitation at other operations.</li> </ul> <p>What is the type of vegetation being rehabilitated?</p> <ul style="list-style-type: none"> <li>All vegetation communities</li> </ul> <p>Time lag?</p> <ul style="list-style-type: none"> <li>10 years</li> </ul> <p>Credibility of the rehabilitation proposed (evidence of demonstrated success)?</p> <ul style="list-style-type: none"> <li>The success of rehabilitation of Chuditch and Malleefowl breeding habitat is uncertain.</li> </ul>	<p>Extent</p> <ul style="list-style-type: none"> <li>Fauna habitat impacts are detailed below</li> </ul> <table border="1"> <thead> <tr> <th>Species</th> <th>Habitat</th> <th>Indicative Footprint (ha)</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Malleefowl</td> <td>Breeding and Foraging</td> <td>87</td> </tr> <tr> <td>Foraging only</td> <td>85</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td>173</td> </tr> <tr> <td rowspan="2">Chuditch</td> <td>Breeding and Foraging</td> <td>75</td> </tr> <tr> <td>Foraging only</td> <td>92</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td>168</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>Uncertainty exists over the level of impacts to Malleefowl individuals due to vehicle incidents. It is noted that evidence supports a continuous population with at least 4 + individuals expected</li> <li>Uncertainty exists over the level of impacts to Chuditch individuals due to vehicle incidents. It is noted that records represent an important population due to their location of the north-eastern extent of the current distribution. In addition, there is uncertainty of the population size with at least one to four individuals expected.</li> </ul> <p><b>Quality</b></p> <ul style="list-style-type: none"> <li>Vegetation quality ranged from Degraded to Pristine</li> </ul> <p><b>Conservation Significance</b></p> <ul style="list-style-type: none"> <li>Malleefowl and Chuditch are both Vulnerable under BC Act and EPBC Act.</li> </ul> <p><b>Land Tenure</b></p> <ul style="list-style-type: none"> <li>Mining tenure</li> </ul> <p><b>Time Scale</b></p> <ul style="list-style-type: none"> <li>Project operation will be less than ten years</li> </ul> <p>According to the agreed significance framework, residual impacts may be considered significant for Malleefowl and Chuditch because the potential impacts from vehicle interactions is uncertain.</p> <p>Impacts to fauna habitat are considered minor in proportion to mapped fauna habitat and the wider Great Western Woodlands area (16 million hectares). The potential for habitat fragmentation is also considered low due to the existing infrastructure (public road and State Barrier Fence) not appearing to result in any population fragmentation. Nevertheless, the clearing represents known breeding and foraging habitat, and this combined with the potential for incidental mortality of individuals presents a potential for significant residual impacts. Therefore, offsets are proposed for clearing of up to 173 ha of Malleefowl habitat and 168 ha of Chuditch habitat.</p>	Species	Habitat	Indicative Footprint (ha)	Malleefowl	Breeding and Foraging	87	Foraging only	85	Total		173	Chuditch	Breeding and Foraging	75	Foraging only	92	Total		168	<p><b>Type</b></p> <ul style="list-style-type: none"> <li>Land acquisition, habitat improvement and management.</li> </ul> <p><b>Risk</b></p> <ul style="list-style-type: none"> <li>Low: Mineral Resources is committed to providing funding to DBCA for the transfer and management of the Offset Site and the ongoing presence of species (due to current secondary evidence) is considered likely.</li> </ul> <p><b>Likely Offset Success</b></p> <ul style="list-style-type: none"> <li>High: Land acquisition and management in the wheatbelt is well understood and has been previously implemented by DBCA as an offset for other proposals.</li> </ul> <p><b>Time Lag</b></p> <ul style="list-style-type: none"> <li>N/A</li> </ul> <p><b>Offset Quantification</b></p> <ul style="list-style-type: none"> <li>Offset calculations have been completed using the Commonwealth Calculator as a guide to provide a greater than 100% impact of offset</li> </ul>
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