



Department of Water and Environmental Regulation (DWER)  
 Department of Mines, Industry Regulation and Safety (DMIRS)

## Application for a clearing permit (purpose permit)

*Environmental Protection Act 1986*, section 51E

### FORM C2

Clearing of native vegetation is prohibited in Western Australia except where a clearing permit has been granted or an exemption applies. A person who causes or allows unauthorised clearing commits an offence.

For further information on the stages of assessment for clearing permit applications, refer to the [Procedure: Native vegetation clearing permits](#) on DWER's website.

CPS No.
Date stamp

#### Part 1: Assessment bilateral agreement

<p>The native vegetation clearing processes under Part V of the <i>Environmental Protection Act 1986</i> (WA) (EP Act) have been accredited by the Commonwealth of Australia under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth) (EPBC Act) and can be assessed under an assessment bilateral agreement.</p> <p>To be assessed in this manner, the proposed clearing action must be referred to the Commonwealth under the EPBC Act and deemed a '<a href="#">controlled action</a>' prior to submitting this application form.</p> <p>For further information see <i>Form Annex C7</i> and <i>A guide to native vegetation clearing processes under the assessment bilateral agreement</i> available at <a href="http://www.der.wa.gov.au/our-work/clearing-permits">www.der.wa.gov.au/our-work/clearing-permits</a>.</p>	Do you want your proposed clearing action assessed in accordance with, or under, an EPBC Act Accredited Process such as the assessment bilateral agreement?	
	<input type="checkbox"/>	Yes EPBC Number: _____
	<input checked="" type="checkbox"/>	No Proceed to Part 2
	List the controlling provisions identified in the notification of the controlled action decision.	
		<input type="checkbox"/> <i>Form Annex C7</i> is complete and the required supporting information is attached.

#### Part 2: Land details

The location of the land where clearing is proposed must be accurately described.	Land description: volume and folio number, lot or location number(s), Crown lease or reserve number, pastoral lease number or mining tenement number of all properties.  Miscellaneous Licence 59/191	
FILE REFERENCE	Street address	L59/191
	Local government area	Shire of Perenjori

Part 3: Applicant details				
<b>Applicant details</b>				
<p>If granted, the applicant will be considered the holder of the permit.</p> <p>Include the Australian Company Number (ACN) if the proposed permit holder is a body corporate or other entity formed at law.</p>	<p>Are you applying as an individual, a company or an incorporated body? Enter details for one only.</p>			
	<p>An individual</p>	<p>Title</p> <p>Mr <input type="checkbox"/> Mrs <input type="checkbox"/> Ms <input type="checkbox"/> Other: <input type="text"/></p>	<p>Name(s)</p>	
	<b>OR</b>			
	<p>A body corporate or other entity formed at law (include ACN)</p>	<p>Karara Mining Limited (ACN: 070 871 831)</p>		
	<p>"I am..." (mark applicable box or boxes)</p>			
	<p><input checked="" type="checkbox"/> the owner of the land.</p>	<p><input type="checkbox"/> acting on behalf of the owner and have attached an agent's authority, expressly authorising me to act on behalf of the landowner. <i>[Attach a copy of the authorisation (see "Authority to access land", below)]</i></p>		
	<p><input type="checkbox"/> likely to become the owner of the land. <i>[Attach evidence of the pending transfer of ownership, contract of sale ('offer and acceptance') or letter from current landowner.]</i></p>	<p><input type="checkbox"/> the person doing the clearing.</p>		
<p><input type="checkbox"/> the person on whose behalf the clearing is being done.</p>				
<b>Applicant contact details</b>				
<p>If applying as a company or incorporated body, please also supply the registered business office address.</p> <p>DWER and DMIRS prefer to send all correspondence electronically via email.</p> <p>We request that you consent to receiving all correspondence relating to instruments and notices under Part V of the EP Act ("Part V documents") electronically via email by indicating your consent in this section of the application form.</p> <p>Where 'yes' is selected, all correspondence from DWER or DMIRS (as applicable) will be sent to you via email, to the email address provided in this section.</p> <p>Where 'no' has been selected, Part V documents will be posted to you in hard copy to the postal/business address you have provided in this section. Other general correspondence may still be sent to you via email.</p>	<p>Provide contact details for the above individual or body corporate.</p>			
	<p>Contact person (and position, if applicable)</p>	<p>[REDACTED]</p>		
	<p>Company name (if applicable)</p>	<p>Karara Mining Limited</p>		
	<p>Postal / business address</p>	<p>London House Level 2, 216 St Georges Terrace Perth WA 6000</p>		
	<p>Phone (fixed line)</p>	<p>[REDACTED]</p>	<p>Phone (mobile)</p>	<p>[REDACTED]</p>
	<p>Email address</p>	<p>[REDACTED]</p>		
<p><i>I consent to all written correspondence between myself (the applicant) and DWER/DMIRS (as applicable), regarding the subject of this application, being exclusively via email, using the email address I have provided above.</i></p>			<p><b>Yes</b></p> <p><input checked="" type="checkbox"/></p>	<p><b>No</b></p> <p><input type="checkbox"/></p>

Part 3: Applicant details (continued)	
<b>Authority to access land</b>	
<p>To apply for a permit you must be the landowner, or have the authority of the landowner to access the land and undertake the clearing.</p> <p>Evidence of authority can include, for example, a copy of the certificate of title or a letter of authority signed by the landowner or other person with authority to give land access permission.</p>	<p>State the nature of the applicant's authority to access the land to be cleared.</p> <p><i>[Attach evidence of authority. Note that a letter of authority must explicitly state that the applicant has authority to clear on the land and must be signed by a person with authority to give land access permission.]</i></p>
	<p>Karara Mining Limited is the current tenement holder of L59/191. Works shall be undertaken on this tenement in accordance with the authorities held under the <i>Mining Act 1986</i></p>
<b>Landowner's ownership of land</b>	
<p>A landowner can be:</p> <ul style="list-style-type: none"> <li>• a person who holds the certificate of title;</li> <li>• a person who is the lessee of Crown land;</li> <li>or</li> <li>• a public authority that is responsible for care of the land.</li> </ul>	<p>The landowner's form of ownership is:</p>
	<input type="checkbox"/> Certificate of title <i>[Attach a copy of the certificate and all associated encumbrances with the application – available from Landgate].</i>
	<input type="checkbox"/> Pastoral lease <i>[Attach a copy of the lease and all associated encumbrances].</i>
	<input checked="" type="checkbox"/> Mining lease.
	<input type="checkbox"/> Public authority that has care, control or management of the land.
	<input type="checkbox"/> Other form of lease, land tenure or specific arrangement. Please state: <input style="width: 150px;" type="text"/>
<b>Contact details for enquiries</b>	
<p>If different from the applicant's contact details, enter the contact details of a person with whom DWER or DMIRS should liaise with concerning this clearing application.</p>	<p>Where contact details differ to those of the applicant, complete the below section:</p>
	<p>Contact person (and position, if applicable) <input style="width: 100px;" type="text"/></p>
	<p>Company name (if applicable) Karara Mining Ltd</p>
	<p>Postal / business address London House Level 2, 216 St Georges Terrace Perth WA 6000</p>
	<p>Phone (fixed line) <input style="width: 80px;" type="text"/> Phone (mobile) <input style="width: 80px;" type="text"/></p>
	<p>Email address <input style="width: 150px;" type="text"/></p>





Part 5: Other DWER approvals	
<b>Instructions:</b> <ul style="list-style-type: none"> <li>If your application is to be submitted to DMIRS, complete Section A and then skip to Part 6 of this form.</li> <li>If your application is to be submitted to DWER, complete both Sections A and B.</li> </ul>	
Section A: Environmental Impact Assessment	
Environmental Impact Assessment (Part IV of the EP Act)	
<b>Has this clearing application or any related matter been referred to the Environmental Protection Authority?</b>	<input type="checkbox"/> Yes – provide details [       ] <input checked="" type="checkbox"/> No
<b>Do you intend to refer the proposal to the Environmental Protection Authority?</b> Section 37B(1) of the EP Act defines a 'significant proposal' as "a proposal likely, if implemented, to have a significant effect on the environment". If a decision-making authority (e.g. DWER or DMIRS) considers that the proposal in this application is likely to constitute a 'significant proposal', they are required under section 38(5) of the EP Act to refer the proposal to the EPA for assessment under Part IV, if such a referral has not already been made. If a relevant Ministerial Statement already exists, please provide the MS number in the space provided.	<input type="checkbox"/> Yes – intend to refer (proposal is a 'significant proposal') <input type="checkbox"/> Yes – intend to refer (proposal will require a section 45C amendment to the current Ministerial Statement) MS [       ] <input type="checkbox"/> No – a current valid Ministerial Statement applies: MS [       ] <input checked="" type="checkbox"/> No – not a 'significant proposal'
Section B: Other approvals	
Pre-application scoping	
<b>Have you had any pre-application / pre-referral / scoping meetings with DWER regarding any planned applications?</b>	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes – provide details: [Meeting held with Damien Montague on the 7 <sup>th</sup> May 2021 to discuss the clearing and appropriate measures taken. This included a discussion on best method to submit the clearing permit.  A meeting was held with DBCA EMB on the 10 <sup>th</sup> June to discuss the tower and locality]
Works Approval / Licence / Registration (Part V Division 3 of the EP Act)	
<b>Have you applied or do you intend to apply for a works approval, licence, registration, or an amendment to any of the above, under Part V Division 3 of the EP Act?</b> It is an offence to perform any action that would cause a premises to become a prescribed premises of a type listed in Schedule 1 of the <i>Environmental Protection Regulations 1987</i> , unless that action is done in accordance with a works approval, licence, or registration. For further guidance, refer to the <a href="#">Procedure: Prescribed premises works approvals and licences</a> and <a href="#">Guideline: Industry Regulation Guide to Licensing</a> .	<input type="checkbox"/> Yes – application reference (if known): [       ] <input type="checkbox"/> No – a valid works approval applies: [       ] <input type="checkbox"/> No – a valid licence applies: [       ] <input type="checkbox"/> No – a valid registration applies: [       ] <input checked="" type="checkbox"/> No – not required
Water Licences and Permits ( <i>Rights in Water and Irrigation Act 1914</i> )	
<b>Have you applied or do you intend to apply for:</b> <ol style="list-style-type: none"> <li>a licence or amendment to a licence to take water (surface water or groundwater); or</li> <li>a licence or amendment to a licence to construct wells (including bores and soaks); or</li> <li>a permit or amendment to a permit to interfere with the bed and banks of a watercourse?</li> </ol> For further guidance on water licences and permits under the <i>Rights in Water and Irrigation Act 1914</i> , refer to the <a href="#">Procedure: Water licences and permits</a> .	<input type="checkbox"/> Yes – application reference (if known): [       ] <input type="checkbox"/> No – a current valid licence applies: [       ] <input checked="" type="checkbox"/> N/A

Part 6: Surveys for Assessments (IBSA and IMSA)				
Do you wish to submit marine or biodiversity surveys in support of your application?	<input checked="" type="checkbox"/> Yes			
	<input type="checkbox"/> No – skip to Part 7			
<p>Biodiversity surveys submitted to support this application must meet the requirements of the EPA's <a href="#">Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA)</a>. If these requirements are not met, DWER / DMIRS (as applicable) may decline to deal with the application.</p> <p>Please provide the IBSA number(s) (or submission number(s) if IBSA number has not yet been issued) in the space provided.</p> <p>Note that a submission number is not confirmation of acceptance of a biodiversity survey and is not the same as an IBSA number. IBSA numbers are only issued once a survey has been accepted. Once an IBSA number is issued, please notify DWER / DMIRS (as applicable).</p> <p>Please note the assessment timeframes for your application will be suspended until the IBSA number(s) is provided to DWER / DMIRS (as applicable).</p>	<p>All biodiversity surveys that support this application have been submitted to the <i>Index of Biodiversity Surveys for Assessment</i> available at <a href="https://ibsasubmissions.dwer.wa.gov.au">ibsasubmissions.dwer.wa.gov.au</a></p>		<b>Yes</b>	
	<p><b>Submission number(s)</b> (e.g. <i>IBSASUB-20200101-12345A6D</i>)</p> <p>Please list all numbers. If space is inadequate, list on a separate sheet.</p>	IBSASUB-20210727-8F281920		<input checked="" type="checkbox"/>
	<p><b>IBSA number(s)</b> (e.g. <i>IBSA-2020-0123</i>)</p> <p>Please list all numbers. If space is inadequate, list on a separate sheet.</p>			
<p>Marine surveys submitted to support this application must meet the requirements of the EPA's <a href="#">Instructions for the preparation of data packages for the Index of Marine Surveys for Assessments (IMSA)</a>. If these requirements are not met, DWER will decline to deal with the application.</p>	<p>All marine surveys submitted with this application meet the requirements of the EPA's <a href="#">Instructions for the preparation of data packages for the Index of Marine Surveys for Assessments (IMSA)</a>.</p>		<b>Yes</b>	
			<input type="checkbox"/>	<b>N/A</b>
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	

<b>Part 7: Prescribed fee</b>		
<p>Fees are payable to the:</p> <ul style="list-style-type: none"> <li><b>Department of Water and Environmental Regulation (DWER)</b> for all clearing purposes other than mineral and petroleum activities</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li><b>Department of Mines, Industry Regulation and Safety (DMIRS)</b> for mineral and petroleum clearing activities under the <i>Mining Act 1978</i>, various Petroleum Acts, or State Agreement Acts.</li> </ul> <p><b>DWER</b> will only accept fees paid via either:</p> <ul style="list-style-type: none"> <li>DWER's BPoint system, accessible online at: <a href="https://dwer.wa.gov.au/make-a-payment">https://dwer.wa.gov.au/make-a-payment</a>,</li> <li>secure EFT payment, or</li> <li>cheque / money order.</li> </ul> <p><b>DMIRS</b> will only accept fees paid via secure credit card payment, through the <a href="#">DMIRS online payment and application lodgement portal</a>.</p> <p>Do not send cash in the mail.</p>	<p>The prescribed fee is to be paid at the time of submitting the application form. Please calculate the prescribed fee using the online clearing permit fee calculator (link provided below) when completing this part: <a href="#">clearing permit fee calculator tool</a>. For further guidance, refer to DWER's online <a href="#">clearing fees frequently asked questions</a>.</p> <p><b>Calculated fee:</b> <span style="background-color: black; color: black;">██████████</span></p> <p>Payment method (mark the applicable box):</p> <p><input type="checkbox"/> <b>(DWER)</b> Secure credit card payment through <a href="#">BPoint</a> See <a href="http://www.dwer.wa.gov.au/make-a-payment">www.dwer.wa.gov.au/make-a-payment</a> Note: Biller Code is '1222355 Clearing Regulation'</p> <p><input type="checkbox"/> Receipt number: <span style="background-color: black; color: black;">██████████</span></p> <p><input type="checkbox"/> Date of payment: <span style="background-color: black; color: black;">██████████</span></p> <p><input type="checkbox"/> <b>(DWER)</b> Secure EFT payment See <a href="http://www.dwer.wa.gov.au/make-a-payment">www.dwer.wa.gov.au/make-a-payment</a> for payment details. <i>State the name of the intended permit holder clearly in the EFT payment subject.</i></p> <p><input type="checkbox"/> Date of payment: <span style="background-color: black; color: black;">██████████</span></p> <p><input type="checkbox"/> <b>(DWER)</b> Cheque / Money Order <i>Please make cheques or money orders payable to the "Department of Water and Environmental Regulation".</i></p> <p><input checked="" type="checkbox"/> <b>(DMIRS)</b> Secure credit card payment online through the <a href="#">DMIRS online payment and application lodgement portal</a>. <b>Please note:</b> All applications will be paid online and submitted simultaneously. Please save this application form, along with any supporting document ready for the submission portal and use the link above to pay and submit your application. A receipt will be issued upon submission only. Please ensure this receipt is saved for your records.</p>	<p style="text-align: center; font-size: small;">OFFICE USE ONLY</p>

Part 8: Application checklist		
Additional information to assist in the assessment of your proposal may be attached to this application – e.g. reports on salinity, fauna or flora studies or other environmental reports conducted for the site could be included in electronic format and submitted on suitable portable digital storage device.	Please ensure you have included the following as part of your application:	
	<b>REQUIRED</b>	<input checked="" type="checkbox"/> Payment of the prescribed fee.
		<input checked="" type="checkbox"/> An aerial photograph or map with a north arrow clearly identifying the areas of vegetation proposed to be cleared or ESRI shapefile.
		<input type="checkbox"/> Copy of the certificate of title or pastoral lease.
		<input checked="" type="checkbox"/> An index of all documentation attached to this application.
	<b>AS REQUIRED</b>	<input type="checkbox"/> Copy of written authority to act on behalf of the landowner.
		<input type="checkbox"/> Written authority from the landowner to access the land and conduct the clearing.
		<input type="checkbox"/> Evidence of the pending transfer of land ownership, such as the offer and acceptance letter, or written notice from the current landowner.
		<input type="checkbox"/> <i>Form Annex C7 – Assessment bilateral agreement</i> , if the clearing is also to be assessed under an EPBC Act accredited process.
		<input type="checkbox"/> Appendix A of the <i>Clearing of native vegetation offsets procedure</i> guideline if the application includes a proposal for clearing permit offsets.
		<input checked="" type="checkbox"/> IBSA number has been provided in Part 6.
	<b>ADDITIONAL SUPPORTING INFORMATION</b>	<input checked="" type="checkbox"/> Photos of application area.
<input type="checkbox"/> Marine surveys, submitted in accordance with the requirements of the EPA's <i>Instructions for the preparation of data packages for the Index of Marine Surveys for Assessments (IMSA)</i> .		

Part 9: Commercially sensitive or confidential information		
<p>Information submitted as part of this application will be made publicly available. If you wish to submit commercially sensitive or confidential information, please identify the information in Attachment 1, and include a written statement of reasons why you request each item of information be kept confidential.</p> <p>Information submitted later in the application process may also be made publicly available at the discretion of the relevant department. For any commercially sensitive or confidential information, please follow the same process as described above.</p> <p>DWER and DMIRS will take reasonable steps to protect confidential or commercially sensitive information. Please note in particular that all submitted information may be the subject of an application for release under the <i>Freedom of Information Act 1992 (WA)</i>.</p>		
All information which you would propose to be exempt from public disclosure has been separately placed in a redacted version of the application form and its supporting documentation. Note that this is in addition to the unredacted version(s) provided to DWER / DMIRS (as applicable) for its assessment. Grounds for claiming exemption in accordance with Schedule 1 to the <i>Freedom of Information Act 1992</i> must be specified in <b>Attachment 1</b> (located at the end of this form).	<b>Attached</b>	<b>N/A</b>
	<input checked="" type="checkbox"/>	<input type="checkbox"/>

<b>Part 10: Submission of application</b>	
<p>Check one of the boxes below to nominate how you will submit your application.</p> <p>Files larger than 50MB cannot be received via email by DWER. The DMIRS online portal can accept 1024MB for each attachment and files larger than 45MB cannot be received via email. Alternatively, email DWER or DMIRS (as applicable) to make other arrangements.</p> <p>If you have any enquiries regarding the provision of relevant information as part of this application, contact either DWER or DMIRS (as applicable), on the details below.</p>	
<p><b>(DWER only)</b> A signed, electronic copy of the application form, including all attachments, has been submitted via the applicable email address specified below;</p> <p><b>OR</b></p>	<input type="checkbox"/>
<p><b>(DWER only)</b> A signed, electronic copy of the application form has been submitted via the applicable email address specified below, and attachments have been submitted via File Transfer, or electronically by other means as arranged with the relevant department;</p> <p><b>OR</b></p>	<input type="checkbox"/>
<p><b>(DWER only)</b> A full, signed hard copy has been sent to the applicable postal address specified below.</p> <p><b>OR</b></p>	<input type="checkbox"/>
<p><b>(DMIRS only)</b> A signed electronic copy of the application form, payment and any supporting documentation has been saved and uploaded to <a href="#">DMIRS online payment and application lodgement portal</a>.</p>	
<p><b>Department of Water and Environmental Regulation</b></p> <p>Applications for all clearing purposes (other than mining and petroleum activities) may be submitted via email or post to:</p> <p><b>Email:</b> <a href="mailto:info@dwer.wa.gov.au">info@dwer.wa.gov.au</a></p> <p><b>Post:</b> Department of Water and Environmental Regulation Locked Bag 10 Joondalup DC WA 6919</p> <p><b>If you have any questions regarding lodgement of your application, please contact DWER via:</b></p> <p style="padding-left: 40px;"><b>Email:</b> <a href="mailto:info@dwer.wa.gov.au">info@dwer.wa.gov.au</a></p> <p style="padding-left: 40px;"><b>Phone:</b> 6364 7000</p> <p>For more information: <a href="http://www.dwer.wa.gov.au">www.dwer.wa.gov.au</a></p>	<p><b>Department of Mines, Industry Regulation and Safety</b></p> <p>Applications related to mining and petroleum clearing activities (under delegation) can be lodged online via the <a href="#">DMIRS online payment and application lodgement portal</a>.</p> <p><b>If you have any questions regarding lodgement of your application, please contact DMIRS via:</b></p> <p style="padding-left: 40px;"><b>Email:</b> <a href="mailto:nvab@dmirs.wa.gov.au">nvab@dmirs.wa.gov.au</a></p> <p style="padding-left: 40px;"><b>Phone:</b> 9222 3535</p> <p>For more information: <a href="http://www.dmirs.wa.gov.au">www.dmirs.wa.gov.au</a></p>
<p>Please retain a copy of this form for your records.</p> <p>Incomplete applications will be declined in accordance with section 51E(3) of the EP Act.</p>	
<p>If there is insufficient space on any part of this form, please continue on a separate sheet of paper and attach to this form</p>	

**Part 11: Declaration and signature**

**General**

I / We confirm and acknowledge that:

- the information contained in this application is true and correct and I/we acknowledge that knowingly providing information which is false or misleading in a material particular constitutes an offence under section 112 of the *Environmental Protection Act 1986 (WA)* and may incur a penalty of up to \$50,000;
- I / We have legal authority to sign on behalf of the applicant (where authorisation provided);
- I / We have not altered the requirements and instructions set out in this application form;
- I / We have provided a valid email address in Part 3 for receipt of correspondence electronically via email from DWER or DMIRS (as applicable) in relation to this application;
- I / We acknowledge that successful delivery to my / our server constitutes receipt of correspondence sent electronically via email from DWER or DMIRS (as applicable) in relation to this application; and
- I / We have provided a valid postal and/or business address in Part 3 for the service of all Part V documents.




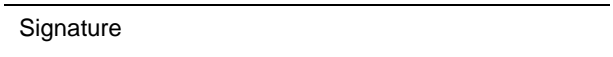
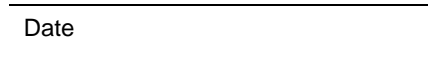
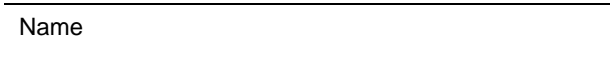

**Publication**

I / We confirm and acknowledge:

- this application (including all attachments, apart from the sections identified in Attachment 1) is a public document and may be published;
- marine surveys provided in accordance with Part 6 will be published and used, for the purposes of the IMSA project, in accordance with your declaration made in the *Metadata and Licensing Statement*;
- all necessary consents for the publication of information have been obtained from third parties;
- information considered exempt from public disclosure has been noted by redaction of a separately provided copy of the completed application form and its supporting documentation (in accordance with Part 9), with reasons as to why the information should be exempt in accordance with the grounds specified in Schedule 1 to the *Freedom of Information Act 1992 (WA)* being provided in Attachment 1;
- subsequent information provided in relation to this application will be a public document and may be published unless written notice has been given to DWER or DMIRS (as applicable) by the applicant, at the time the information is provided, claiming that the information is considered exempt from public disclosure; and
- the decision to not publish information will be at the discretion of the CEO of DWER or DMIRS (as applicable) and will be made consistently with the provisions of the *Freedom of Information Act 1992 (WA)*.

**Please indicate if you are signing as an individual or a company:**

<input type="checkbox"/>	<b>An individual.</b> If an individual landowner is applying, <b>all landowners</b> must sign this form.
<input checked="" type="checkbox"/>	<b>A company.</b> <b>Company name:</b> Karara Mining Ltd. <b>ACN:</b> 070 871 831 A person expressly authorised or authorised to execute on behalf of a body corporate must sign this form. A company must be a legal entity and provide an ACN. Please note an Australian Business Number is not sufficient.
<input type="checkbox"/>	<b>Other entity formed at law.</b> Provide details:

	
Signature	Date
	
Name	
DIRECTOR AND CHIEF EXECUTIVE OFFICER	
Position	
	
Signature	Date
	
Name	
	
Position	

**ATTACHMENT 1 – Confidential or commercially sensitive information**

Request for exemption from publication			
Information which you consider should not be published, on the grounds of a relevant exemption found in Schedule 1 to the <i>Freedom of Information Act 1992 (WA)</i> , available <a href="#">here</a> , must be specified in this Attachment. Add additional rows as required.			
<b>NOT FOR PUBLICATION IF GROUNDS FOR EXEMPTION ARE DETERMINED TO BE ACCEPTABLE</b>			
Section of this form:	Part 3: Applicant contact details and Contact details for enquires	Grounds for claiming exemption:	Includes personal information
Section of this form:	Part 7	Grounds for claiming exemption:	Commercial in confidence
Section of this form:	Part 11	Grounds for claiming exemption:	Includes personal information
Section of this form:	Attachment D	Grounds for claiming exemption:	Commercial in confidence
Section of this form:	Attachment E	Grounds for claiming exemption:	Commercial in confidence
<div style="background-color: black; width: 300px; height: 15px; margin-bottom: 5px;"></div> <p>Full Name</p> <div style="background-color: black; width: 150px; height: 30px; margin-bottom: 5px;"></div> <p>_____</p> <p>Signature</p> <p style="text-align: right;">_____ 27/07/2021 _____</p> <p style="text-align: right;">Date</p>			

## **Index of KML Communication Tower Clearing Permit Application Attachments**

Figure 1: Tenement L59/191 Location

Figure 2: Proposed Clearing Footprint and Priority Species Locations

Attachment A: 10 Clearing Principles Assessment – KML Communication Tower

Attachment B: Targeted Flora Survey of the Proposed Installation of a New Communications Tower in tenement L59/191 (JBBC, 2021)

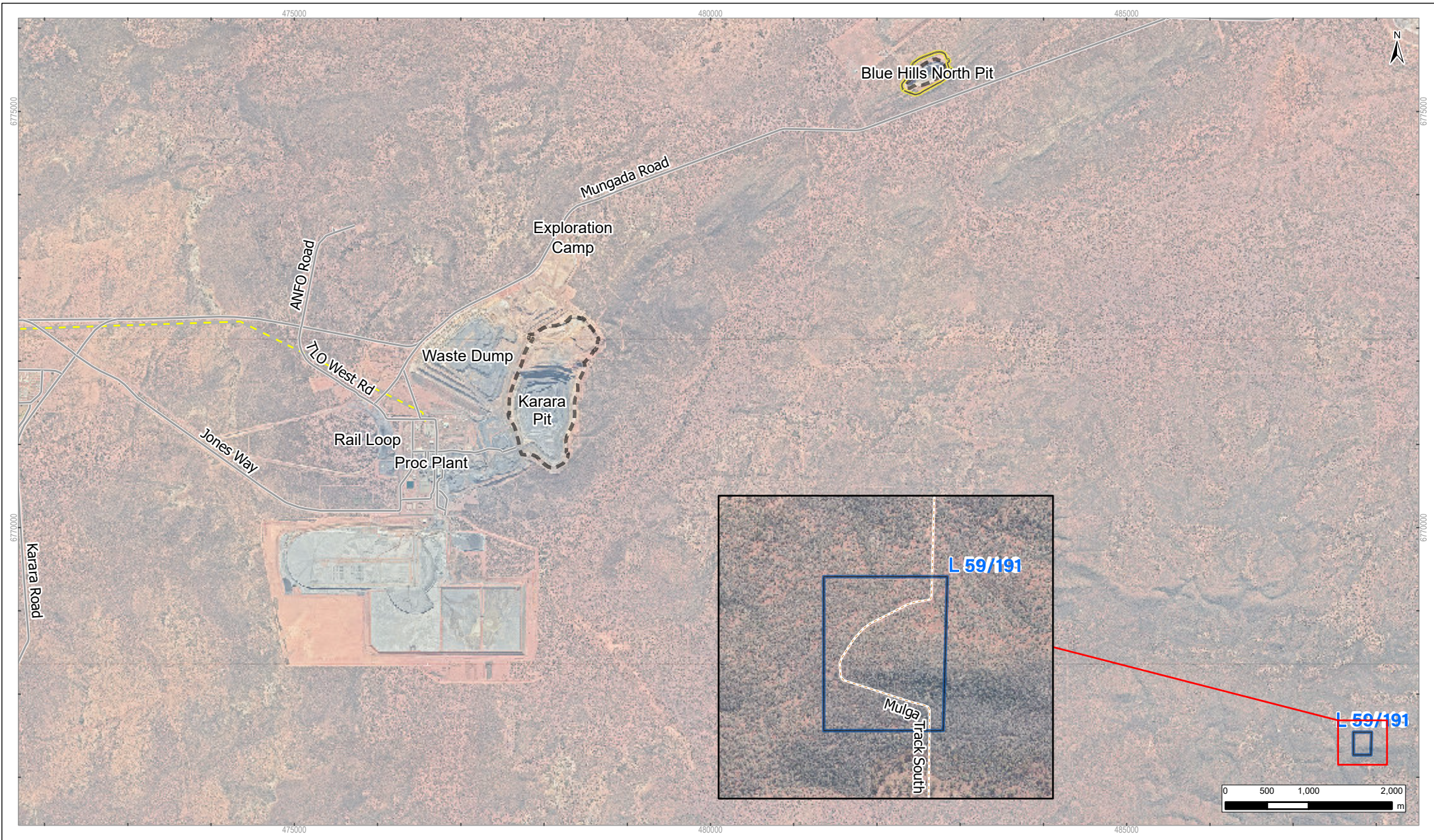
Attachment C: Fauna Assessment for Karara Telecommunication Tower (KML, 2021)

Attachment D: Access Agreement for L59/191 (**Confidential**)

Attachment E: Minute of Proposed Orders by Consent Mention Hearing on 22 July 2021 for Withdrawal of Objection 620149 against Application for L59/191 (**Confidential**)

Attachment F: Clearing Permit Application (Redacted Version without Confidential Information)





8 April 2021  
 Version: A  
 Size: A4  
 Ref: K0097 F1

Karara Mine Iron Ore Project  
**Tenement L59/191**

KML Tenements by Type  
 Miscellaneous Licence

GDA 1994 MGA Zone 50 SCALE: 1:60,000





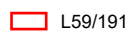


16 July 2021  
 Version: A  
 Size: A4  
 Ref: K0097 F14

**Karara Mine Iron Ore Project**  
**Comms Tower Footprint**

Priority Survey April 2021

Code



GDA 1994 MGA Zone 50 SCALE: 1:1,250

Geraldton





## Attachment A: 10 Clearing Principles Assessment – KML Communication Tower

Principle	Assessment	Outcome
<p>(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.</p>	<p>A targeted flora survey was completed by Jenny Borger Botanical Consulting (JBBC, 2021). The survey report is provided as <b>Attachment B</b> to the application.</p> <p>The proposed clearing area is located within the Yalgoo Interim Biogeographic Regionalisation for Australia (IBRA) region and within the Tallering sub-IBRA region.</p> <p>Six priority taxa were recorded in the survey area: <i>Acacia karina</i> P1, <i>Allocasuarina tessellata</i> P3, <i>Chamelaucium</i> sp. Warriedar P1, <i>Grevillea scabrida</i> P3, <i>G. subtiliflora</i> P3 and <i>Lepidosperma</i> sp. Blue Hills P1.</p> <p>The above species are all locally well represented in the area surrounding survey area based on FCT mapping, vegetation patterns and geology.</p> <p>No threatened flora were recorded within the survey area.</p> <p>The proposed clearing area has been designed to minimise any impacts on priority species that are well represented in surrounding areas and unlikely to impact the biological diversity.</p>	<p>Unlikely to be at variance of this Principle</p>
<p>(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.</p>	<p>A threatened fauna survey was completed by Karara staff in 2021. The fauna survey report is attached to the clearing permit application as <b>Attachment C</b>.</p> <p>The region is known for high biodiversity, and includes species listed as threatened under both the <i>Biodiversity Conservation Act 2016</i> and the <i>Environment Protection and Biodiversity Conservation Act 1999</i>. Species identified that may be at risk from this project are the Malleefowl (<i>Leopia ocellata</i>) and Western Spiny-tailed Skink (<i>Egernia stokesii</i>).</p> <p>No threatened fauna were identified in the clearing permit footprint.</p>	<p>Not at variance of this Principle</p>
<p>(c) Native vegetation should not be cleared if it includes, or is necessary</p>	<p>The proposed clearing area has been designed to minimise any impacts on priority species that are well represented in surrounding areas.</p>	<p>Not at variance of this Principle</p>

Principle	Assessment	Outcome
for the continued existence of, rare flora.	No Threatened flora listed under the EPBC Act and/or BC Act were recorded in the proposed clearing area.	
(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.	<p>The proposed clearing area contains no priority species identified in the survey area.</p> <p>There are no vegetation communities that are representative of a TEC within the proposed clearing area.</p>	Not at variance of this Principle
(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	<p>The survey area is located within the Yalgoo Interim Biogeographic Regionalisation for Australia (IBRA) region and within the Tallering sub-IBRA region (Thackway &amp; Creswell 2017), which is the interchange zone from the semi-arid to arid Eremaean Province and cooler, wetter South-west Province.</p> <p>Regional vegetation surveys were undertaken by Beard (1976) from which the pre-European vegetation (PEV) associations were described and extent mapped. The survey area is mapped as Yalgoo 358 - Shrublands; bowgada &amp; <i>Acacia quadrimarginea</i> on stony ridges, which covers an area of 55,447 ha (99.85 % of mapped extent).</p> <p>The clearing will constitute 0.4ha of disturbance – being 0.007% of the total area of Yalgoo 358.</p>	Not at variance of this Principle
(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	<p>The clearing shall occur on a small outcrop. From site inspections and contour data, no watercourses or wetlands occur within the project area.</p> <p>Vegetation present is not be considered as growing in association with wetlands or watercourses as identified in the 2021 targeted flora survey.</p>	Not at variance of this Principle
(g) Native vegetation should not be cleared if the clearing of the	Clearing is unlikely to cause substantial land degradation. Controls will be in place during clearing through standard environmental management measures to reduce	Unlikely to be at variance of this Principle

Principle	Assessment	Outcome
vegetation is likely to cause appreciable land degradation.	the risk of wind and water erosion. The area will not be left cleared for a long period of time prior to works.	
(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	<p>The underlying land tenure is Unallocated Crown Land, managed for the purpose of conservation by the DBCA. The area is classified as the 'Karara Rangeland Park' being the area of management by DBCA, constituting five pastoral stations purchased by the state. No formal (gazetted) conservation reserves are located within 1km of the Project area.</p> <p>Consultation occurred with DBCA on the proposed tower in June 10, 2021. No issues were raised.</p>	Not at variance of this Principle
(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	<p>The survey area is not located within a Public Drinking Water Source Area (PDWSA). Vegetation clearing for installation of the communications tower and associated access track is considered unlikely to impact upon groundwater quality.</p> <p>There are no watercourses or wetlands in the vicinity of the clearing area.</p>	Not at variance of this Principle
(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	It is considered unlikely that clearing of vegetation associated with installation of the communications tower would cause, or exacerbate the incidence or intensity of flooding. Potential surface runoff will be appropriately captured on site and not discharging into the surrounding landscape.	Unlikely to be at variance of this Principle

**Targeted flora survey of the proposed installation of a new communications  
tower in tenement L59/191**

**Karara Mining Limited**



**July 2021**

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## **1. Introduction**

### **1.1 Background**

Karara Mining Limited (KML) propose to construct a new communications tower to improve mobile phone coverage at the Karara Iron Ore Project (KIOP) located 60 km north of Perenjori in the Midwest of Western Australia. A site has been selected within Tenement L59/191, 12 km east of the main mining operation at Mt Karara (Figure 1). The proposed site is located on Karara Station, an ex-pastoral lease, within the Yalgoo Interim Biogeographic Regionalisation for Australia (IBRA) region and within the Tallering sub-IBRA region (Thackway & Creswell 2017), which is the interchange zone from the semi-arid to arid Eremaean Province and cooler, wetter South-west Province. The site will be accessed by existing tracks. The tower will be located on the summit of a dolerite ridge with a short access track to be constructed from the existing Mulga Track South. The proposal will require the clearing of 0.2 ha of vegetation.

Previous vegetation and flora surveys have identified several conservation significant flora and vegetation communities in the region. KML commissioned Woodman Environmental Consulting (WEC) (2012) to undertake regional surveys of the vegetation associated with banded ironstone formations over a three year period from 2008 – 2010 from which regional vegetation mapping was created for the Karara area, including the current survey area.

A vegetation and flora survey was undertaken by WEC in part of the proposal area in 2010 for the purpose of constructing a water pipeline (Rothsay Pipeline Project) for which a clearing permit was granted (CPS 5201/1) which has now expired.

KML engaged Jenny Borger Botanical Consulting (JBBC) to undertake a targeted vegetation and flora survey of Tenement L59/191, which covers an area of 6 ha. The survey was undertaken on the 2<sup>nd</sup> April 2021 with a Senior Environmental Advisor (Adam Freeman) from KML who was recording fauna activity. The objectives of the survey were to:

- Undertake a desktop survey to determine conservation flora and vegetation communities previously recorded in the area
- Describe the landforms, land surface and vegetation
- Compare the existing vegetation against existing mapping undertaken by WEC
- Compare the vegetation against described threatened or priority ecological communities
- Record the locations of conservation significant flora
- Record the condition of the vegetation, disturbances and threats, and
- Report observations of Malleefowl mounds or other fauna sightings to KML Environmental Advisor

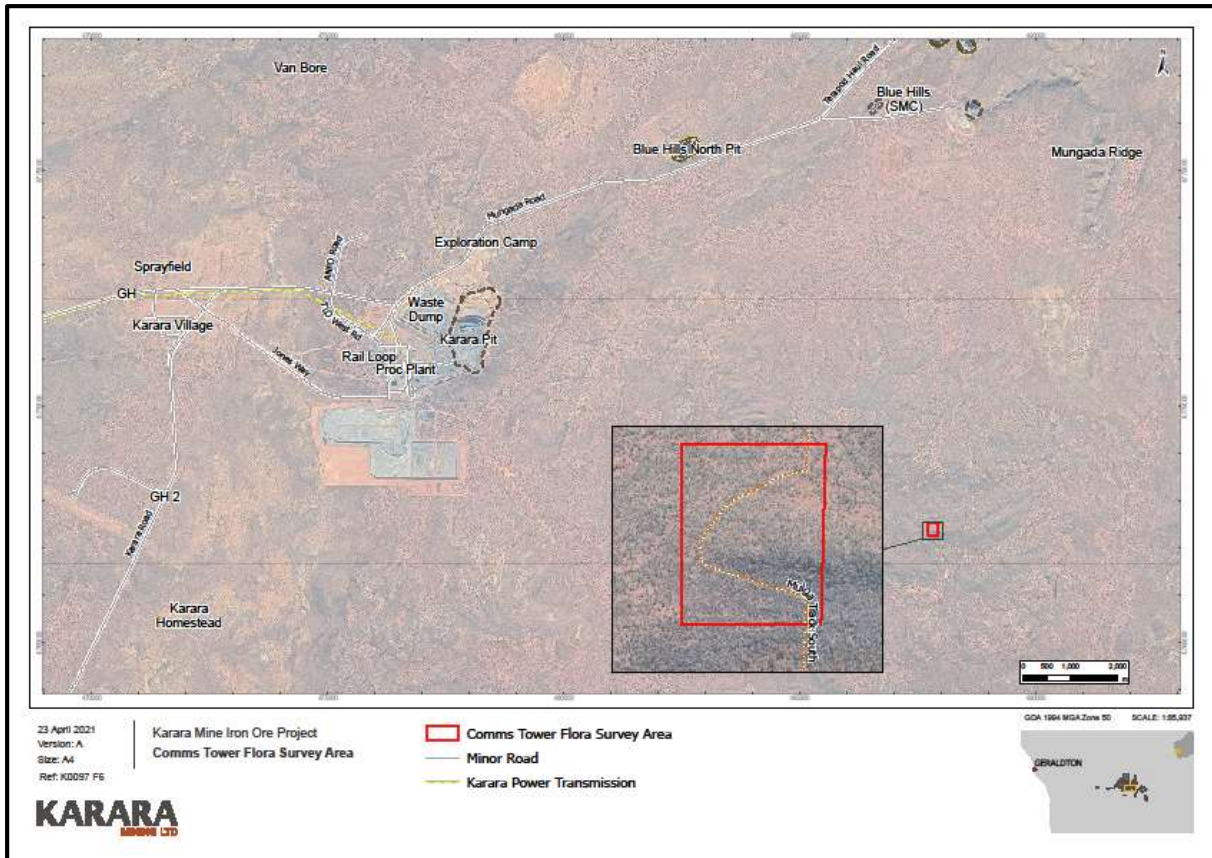


Figure 1: Location of the proposed site for the communications tower on Mulga Track South. The site is located 12 km east of the main Karara Iron Ore Project (KIOP) and 80 km west of Paynes Find.

## 1.2 Climate

The climate for the Yalgoo region is described as Mediterranean with hot dry summers and cool moist winters, although this pattern is changing with an increase in summer rainfall mostly brought about through significant rainfall events resulting from depressions associated with ex-tropical cyclones. Mean annual rainfall recorded at Karara (Bureau of Meteorology (BOM) Station 10195) is 305.1 mm; recorded from 1928 – 1940, and 1991 – 2021. Rainfall recorded from 2019 up to the survey period is presented in Table 1 and Figure 2.

Table 1: Monthly rainfall totals recorded at Karara with the long term means

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	21.2	24	26.7	21.4	34.4	42.1	41.7	39.1	19.9	9.5	12.9	12.1	305.1
2019	0	1.6	1.4	33.8	1.6	72	32.4	18.4	2.4	4	1.2	0	168.8
2020	2.4	59.1	20.2	1.4	24.2	32	20.6	32.2	5.4	0	13.8	6.4	217.7
2021	1.4	41.2	88										

The long term rainfall pattern (Figure 2) shows the highest monthly totals are usually received over the winter period (May – August), with the driest period from September to December, followed by a slight increase during January and February. Annual rainfall recorded in 2019 and 2020 (168.8 and 217.7 mm respectively) has been well below the long term mean of 305.1 mm. Rainfall in the two

months prior to the survey has been well above average, with significant falls (38 mm and 50 mm) recorded in early March.

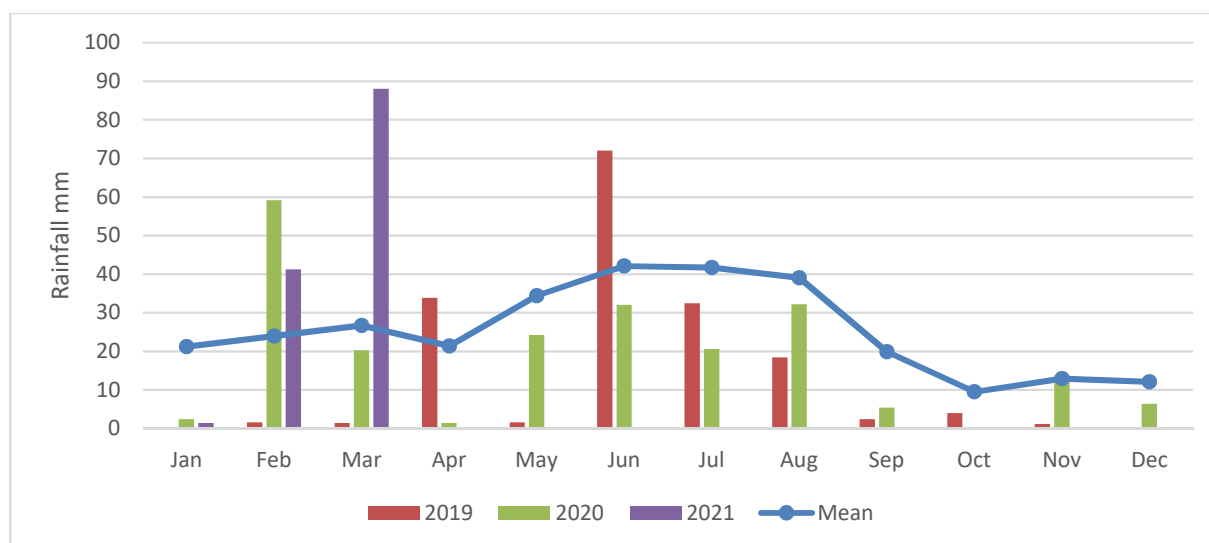


Figure 2: Monthly rainfall totals recorded against the long term means (Karara BOM 10195).

The nearest available temperature data were accessed from the Paynes Find recording station (BOM 7139) located 80 km east of the proposal (Table 2, Figure 3). The coolest month of the year is July with a mean maximum of 18.6 °C and minimum of 5.5 °C. The highest mean maximum temperature has been recorded in January (37.4 °C) and highest mean minimum temperature in February (21.2 °C). Temperatures in 2020 were mostly above average followed by a cooler than average summer in 2021.

The drier and warmer weather in 2020 resulted in stressed vegetation and poor germination of annuals noted during surveys at Karara (annual spring monitoring of vegetation health sites) and the broader region in 2020.

Table 2: Mean monthly maxima and minima temperatures recorded at Paynes Find (BOM 7139)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Max	37.4	36.4	33.1	28.5	23.2	19.4	18.6	20.2	23.9	28	31.9	35.2	28
2020 Max	37.2	36.5	32.6	29.6	23.6	22.3	21	20.6	25.8	30.4	31.4	36.5	29
2021 Max	36.3	32.7	33.5										
Mean Min	21	21.2	18.3	14.3	9.4	6.6	5.5	6	8.1	11.6	15.5	18.6	13
2020 Min	20.5	22.6	18.4	15.5	8	7.2	5.6	7.8	9.8	13.8	15.3	20.1	13.7
2021 Min	21.9	19.3	18.7										

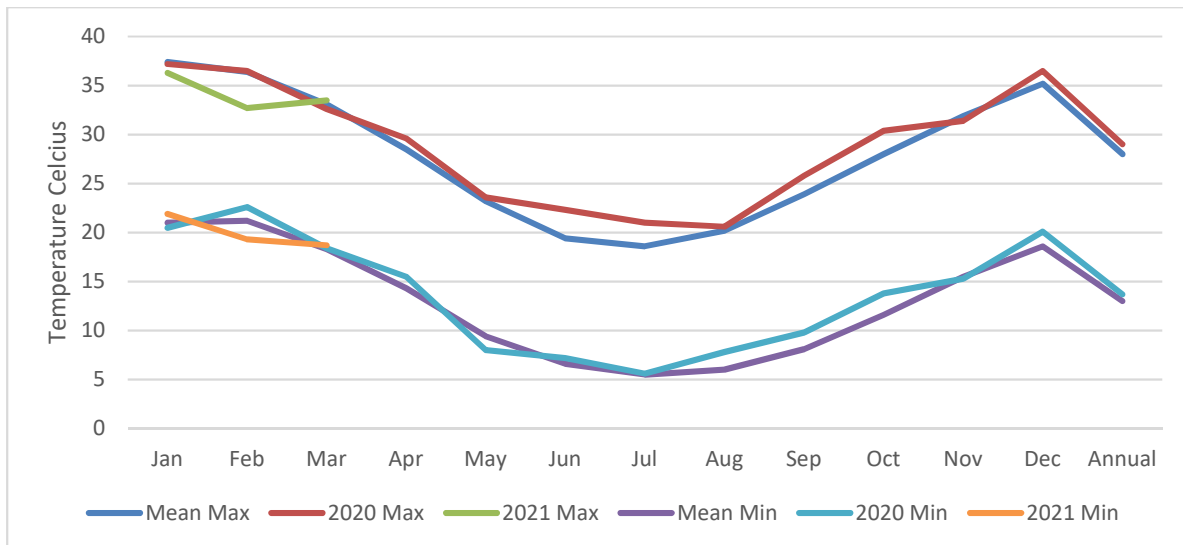


Figure 3: Mean monthly maximum and minimum temperatures recorded at Paynes Find

### 1.3 Biogeography

#### 1.3.1 Geology and landforms

The proposal is located within the Warriedar Fold Belt, a series of low undulating hills of Archaean greenstone composed of banded ironstone and basalts (Lipple et al 1983). The name Greenstone comes from the green hue of the volcanic mafic rocks, which are predominantly basalt or gabbro, that are high in magnesium and iron. Banded ironstone formations are exposed at several sites within the KIOP with the Blue Hills Ranges and extensive areas of basalts are present in the southern and eastern areas where the survey area is located. The survey area is predominantly dolerite with minor outcrops of metabasalt on the western side.

The survey area is located on the midslopes to summit of a low hill with a ridge located in the central area and drainage to the north and south. A defined drainage line is located in the north west corner.

#### 1.3.2 Vegetation

The survey area is located within the Yalgoo Interim Biogeographic Regionalisation for Australia (IBRA) region and within the Tallering sub-IBRA region (Thackway & Creswell 2017), which is the interchange zone from the semi-arid to arid Eremaean Province and cooler, wetter South-west Province. Regional vegetation surveys were undertaken by Beard (1976) from which the pre-European vegetation (PEV) associations were described and extent mapped. The survey area is mapped as Yalgoo 358 - Shrublands; bowgada & *Acacia quadrimarginea* on stony ridges which covers an area of 55, 447 ha (99.85 % of mapped extent). Payne et al (1998) undertook a rangeland condition survey and described the region in terms of land systems. The site is located within GHAS (greenstone hill *Acacia* shrublands). More recent surveys on banded ironstone formations were undertaken by the Department of Environment and Conservation (DEC) (Markey & Dillon 2008) and on greenstone formations (Meissner & Coppin 2014) and for Karara by Woodman Environmental Consulting (WEC 2012) from 2008 - 2010. Two floristic community types (FCT) were mapped by WEC as occurring in the survey area (Figure 4) – FCT 31 and 21a which are described in Table 3.



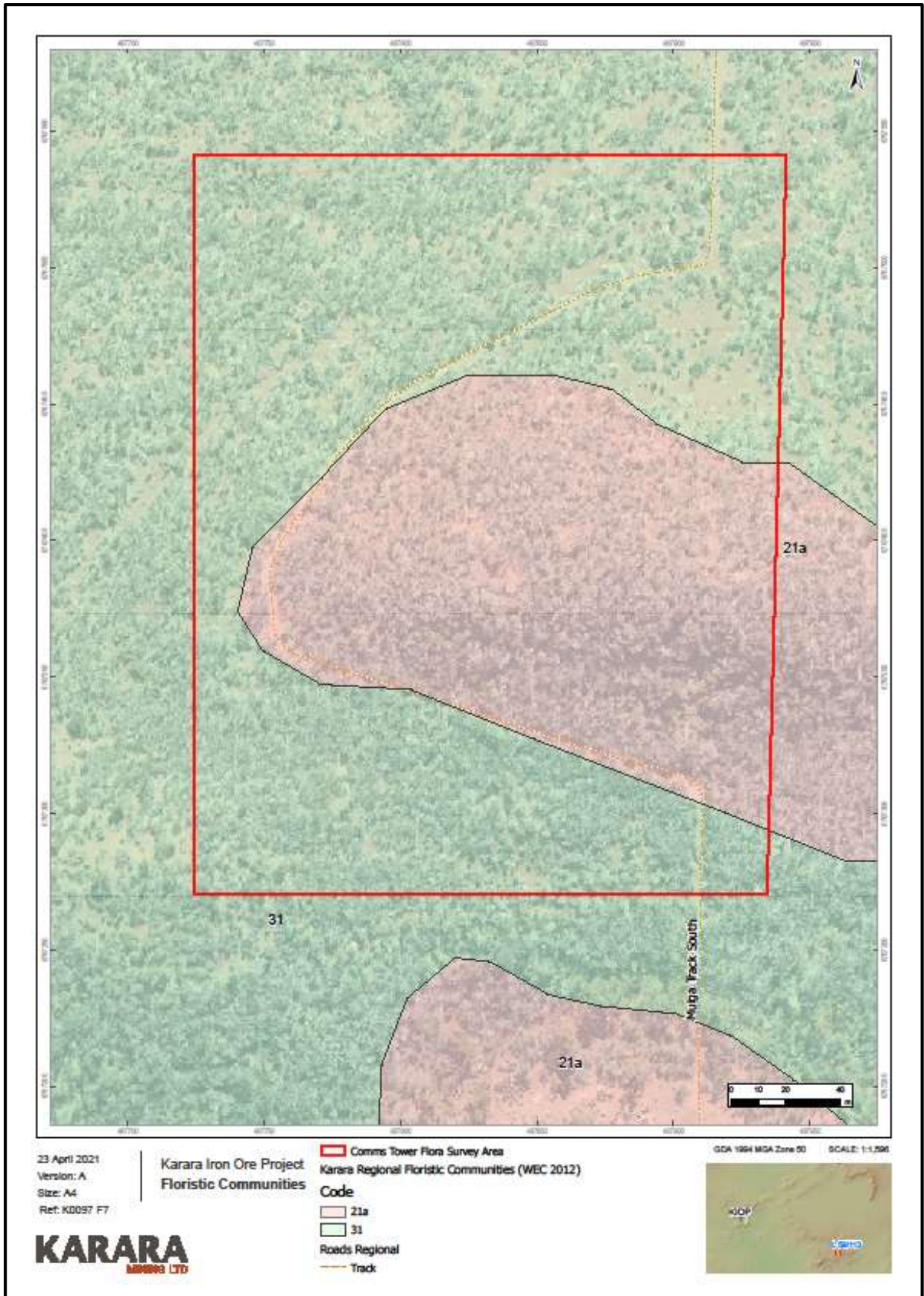


Figure 4: Regional Floristic Community mapping (WEC 2012)

Table 3: Floristic community type descriptions (WEC 2012)

Code	Landform	Description
21a 792 ha	Flats to midslopes; red to red brown clay loam or sandy clay loam	Low woodland to low open woodland of <i>Eucalyptus salubris</i> over mid sparse shrubland of mixed species including <i>Acacia acanthoclada</i> subsp. <i>glaucescens</i> and <i>Rhagodia drummondii</i> over low sparse chenopod shrubland of mixed species including <i>Sclerolaena fusiformis</i> and <i>Maireana trichoptera</i>
Conservation flora		No CSF
31 2306 ha	Mostly hillslopes with granite and/or ironstone outcropping	Tall shrubland to tall open shrubland of mixed species including <i>Acacia burkittii</i> , <i>A. karina</i> , <i>A. tetragonophylla</i> , <i>Allocasuarina tessellata</i> and <i>A. dielsiana</i> over low sparse shrubland of species including <i>Ptilotus obovatus</i> over low sparse forbland of <i>Borya sphaerocephala</i>
Conservation flora		<i>Acacia diallaga</i> P1, <i>A. karina</i> P1, <i>Allocasuarina tessellata</i> P3, <i>Austrostipa blackii</i> P3, <i>Chamelaucium</i> sp. Warriedar P1, <i>Grevillea scabrida</i> P3, <i>Lepidosperma</i> sp. Blue Hills P1, <i>Millotia dimorpha</i> P1, <i>Persoonia pentasticha</i> P3 and <i>Rhodanthe collina</i> P3

Five community types were described from the DEC surveys on greenstone formations (Meissner & Coppen 2014) from 50 quadrats. Two quadrats are located in the survey area, which are representative of Community 5 (Table 4). The quadrat results are presented in Appendix 6.

Table 4: DEC Community 5 on greenstone formations on Rothsay and Mulgine Hills

Code	Landform	Description
5	Crests and midslopes of hills on red brown skeletal to shallow sandy clay soils on basalt	Open woodlands (< 10 % cover) of <i>Allocasuarina dielsiana</i> , <i>Acacia burkittii</i> or <i>Melaleuca hamata</i> over shrublands (30 – 70 %) of <i>Allocasuarina tessellata</i> over forbland (30 – 70 %) of <i>Borya sphaerocephala</i> and <i>Chamelaucium</i> sp. Warriedar and other ephemerals. Indicator species were <i>Allocasuarina tessellata</i> , <i>Chamelaucium</i> sp. Warriedar, <i>Micromyrtus trudgenii</i> and <i>Melaleuca hamata</i>
Conservation flora		<i>Acacia diallaga</i> P1, <i>A. karina</i> P1, <i>Allocasuarina tessellata</i> P3, <i>Austrostipa blackii</i> P3, <i>Chamelaucium</i> sp. Warriedar P1, <i>Grevillea scabrida</i> P3, <i>G. subtiliflora</i> P3, <i>Micromyrtus trudgenii</i> P3, <i>Millotia dimorpha</i> P1

### 1.3.3 Conservation Significant Flora (CSF)

The survey area is located within an area with restricted landforms, which support a range of restricted flora, some of which are listed as threatened or priority. The conservation codes are explained in Appendix 7. A list of CSF which have been recorded within 50 km of the survey area has been compiled from searches of databases and other survey reports in the region (Table 5). The likelihood of these taxa occurring in the survey area has been based on known habitat and habit (herbs may not be present due to timing). (H – high – similar habitat; M – some similarity of habitat, or known from a broad ranges of habitats, or poorly described habitat; L – unlikely; described habitat unlike survey area; P – previous record)

Table 5: Conservation Significant Flora recorded within 50 km of the survey area (\*Likely occurrence)

Scientific Name	Code	Habitat	LO*
<i>Acacia woodmaniorum</i>	T	BIF ridges	L
<i>Eucalyptus synandra</i>	T	Granite	L
<i>Stylidium scintillans</i>	T	Herb; Decaying granite; shale & BIF outcrops	L
<i>Acacia diallaga</i>	P1	Basalt	H
<i>Acacia karina</i>	P1	Ironstone; BIF	H, P
<i>Acacia sulcatacaulis</i>	P1	Dolerite; greenstone; granite	M
<i>Chamelaucium</i> sp. Warriedar (AP Brown and S Patrick; APB 1100)	P1	Basalt	H, P
<i>Chamelaucium</i> sp. Yalgoo (Y. Chadwick 1816)	P1	Granite outcrops	L
<i>Eremophila oldfieldii</i> subsp. <i>papula</i>	P1	Lower slopes of rocky hills; dolerite; Eucalypt woodlands	M
<i>Eremophila</i> sp. Rothsay	P1	Rocky loam or clay soils	M
<i>Eucalyptus jutsonii</i> subsp. <i>kobela</i>	P1	Deep yellow to orange sand	L
<i>Gnephosis setifera</i>	P1	Saline flats	L
<i>Grevillea scabrada</i>	P1	Range of habitats	H
<i>Hydrocotyle</i> sp. Warriedar (P G Wilson 12267)	P1	Herb; Red loam; basalt	H
<i>Lepidosperma</i> sp. Blue Hills (A. Markey & S. Dillon 3468)	P1	Rocky outcrops; creeklines	H, P
<i>Millotia dimorpha</i>	P1	Herb; Red loamy soils; BIF	M
<i>Prostanthera</i> sp. Karara (D. Coultas & K. Greenacre Opp 8)	P1	Plains & lower slopes assoc. with BIF	L
<i>Calandrinia kalanniensis</i>	P2	Herb; Granite outcrops	L
<i>Calandrinia</i> sp. Warriedar (F. Obbens 04/09)	P2	Herb; Granite; ironstone gravel	L
<i>Acacia subsessilis</i>	P3	Ironstone rocky hills	L
<i>Allocasuarina tessellata</i>	P1	Greenstone & dolerite	H, P
<i>Austrostipa blackii</i>	P3	Range of habitats	H, P
<i>Bossiaea</i> sp. Jackson Range (G. Cockerton & S. McNee LCS13614)	P3	Granite outcrop; laterite breakaway	L
<i>Calotis</i> sp. Perrinvale Station (R. J. Cranfield 7096)	P3	Herb; BIF	L
<i>Cyanicula fragrans</i>	P3	Herb; Granite outcrops	L
<i>Dicrastylis linearifolia</i>	P3	Sandplain	L
<i>Drummondita fulva</i>	P3	Lower to midslopes of rocky hills; BIF	L
<i>Grevillea globosa</i>	P3	Red loam; yellow sand	L
<i>Grevillea granulosa</i>	P3	Sandplains	L
<i>Grevillea leptopoda</i>	P3	Lateritic gravel; sand, clay	L
<i>Grevillea subtiliflora</i>	P3	Basalt	H, P
<i>Gunniopsis propinqua</i>	P3	Range of sites	L
<i>Menkea draboides</i>	P3	Herb; Granite; red sand or clay	L
<i>Micromyrtus acuta</i>	P3	BIF landforms	L
<i>Micromyrtus trudgenii</i>	P3	BIF landforms	M
<i>Persoonia pentasticha</i>	P3	Range of habitats	M
<i>Petrophile pauciflora</i>	P3	Granite breakaways	L
<i>Polianthion collinum</i>	P3	BIF	L
<i>Psammomoya implexa</i>	P3	Range of habitats	L
<i>Rhodanthe collina</i>	P3	Herb; Rocky hills	M
<i>Stenanthemum poicilum</i>	P3	Range of habitats	L
<i>Acacia speckii</i>	P4	Basalt or dolerite	H
<i>Wurmbea murchisoniana</i>	P4	Herb; Seasonally inundated clay hollows	L



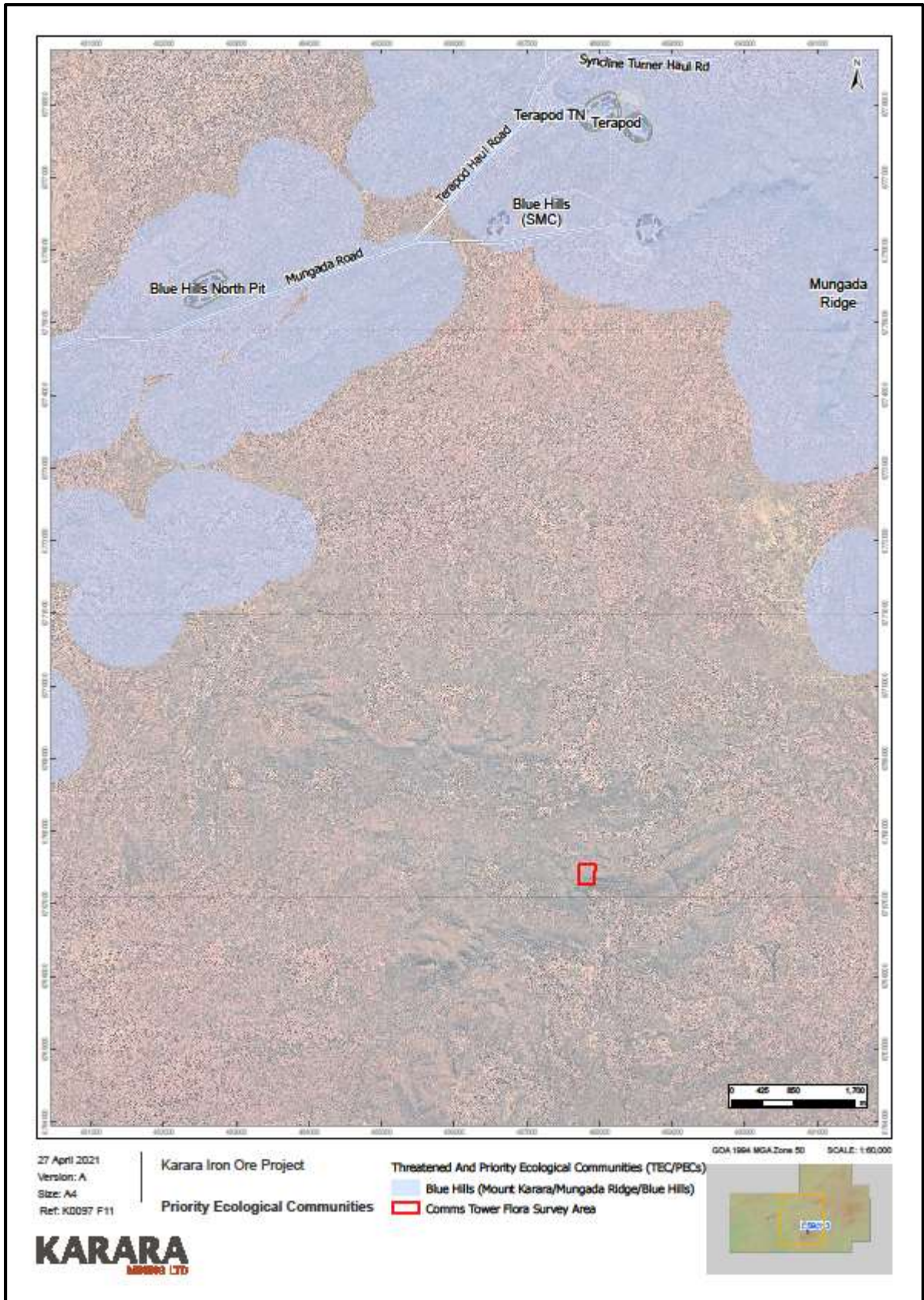


Figure 5: Location of Priority Ecological Communities (PEC) and buffer zones in relation to the survey area. The Blue Hills PEC is located to the north and west of the survey area.

The survey area has been partly surveyed on previous occasions under the greenstone survey program (DEC) and by WEC in 2010 for the Rothsay Water Pipeline Mining Proposal (KML 2012 – MP 34319). The aim of the latter survey was to construct a pipeline over 27 km linking bores at Rothsay with the KIOP. The proposed route included Tenement L59/191. Priority flora recorded in this area included *Allocasuarina tessellata* P3, *Millotia dimorpha* P1, *Acacia karina* P1, *Grevillea subtiliflora* P3 and *Lepidosperma* sp. Blue Hills P1.

### **1.3.4 Threatened and priority ecological communities (TEC/ PEC)**

There are no threatened ecological communities located near the survey area. The priority 1 PEC Blue Hills (Mount Karara/ Mungada Ridge/ Blue Hills) vegetation assemblages (banded ironstone formation) is mapped as occurring to the north and west of the survey area (Figure 5). Minjar and Chulaar Hills vegetation assemblages (banded ironstone formation) priority 1 PEC is located further east and north, and Warriedar/ Pinyalling/ Walagnumming Hills vegetation assemblages (banded ironstone formation) priority 1 PEC is mapped as occurring east of the area.

### **1.3.5 Disturbance history**

The survey area is located on ex-Karara Station, a pastoral lease which was operational from the 1920's until around 2005. Stock have been removed from the area and it now forms part of the Karara Rangeland Park managed by the Department of Biodiversity, Conservation and Attractions (DBCA). Iron ore, gold and tungsten have been mined in the region over several decades. The survey area has not been subjected to mining. A vehicle access track and old fenceline are present within the survey area. Impact to the vegetation has been minor.

## **2. Methods**

### **2.1 Objectives**

The objectives of the survey were to describe the vegetation and landforms, record the locations of conservation significant flora (CSF) and to record disturbances and threats. Previous FCT mapping was to be ground truthed and adjustments made to mapping if required.

### **2.2 Methodology**

KML provided aerial imagery of the survey area and the proposed location of the tower and access track. Due to the likely presence of CSF in much of the area, a number of transects across the site was considered the best method to determine the presence and extent of expected taxa. A GPS point was recorded every 10 – 20 metres depending on the thickness of the vegetation and the number of each CSF recorded. The vegetation was described at a number of representative sites based on the National Vegetation Information System (NVIS Working Group 2017) structural and floristic format (Tables 6 – 9). No quadrats were established.

Table 6: NVIS foliage cover codes.

Cover Characteristics					
Foliage cover	70 – 100	30 – 70	10 – 30	< 10	~ 0 (<2)
Crown cover	>80	50 – 80	20 – 50	0.25 – 20	<0.25
% cover	>80	50 – 80	20 – 50	0.25 - <20	<0.25
Cover code	d	c	i	r	bi

Table 7: Height classes defined for the NVIS.

Height		Growth Form				
Height Class	Height Range (m)	Tree	Shrub, chenopod shrub	Tree mallee, mallee shrub	Tussock grass	Bryophyte, lichen
8	>30	Tall	N/A	N/A	N/A	N/A
7	10 – 30	Mid	N/A	Tall	N/A	N/A
6	< 10	Low	N/A	Mid	N/A	N/A
5	<3	N/A	N/A	Low	N/A	N/A
4	>2	N/A	Tall	N/A	Tall	N/A
3	1 – 2	N/A	Mid	N/A	Tall	N/A
2	0.5 – 1	N/A	Low	N/A	Mid	Tall
1	< 0.5	N/A	Low	N/A	Low	Low

Table 8: Summary of NVIS strata codes.

NVIS stratum code	NVIS sub-stratum	Description	Growth forms	Height classes
U	U1	Tallest stratum	Tree, tree mallees (mallee shrubs)	8, 7, 6, (5)
	U2	Sub-canopy layer, second tree layer		
	U3	Sub-canopy layer, third tree layer		
M	M1	Tallest shrub layer	Shrubs, low trees, mallee shrubs, low shrubs, vines	(6), 5, 4, 3
	M2	Next shrub layer		
	M3	Third shrub layer		
G	G1	Tallest ground species	Grasses, forbs, sedges, rushes, vines, lichens, low shrubs	(4, 3), 2, 1
	G2	Ground		

The condition of the vegetation was described using the ratings recommended by the EPA (2018) (Table 9).

Table 9: Vegetation Condition ratings recommended for the Southwest and Interzone Botanical Provinces (EPA 2018).

Condition	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. 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 structure or the ability to regenerate it. Disturbance to vegetation structure by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Degraded	Basic 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.

Survey specific issues/ limitations have been addressed in Table 10. Climatic condition was the main limiting factor.

Table 10: Survey limitations

Potential Limitation	Extent
Contextual information at a regional and local scale	<b>Not limiting</b> Several surveys have been undertaken in the region and local area and information is readily available.
Competency/ experience	<b>Not limiting</b> The survey was undertaken by a botanist, Jenny Borger, who has more than 15 years' experience in the Midwest, including 10 years in the Karara area.
Proportion of flora recorded and/ or collected, any identification issues	<b>Partly limiting</b> Most flora was identified in the field. There were some identification issues with recently germinated herbs and grasses following substantial recent rainfall events. It is likely that one of the grasses is <i>Austrostipa blackii</i> P3; however, they were seedlings with no reproductive structures and could also be other <i>Austrostipa</i> spp. Some of the shrub species were in flower and fruiting structures were present on some species.
Was the appropriate area fully surveyed	<b>Not limiting</b> JBBC was provided with maps and GPS coordinates of the area to be surveyed. Different vegetation patterns were identified and surveyed through the combination of quadrats, relevés and observations. There are areas within the

	greenstone ranges which may support flora not recorded; however, the suite of species recorded were mostly present at multiple sites throughout the ranges and enough data were recorded for the purpose of vegetation mapping to NVIS V.
Access restrictions within the survey area	<b>Not limiting.</b> The survey area was accessed by an existing track and by foot. The vegetation was very thick in some areas, which was slow to navigate.
Survey timing, rainfall, season	<b>Partly limiting</b> Herbs and grasses were recently germinated which made identification difficult.
Disturbance that may have affected the results such as fire, flood or clearing	<b>Not limiting</b> Historic disturbances in the area are very low. Historic impacts from pastoral activities appears to have been very minor. Minor clearing has been done for a vehicle track and a fenceline. No signs were observed of goats in the area; however, there were some old signs of rabbits (piles of scats).

### 3. Results

#### 3.1 Flora

A total of 28 taxa were recorded from 18 families and 22 genera (Appendix 3). The most diverse families were Fabaceae with four species from two genera and Myrtaceae with three taxa from two genera. The dominant species was *Allocasuarina tessellata* P3, which was very common and occurred over the whole area. No threatened flora were recorded within the survey area. Six priority taxa were recorded – *Acacia karina* P1, *Allocasuarina tessellata* P3, *Chamelaucium* sp. Warriedar P1, *Grevillea scabrida* P3, *G. subtiliflora* P3 and *Lepidosperma* sp. Blue Hills P1. The locations of priority flora are presented in Figure 6 and Appendices 6a – 6f.

Annual species and grasses were sparse and mostly at an early germination stage making identification difficult. No range extensions were recorded, and the flora recorded was expected based on geology of the area. No weeds were recorded.

Priority flora descriptions are presented in Table 11.





Karara Iron Ore Project

Regional floristic communities



**KARARA**  
MINING LTD





Figure 6: Locations of priority flora within the survey area with WEC FCT mapping. A GPS point was taken and numbers of plants recorded over a broader area (e.g., 20 m x 20 m) depending on density of the vegetation.





Table 11: Priority flora descriptions

<p><b><i>Acacia karina</i> P1</b> Family: Fabaceae</p> <p>Total: 118 VT: 1, 3 – mainly on north facing slopes</p> <p>Condition: mostly vegetative and senescent with a few old pods present on shrubs or on the ground; some bark stripping by kangaroos; a few seedlings/ juvenile plants were present in the area indicating that recruitment is occurring.</p>	<p><b>Description:</b> Openly branched spreading shrubs to 3 m tall; single stemmed or dividing just above ground level; crowns not dense, confined to ends of branchlets</p> <p><b>Phyllodes:</b> Filiform, terete (8) 10 – 28 (32) cm long; 0.6 – 1 mm diameter, continuous with branchlets; not rigid, ascending to erect; glabrous except sparsely hairy towards the apex of juvenile phyllodes; green; 8 longitudinal nerves, deeply grooved between nerves; apices acute to acuminate; not pungent; pulvinus absent or occasionally very rudimentary; gland situated on upper surface 0 – 7 mm above the base</p>	<p>File photo</p> 
<p><b><i>Allocasuarina tessellata</i> P3</b> Family: Casuarinaceae</p> <p>Total: 4072 VT: 1, 2, 3</p> <p>Condition: The plants appeared quite healthy with cones present on many female plants. Some plants were also in flower. They were locally abundant, particularly on the southern side of the survey area, and the count may be an underestimate.</p>	<p><b>Description:</b> Dioecious (separate male and female) shrub or tree to 5 m high; branchlets ascending</p> <p><b>Articles/ phyllichnia/ teeth:</b> Articles (segments of branchlets) 7 – 14 mm long, 0.7 – 1 mm wide, glabrous; phyllichnia (ridges on articles) rounded; teeth 8 – 9</p> <p><b>Flowers:</b> Male spikes 2 – 4 cm long</p> <p><b>Fruit:</b> cones occasionally with sterile apex to 5 mm long; peduncle 7 – 13 mm; cone body 26 – 55 mm long, 14 – 18 mm diam.; bracts thickened, bracteoles obtuse</p>	

<p><b><i>Chamelaucium</i> sp. <i>Warriedar</i></b> (AP Brown and S Patrick; APB 1100) <b>P1</b> Family: Myrtaceae</p> <p>Total: 1106 VT: 1, 3</p> <p>Condition: The shrubs were very healthy and in flower. Numerous Lesser Wanderer butterflies (<i>Danaus chrysippus</i>) were feeding on nectar in the flowers. This species was recorded on the mid to upper slopes but was absent from the rocky outcrop area (VT 2).</p>	<p>This taxon has not been formally described. The best distinguishing feature is the hooked style with a beard on one side.</p> <p><b>Description:</b> Mostly low erect to spreading shrubs 0.5 m up to ~ 1 m.</p> <p><b>Leaves:</b> Fleshy; oil glands present; in bunches</p> <p><b>Flowers:</b> Small; cream to yellowish with protruding hooked style with a beard on one side. Most plants were in flower.</p>	
<p><b><i>Grevillea</i> <i>scabrida</i> P3</b> Family: Proteaceae</p> <p>Total: 3 VT: 1</p> <p>Condition: Healthy; dehiscent fruit present Only three shrubs were recorded in the survey area on the south facing mid slope.</p>	<p><b>Description:</b> Densely and irregularly branched silvery shrub 0.6 – 1.5 m high; branchlets hairy (silky), not glaucous; angular, ridged.</p> <p><b>Leaves:</b> Alternate 10 – 60 mm long x 0.5 – 1.5 mm wide; spreading, sessile, sometimes curled, crowded, simple, linear; lamina flat; upper surface silky becoming soon glabrous, ribbed, scabrous (rough to touch) – especially the ribs; the margins revolute, enclosing the lower leaf blade forming a groove either side of the midvein.</p> <p><b>Flowers:</b> Conflorescence erect, prominently pedunculated; green, white or yellow; terminal or axillary in upper axils; simple or few-branched</p> <p><b>Fruit:</b> Follicles hairy, not viscid, dehiscent, 9 – 11.5 mm long; faintly ribbed</p>	



<p><b><i>Grevillea subtiliflora</i> P3</b> Family: Proteaceae</p> <p>Total: 54 VT: 1, 3</p> <p>Condition: Healthy, a few in flower; dehisced fruit present on some shrubs</p> <p>Present on mid to upper mid slopes; isolated occurrences</p>	<p><b>Description:</b> Erect to spreading shrub, 1 – 2.5 m high. Branchlets terete, silky, not glaucous</p> <p><b>Leaves:</b> 25 – 45 mm long; hairy on the abaxial surface (underside); shortly petiolate, lamina flat, twice or more divided, pinnately divided, divided to the midrib. Lobes 5 – 20 mm long x 0.5 – 1 mm wide, the margins revolute, enclosing the lower surface of the leaf blade, forming a groove either side of the midvein.</p> <p><b>Flowers:</b> Inflorescences terminal, green or white; pedicels 3.5 – 6 mm long; perianth 2.5 – 3 mm long; tepals all free after flower opens. Ovary glabrous, stipitate, the stipe 1 – 1.5 mm long; pistil 4 – 5 mm long, white; pollen presenter conical or erect, style glabrous. Flowering recorded April; August to October (responds to significant rainfall events).</p> <p><b>Fruit:</b> Follicles glabrous, 8 – 10 mm long x 6 – 7 mm wide, erect to oblique, oblong-ellipsoidal, smooth to faintly rugose</p>	
<p><b><i>Lepidosperma</i> sp. Blue Hills</b> (A. Markey &amp; S. Dillon 3468) P1</p> <p>Total: 364 tussocks VT: 2</p> <p>Condition: Healthy; some dead foliage</p> <p>Restricted to the south facing upper slope on dolerite outcrops</p>	<p>This taxon has not been formally described and there is significant morphological variation within the group.</p> <p><b>Description:</b> Tufted rhizatomous grass-like herb (sedge); 0.5 – 1 m high. Culms variable from almost terete to diamond shaped in cross section.</p> <p><b>Leaves:</b> Approaching triangular in cross section; “mid-vein” apparent on some specimens; edges rough</p>	

### 3.2 Vegetation

Three vegetation associations (NVIS V) were described from field descriptions based on structure and floristics (Table 12). VA1 was the most extensive vegetation association and occurred on midslopes, and to the lower crest on the western side. VA1 is dominated by *Allocasuarina tessellata*. VA2 occurred on upper slopes to crests on the south facing slope of rocky ridge in the central area of the survey area. It is distinguished from the other VAs with the presence of *Lepidosperma* sp. Blue Hills in the understorey, and sparser occurrences of *Allocasuarina tessellata*. *Melaleuca hamata* and *M. radula* were more common in this VA. VA3 is similar to VA1 in species composition; however, it is more open and *Acacia karina* is more common.

Two floristic community types were mapped by WEC (2012) (Figure 6) – FCTs 21a (Low woodland to low open woodland of *Eucalyptus salubris* over mid sparse shrubland of mixed species including *Acacia acanthoclada* subsp. *glaucescens* and *Rhagodia drummondii* over low sparse chenopod shrubland of mixed species including *Sclerolaena fusiformis* and *Maireana trichoptera*) and 31 (Tall shrubland to tall open shrubland of mixed species including *Acacia burkittii*, *A. karina*, *A. tetragonophylla*, *Allocasuarina tessellata* and *A. dielsiana* over low sparse shrubland of species including *Ptilotus obovatus* over low sparse forbland of *Borya sphaerocephala*). No *Eucalyptus* woodlands (FCT21a) are present within the survey area and the vegetation present is representative of FCT31. An amended map is presented in Appendix 4.

An area of FCT21a is present about 1 km south of the survey area. A healthy population of *Eremophila oldfieldii* subsp. *papillosa* P1 was observed with at least 40 shrubs, all vegetative.

Two quadrats established by Meissner and Coppen (2014) during the DEC Greenstone surveys are located within the survey area. Species diversity was higher in both quadrats due to the presence of annuals and grasses. ROTH05 is similar to VA3, and ROTH06 is similar to VA1 in the current survey in terms of perennial taxa and structure. (Descriptions and images are presented in Appendix 6.) The vegetation within the survey area is representative of Community 5 on greenstone hills (Table 4).

### 3.3 Condition

The survey area has been subjected to very low impacts historically and recently. The vegetation structure is intact, with the exception of the vehicle track and along the old fenceline on the eastern side. Regrowth has occurred along the fenceline. No weeds were recorded which is possibly due to timing of the survey. Most weeds recorded in the broader area would be germinating in autumn. Slight erosion was present on the northern lower midslopes, which support more open vegetation; however, due to the high cover of surface rock it is unlikely to become a major problem.

The climate at Karara has been drier and warmer over the period 2019 – 2020 which would have had an impact on germination and growth of annuals and grasses. Several perennial plants also exhibited moderate to high percentages of crown death or senescent foliage.



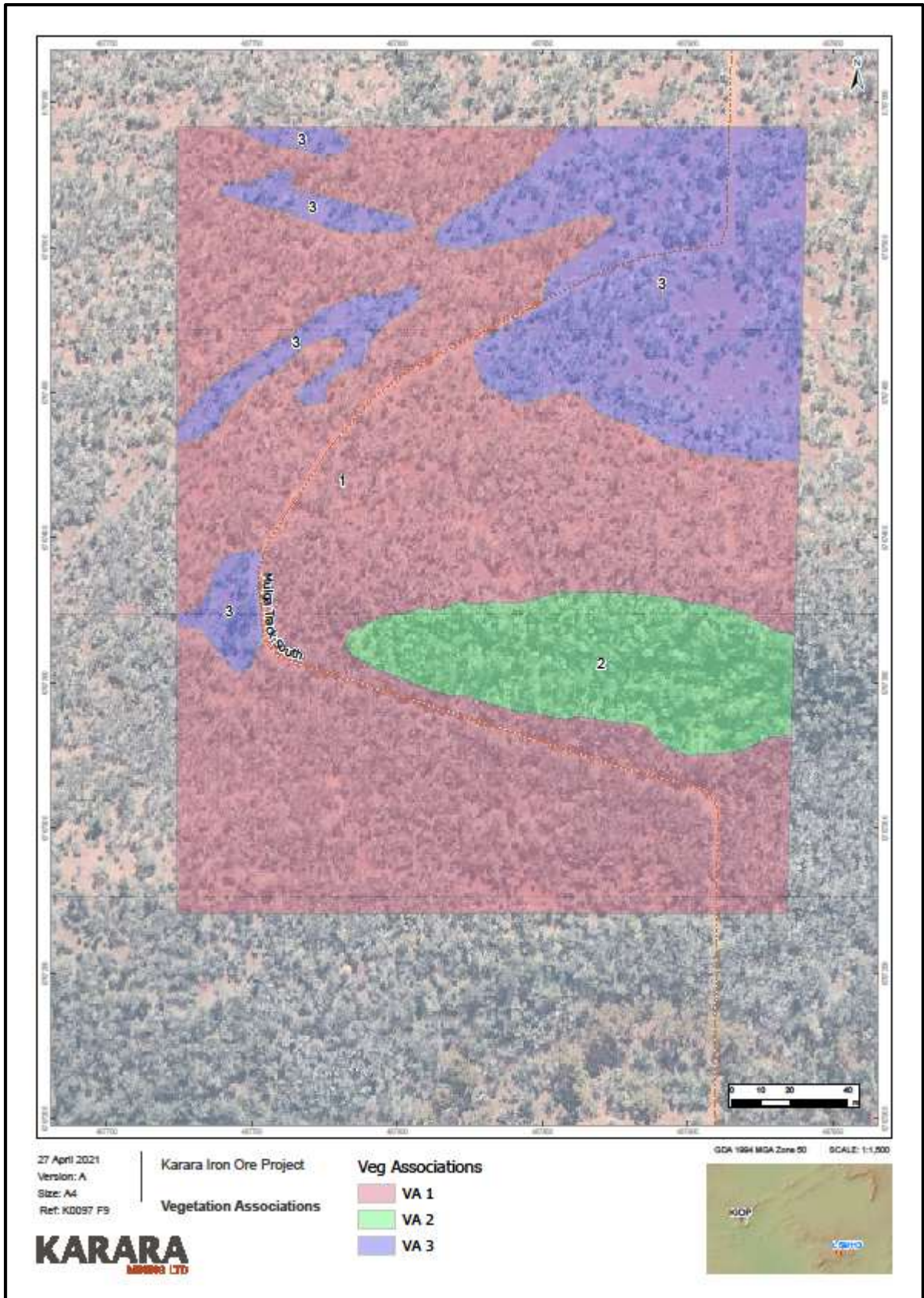





Figure 7: Vegetation associations (NVIS V) mapped in the survey area

Table 12: Vegetation association (NVIS V) descriptions

VA	Description	Image
1	<p>Landform: Hill, mid to upper slopes, gentle slope</p> <p>Land surface: Reddish brown (5YR 4/4) clay loam; surface rock (dolerite, metabasalt (isolated outcrops on western side)) 10 – 20 (40) %; litter 60 - &gt; 90 %; fallen timber 10 – 20 (40) %</p> <p>Vegetation: <i>Allocasuarina dielsiana</i> emergent low trees (6 – 8 m) over <i>Allocasuarina tessellata</i> P3, <i>Melaleuca hamata</i>, <i>Acacia burkittii</i> tall shrubland (5 – 6 m) over <i>Chamelaucium</i> sp. Warriedar P1, <i>Melaleuca radula</i> sparse shrubland (0.9 – 1.6 m) over <i>Tricoryne tuberosa</i>, <i>Erodium cygnorum</i>, <i>Sida calyxhymenia</i>, Asteraceae sp. (germinating), <i>Acacia</i> sp. (seedlings) low sparse forbland 2 – 5 %</p> <p>Other species: <i>Acacia karina</i> P1, <i>A. kochii</i>, <i>Austrostipa elegantissima</i>, <i>Borya sphaerocephala</i>, <i>Dianella revoluta</i> var. <i>divaricata</i>, <i>Dodonaea inaequifolia</i>, <i>Euphorbia drummondii</i>, <i>E. tannensis</i> subsp. <i>eremophila</i>, <i>Grevillea subtiliflora</i> P3, <i>G. scabrida</i> P3, <i>Cryptandra micrantha</i>, <i>Leptosema aphyllum</i></p>	
2	<p>Landform: Hill, rocky ridge with rocky scree slope, south aspect; moderate to steep slope</p> <p>Land surface: Reddish brown (5YR 4/4) clay loam skeletal soils; surface rock (dolerite) &gt; 90 %, outcropping rock, boulders; litter 20 – 30%, fallen timber 2 – 5 %</p> <p>Vegetation: <i>Allocasuarina dielsiana</i>, <i>Melaleuca hamata</i>, <i>Acacia burkittii</i> low open woodland over <i>Allocasuarina tessellata</i> P3, <i>Dodonaea inaequifolia</i>, <i>Acacia burkittii</i> tall sparse shrubland over <i>Melaleuca radula</i>, <i>Allocasuarina tessellata</i>, <i>Dodonaea inaequifolia</i> open shrubland over <i>Lepidosperma</i> sp. Blue Hills P1, <i>Melaleuca radula</i>, <i>Solanum lasiophyllum</i> sedgeland to open sedgeland</p> <p>Other species: <i>Grevillea scabrida</i> P3</p>	



3	<p>Landform: Hill; midslopes; northerly aspect; moderate slope  Land surface: Reddish brown clay loam; surface rock (dolerite) 60 – 80 %; litter 5 – 10 %; fallen timber &lt; 2 %; cryptogams (lichen) &lt; 5 %</p> <p>Vegetation: <i>Allocasuarina dielsiana</i> isolated low trees over <i>Allocasuarina tessellata</i> P3, <i>Acacia karina</i> P1, <i>Allocasuarina dielsiana</i>, <i>Acacia burkittii</i> open to sparse shrubland over <i>Acacia karina</i> P1, <i>Grevillea subtiliflora</i> P3, <i>Chamelaucium</i> sp. Warriedar P1, <i>Ptilotus obovatus</i> low sparse shrubland over isolated patches of germinating grasses</p> <p>Other species: <i>Borya sphaerocephala</i>, <i>Euphorbia tannensis</i> subsp. <i>eremophila</i>, <i>Melaleuca hamata</i></p>	
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## 4. Discussion

The species composition is representative of WEC FCT 31. No vegetation representative of FCT 21a was present in or adjacent to the survey area. The survey area was dominated by conservation significant flora, with six taxa recorded. *Allocasuarina tessellata* is common on basalt landforms in the region and has been recorded over approximately 200 km, with substantial populations in the Mt Singleton and Mt Mulgine areas. *Lepidosperma* sp. Blue Hills is locally common on rocky outcrops (banded ironstone formations, granite and in drainage lines) and has been recorded as far south as Mt Gibson. The *Lepidosperma* complex is currently under review. *Chamelaucium* sp. Warriedar has a restricted distribution to the Karara – Mt Mulgine areas and mainly recorded from basalt. *Acacia karina* has a broader distribution and occurs on a range of habitats including basalt, granite and along drainage lines on plains. *Grevillea scabrida* and *G. subtiliflora* have a distribution of approximately 180 km and are also recorded in the Mt Mulgine area and Mt Singleton area to the south.

All taxa are likely to be locally well represented in the area surrounding survey area based on FCT mapping, vegetation patterns and geology.

Due to the numerous occurrences of most priority taxa in the survey area, it is highly likely that some taxa will be impacted through the construction of the tower and access track. The location of the infrastructure was determined after the survey. As this location was surveyed too broadly the exact number of each species impacted is not known. An estimate, based on field densities and recorded locations, is presented in Table 13. The total area to be cleared is 0.4 ha.

Table 13: Estimate of impact to priority flora

Scientific Name	Code	Total (estimated density in impact area)	No. impacted
<i>Acacia karina</i>	1	118 (39/ha)	16 – 20
<i>Allocasuarina tessellata</i>	3	4072 (678/ ha)	260 – 300
<i>Chamelaucium</i> sp. Warriedar	1	1106 (221/ha)	80 – 100
<i>Grevillea scabrida</i>	3	3 (0/ha)	0
<i>Grevillea subtiliflora</i>	3	54 (9/ha)	4 – 8
<i>Lepidosperma</i> sp. Blue Hills	1	364 (0/ha)	0

Other priority species, which may be present (such as annuals and perennial herbs, which may sprout from a tuber), would include:

- *Austrostipa blackii* P3
- *Millotia dimorpha* P1
- *Hydrocotyle* sp. Warriedar (P G Wilson 12267) P1

*Styloidium scintillans* T is not likely to occur due to absence of suitable habitat.

The area is at low risk of further impacts from mining as the geology is not suitable. Impact from feral grazing is also likely to be minimal due to ongoing control of goats and rabbits. A recently active Malleefowl mound was recorded > 50 m from the proposed disturbance within VA 1. KML have installed sensor cameras in the area to monitor Malleefowl movements.

## **5. Conclusions**

Four of the six priority flora are very common within the survey area and likely to be well represented in the adjacent bushland. The two priority species which are less common (*Grevillea scabrida* P3 and *G. subtiliflora* P3) will be either not impacted or minimally impacted. The extent of WEC FCT 31 is more widespread in the area than previously mapped (2036 ha) which means that impact to the FCT 31 will be less than 0.009 %.

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**Appendix 1: Survey area showing location of existing track**



Karara Iron Ore Project

Survey area and tenement

**KARARA**  
MINING LTD

- L59/191
- Tenements



Ref: K0097 F17    Proj: GDA94 MGAZ50  
Version: A        Scale: 1:1,250  
23 July 2021     Size: A4



**Appendix 2: Proposed location of tower footprint (post survey) 0.4 ha**



Karara Iron Ore Project

Clearing area and  
Communications Tower

**KARARA**  
MINING LTD

Priority Survey April 2021

Code

- 1
- 3

Communication Tower Footprint

L59/191



Ref: K0097 F15  
Version: A  
23 July 2021

Proj: GDA94 MGAZ50  
Scale: 1:1,250  
Size: A4

### Appendix 3: Species list

Family	Scientific Name	Code
Amaranthaceae	<i>Ptilotus obovatus</i>	
Asteraceae	<i>Waitzia acuminata</i> (tentative) <i>Podolepis lessonii</i> (tentative)	
Boryaceae	<i>Borya sphaerocephala</i>	
Casuarinaceae	<i>Allocasuarina tessellata</i> <i>Allocasuarina dielsiana</i>	3
Cyperaceae	<i>Lepidosperma</i> sp. Blue Hills (A. Markey & S. Dillon 3468)	1
Euphorbiaceae	<i>Euphorbia drummondii</i> <i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	
Fabaceae	<i>Acacia karina</i> <i>Acacia burkittii</i> <i>Acacia kochii</i> <i>Leptosema aphyllum</i>	1
Geraniaceae	<i>Erodium cygnorum</i>	
Haloragaceae	<i>Haloragis trigonocarpa</i>	
Hemerocallidaceae	<i>Tricoryne tuberosa</i> <i>Dianella revoluta</i> var. <i>divaricata</i>	
Malvaceae	<i>Sida calyxhymenia</i>	
Myrtaceae	<i>Chamelaucium</i> sp. Warriedar (AP Brown and S Patrick; APB 1100) <i>Melaleuca hamata</i> <i>Melaleuca radula</i>	3
Poaceae	<i>Austrostipa elegantissima</i>	
Proteaceae	<i>Grevillea scabrida</i> <i>Grevillea subtiliflora</i>	3 3

Pteridaceae	<i>Cheilanthes adiantoides</i>
Rhamnaceae	<i>Cryptandra micrantha</i>
Sapindaceae	<i>Dodonaea inaequifolia</i>
Solanaceae	<i>Solanum lasiophyllum</i>



**Appendix 4: Amended WEC FCT mapping. The entire survey area is representative of WEC FCT31.**



Karara Iron Ore Project

Regional floristic communities

**KARARA**  
MINING LTD

Floristic Communities

Code  
31

Priority Survey April 2021

Code

- 1
- 3

Communication Tower Footprint

L59/191



Ref: K0097 F16  
Version: A  
23 July 2021

Proj: GDA94 MGAZ50  
Scale: 1:1,250  
Size: A4



**Appendix 5a: Locations of priority flora – *Acacia karina* P1**

Scientific Name	Code	Date	Easting	Northing	No.
Acacia karina	1	2/04/2021	487732	6767370	1
Acacia karina	1	2/04/2021	487858	6767409	1
Acacia karina	1	2/04/2021	487851	6767399	1
Acacia karina	1	2/04/2021	487826	6767389	4
Acacia karina	1	2/04/2021	487813	6767394	1
Acacia karina	1	2/04/2021	487789	6767387	2
Acacia karina	1	2/04/2021	487823	6767437	6
Acacia karina	1	2/04/2021	487868	6767445	5
Acacia karina	1	2/04/2021	487879	6767444	5
Acacia karina	1	2/04/2021	487882	6767429	1
Acacia karina	1	2/04/2021	487904	6767440	7
Acacia karina	1	2/04/2021	487915	6767444	3
Acacia karina	1	2/04/2021	487925	6767444	3
Acacia karina	1	2/04/2021	487935	6767442	2
Acacia karina	1	2/04/2021	487940	6767454	1
Acacia karina	1	2/04/2021	487927	6767461	5
Acacia karina	1	2/04/2021	487914	6767468	6
Acacia karina	1	2/04/2021	487903	6767472	9
Acacia karina	1	2/04/2021	487892	6767472	8
Acacia karina	1	2/04/2021	487870	6767466	2
Acacia karina	1	2/04/2021	487862	6767464	1
Acacia karina	1	2/04/2021	487843	6767464	2
Acacia karina	1	2/04/2021	487817	6767466	1
Acacia karina	1	2/04/2021	487785	6767458	2
Acacia karina	1	2/04/2021	487734	6767450	1
Acacia karina	1	2/04/2021	487810	6767497	2
Acacia karina	1	2/04/2021	487860	6767476	1
Acacia karina	1	2/04/2021	487878	6767483	1
Acacia karina	1	2/04/2021	487900	6767484	1
Acacia karina	1	2/04/2021	487907	6767490	2
Acacia karina	1	2/04/2021	487925	6767482	6
Acacia karina	1	2/04/2021	487935	6767508	6
Acacia karina	1	2/04/2021	487935	6767520	1
Acacia karina	1	2/04/2021	487931	6767534	3
Acacia karina	1	2/04/2021	487894	6767516	4
Acacia karina	1	2/04/2021	487860	6767517	3
Acacia karina	1	2/04/2021	487858	6767531	4
Acacia karina	1	2/04/2021	487775	6767509	3
Acacia karina	1	2/04/2021	487761	6767493	1
					118

**Appendix 5b: Locations of priority flora – *Allocasuarina tessellata* P3**

Scientific Name	Code	Date	Easting	Northing	No.
<i>Allocasuarina tessellata</i>	3	2/04/2021	487841	6767268	12
<i>Allocasuarina tessellata</i>	3	2/04/2021	487892	6767270	50
<i>Allocasuarina tessellata</i>	3	2/04/2021	487930	6767272	57
<i>Allocasuarina tessellata</i>	3	2/04/2021	487869	6767272	95
<i>Allocasuarina tessellata</i>	3	2/04/2021	487904	6767273	4
<i>Allocasuarina tessellata</i>	3	2/04/2021	487788	6767273	90
<i>Allocasuarina tessellata</i>	3	2/04/2021	487809	6767274	48
<i>Allocasuarina tessellata</i>	3	2/04/2021	487768	6767274	26
<i>Allocasuarina tessellata</i>	3	2/04/2021	487935	6767277	43
<i>Allocasuarina tessellata</i>	3	2/04/2021	487837	6767277	45
<i>Allocasuarina tessellata</i>	3	2/04/2021	487734	6767282	20
<i>Allocasuarina tessellata</i>	3	2/04/2021	487724	6767296	42
<i>Allocasuarina tessellata</i>	3	2/04/2021	487753	6767301	60
<i>Allocasuarina tessellata</i>	3	2/04/2021	487910	6767301	145
<i>Allocasuarina tessellata</i>	3	2/04/2021	487776	6767305	45
<i>Allocasuarina tessellata</i>	3	2/04/2021	487802	6767306	52
<i>Allocasuarina tessellata</i>	3	2/04/2021	487835	6767309	90
<i>Allocasuarina tessellata</i>	3	2/04/2021	487858	6767316	95
<i>Allocasuarina tessellata</i>	3	2/04/2021	487851	6767322	50
<i>Allocasuarina tessellata</i>	3	2/04/2021	487892	6767325	102
<i>Allocasuarina tessellata</i>	3	2/04/2021	487810	6767326	46
<i>Allocasuarina tessellata</i>	3	2/04/2021	487749	6767326	86
<i>Allocasuarina tessellata</i>	3	2/04/2021	487715	6767329	65
<i>Allocasuarina tessellata</i>	3	2/04/2021	487780	6767330	125
<i>Allocasuarina tessellata</i>	3	2/04/2021	487932	6767344	16
<i>Allocasuarina tessellata</i>	3	2/04/2021	487910	6767347	20
<i>Allocasuarina tessellata</i>	3	2/04/2021	487940	6767348	2
<i>Allocasuarina tessellata</i>	3	2/04/2021	487898	6767352	35
<i>Allocasuarina tessellata</i>	3	2/04/2021	487749	6767354	135
<i>Allocasuarina tessellata</i>	3	2/04/2021	487882	6767354	5
<i>Allocasuarina tessellata</i>	3	2/04/2021	487935	6767358	4
<i>Allocasuarina tessellata</i>	3	2/04/2021	487802	6767360	36
<i>Allocasuarina tessellata</i>	3	2/04/2021	487841	6767361	13
<i>Allocasuarina tessellata</i>	3	2/04/2021	487934	6767361	10
<i>Allocasuarina tessellata</i>	3	2/04/2021	487761	6767364	14
<i>Allocasuarina tessellata</i>	3	2/04/2021	487919	6767366	24
<i>Allocasuarina tessellata</i>	3	2/04/2021	487785	6767369	33
<i>Allocasuarina tessellata</i>	3	2/04/2021	487827	6767370	2
<i>Allocasuarina tessellata</i>	3	2/04/2021	487782	6767372	52
<i>Allocasuarina tessellata</i>	3	2/04/2021	487902	6767374	27
<i>Allocasuarina tessellata</i>	3	2/04/2021	487898	6767381	10

Scientific Name	Code	Date	Easting	Northing	No.
Allocasuarina tessellata	3	2/04/2021	487789	6767387	80
Allocasuarina tessellata	3	2/04/2021	487774	6767389	70
Allocasuarina tessellata	3	2/04/2021	487745	6767389	33
Allocasuarina tessellata	3	2/04/2021	487724	6767389	25
Allocasuarina tessellata	3	2/04/2021	487876	6767390	12
Allocasuarina tessellata	3	2/04/2021	487818	6767391	34
Allocasuarina tessellata	3	2/04/2021	487797	6767391	17
Allocasuarina tessellata	3	2/04/2021	487807	6767394	37
Allocasuarina tessellata	3	2/04/2021	487876	6767403	32
Allocasuarina tessellata	3	2/04/2021	487854	6767403	11
Allocasuarina tessellata	3	2/04/2021	487775	6767413	21
Allocasuarina tessellata	3	2/04/2021	487761	6767418	7
Allocasuarina tessellata	3	2/04/2021	487738	6767419	50
Allocasuarina tessellata	3	2/04/2021	487794	6767420	10
Allocasuarina tessellata	3	2/04/2021	487882	6767429	25
Allocasuarina tessellata	3	2/04/2021	487819	6767434	40
Allocasuarina tessellata	3	2/04/2021	487826	6767438	30
Allocasuarina tessellata	3	2/04/2021	487848	6767440	24
Allocasuarina tessellata	3	2/04/2021	487879	6767444	37
Allocasuarina tessellata	3	2/04/2021	487919	6767444	15
Allocasuarina tessellata	3	2/04/2021	487863	6767445	45
Allocasuarina tessellata	3	2/04/2021	487737	6767449	45
Allocasuarina tessellata	3	2/04/2021	487940	6767454	10
Allocasuarina tessellata	3	2/04/2021	487722	6767459	55
Allocasuarina tessellata	3	2/04/2021	487765	6767462	45
Allocasuarina tessellata	3	2/04/2021	487862	6767464	45
Allocasuarina tessellata	3	2/04/2021	487843	6767464	40
Allocasuarina tessellata	3	2/04/2021	487876	6767466	48
Allocasuarina tessellata	3	2/04/2021	487870	6767466	20
Allocasuarina tessellata	3	2/04/2021	487817	6767466	29
Allocasuarina tessellata	3	2/04/2021	487785	6767468	30
Allocasuarina tessellata	3	2/04/2021	487903	6767471	35
Allocasuarina tessellata	3	2/04/2021	487904	6767472	8
Allocasuarina tessellata	3	2/04/2021	487923	6767476	8
Allocasuarina tessellata	3	2/04/2021	487725	6767479	60
Allocasuarina tessellata	3	2/04/2021	487755	6767488	102
Allocasuarina tessellata	3	2/04/2021	487826	6767493	95
Allocasuarina tessellata	3	2/04/2021	487773	6767494	48
Allocasuarina tessellata	3	2/04/2021	487795	6767498	95
Allocasuarina tessellata	3	2/04/2021	487724	6767500	25
Allocasuarina tessellata	3	2/04/2021	487940	6767503	60
Allocasuarina tessellata	3	2/04/2021	487722	6767504	20



Scientific Name	Code	Date	Easting	Northing	No.
Allocasuarina tessellata	3	2/04/2021	487741	6767507	87
Allocasuarina tessellata	3	2/04/2021	487929	6767509	70
Allocasuarina tessellata	3	2/04/2021	487806	6767509	16
Allocasuarina tessellata	3	2/04/2021	487775	6767509	20
Allocasuarina tessellata	3	2/04/2021	487925	6767510	35
Allocasuarina tessellata	3	2/04/2021	487757	6767510	120
Allocasuarina tessellata	3	2/04/2021	487888	6767512	20
Allocasuarina tessellata	3	2/04/2021	487867	6767517	19
Allocasuarina tessellata	3	2/04/2021	487943	6767530	35
Allocasuarina tessellata	3	2/04/2021	487899	6767530	120
Allocasuarina tessellata	3	2/04/2021	487925	6767534	21
					4072

**Appendix 5c: Locations of priority flora – *Chamelaucium* sp. Warriedar P1**

Scientific Name	Code	Date	Easting	Northing	No.
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487927	6767277	9
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487940	6767278	17
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487891	6767273	18
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487867	6767275	18
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487855	6767269	1
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487837	6767277	12
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487818	6767274	16
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487794	6767275	2
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487772	6767273	2
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487754	6767286	7
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487734	6767283	3
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487734	6767279	14
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487733	6767301	16
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487765	6767307	9
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487784	6767306	18
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487790	6767301	4
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487806	6767307	28
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487827	6767306	2
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487849	6767315	7
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487862	6767322	2
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487853	6767328	2
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487843	6767325	3
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487807	6767329	7
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487788	6767334	32
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487760	6767327	6
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487738	6767329	8
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487730	6767335	14
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487716	6767321	2
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487724	6767362	27
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487730	6767374	25
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487746	6767364	8
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487750	6767357	16
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487754	6767354	5
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487761	6767364	2
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487770	6767359	24
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487780	6767368	12
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487789	6767368	7
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487802	6767361	17
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487892	6767385	5
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487878	6767387	8
<i>Chamelaucium</i> sp. Warriedar	1	2/04/2021	487871	6767396	20

Scientific Name	Code	Date	Easting	Northing	No.
Chamelaucium sp. Warriedar	1	2/04/2021	487876	6767403	3
Chamelaucium sp. Warriedar	1	2/04/2021	487867	6767406	1
Chamelaucium sp. Warriedar	1	2/04/2021	487862	6767410	1
Chamelaucium sp. Warriedar	1	2/04/2021	487850	6767394	13
Chamelaucium sp. Warriedar	1	2/04/2021	487841	6767395	4
Chamelaucium sp. Warriedar	1	2/04/2021	487826	6767389	2
Chamelaucium sp. Warriedar	1	2/04/2021	487818	6767391	2
Chamelaucium sp. Warriedar	1	2/04/2021	487801	6767396	11
Chamelaucium sp. Warriedar	1	2/04/2021	487789	6767387	6
Chamelaucium sp. Warriedar	1	2/04/2021	487781	6767390	31
Chamelaucium sp. Warriedar	1	2/04/2021	487770	6767384	11
Chamelaucium sp. Warriedar	1	2/04/2021	487757	6767380	5
Chamelaucium sp. Warriedar	1	2/04/2021	487744	6767389	23
Chamelaucium sp. Warriedar	1	2/04/2021	487744	6767395	17
Chamelaucium sp. Warriedar	1	2/04/2021	487726	6767389	23
Chamelaucium sp. Warriedar	1	2/04/2021	487725	6767394	14
Chamelaucium sp. Warriedar	1	2/04/2021	487726	6767406	7
Chamelaucium sp. Warriedar	1	2/04/2021	487724	6767410	15
Chamelaucium sp. Warriedar	1	2/04/2021	487738	6767424	37
Chamelaucium sp. Warriedar	1	2/04/2021	487782	6767416	7
Chamelaucium sp. Warriedar	1	2/04/2021	487795	6767420	7
Chamelaucium sp. Warriedar	1	2/04/2021	487814	6767430	9
Chamelaucium sp. Warriedar	1	2/04/2021	487826	6767438	34
Chamelaucium sp. Warriedar	1	2/04/2021	487854	6767442	27
Chamelaucium sp. Warriedar	1	2/04/2021	487932	6767449	1
Chamelaucium sp. Warriedar	1	2/04/2021	487936	6767440	3
Chamelaucium sp. Warriedar	1	2/04/2021	487940	6767454	2
Chamelaucium sp. Warriedar	1	2/04/2021	487870	6767466	2
Chamelaucium sp. Warriedar	1	2/04/2021	487785	6767468	3
Chamelaucium sp. Warriedar	1	2/04/2021	487758	6767460	1
Chamelaucium sp. Warriedar	1	2/04/2021	487749	6767459	9
Chamelaucium sp. Warriedar	1	2/04/2021	487737	6767449	10
Chamelaucium sp. Warriedar	1	2/04/2021	487722	6767460	4
Chamelaucium sp. Warriedar	1	2/04/2021	487725	6767470	45
Chamelaucium sp. Warriedar	1	2/04/2021	487725	6767479	12
Chamelaucium sp. Warriedar	1	2/04/2021	487737	6767499	39
Chamelaucium sp. Warriedar	1	2/04/2021	487752	6767490	8
Chamelaucium sp. Warriedar	1	2/04/2021	487755	6767488	6
Chamelaucium sp. Warriedar	1	2/04/2021	487777	6767493	14
Chamelaucium sp. Warriedar	1	2/04/2021	487911	6767492	8
Chamelaucium sp. Warriedar	1	2/04/2021	487943	6767486	8
Chamelaucium sp. Warriedar	1	2/04/2021	487939	6767494	2

Scientific Name	Code	Date	Easting	Northing	No.
Chamelaucium sp. Warriedar	1	2/04/2021	487944	6767500	15
Chamelaucium sp. Warriedar	1	2/04/2021	487941	6767507	1
Chamelaucium sp. Warriedar	1	2/04/2021	487936	6767520	2
Chamelaucium sp. Warriedar	1	2/04/2021	487944	6767525	9
Chamelaucium sp. Warriedar	1	2/04/2021	487939	6767542	13
Chamelaucium sp. Warriedar	1	2/04/2021	487890	6767531	1
Chamelaucium sp. Warriedar	1	2/04/2021	487795	6767511	6
Chamelaucium sp. Warriedar	1	2/04/2021	487779	6767515	15
Chamelaucium sp. Warriedar	1	2/04/2021	487766	6767520	20
Chamelaucium sp. Warriedar	1	2/04/2021	487762	6767513	2
Chamelaucium sp. Warriedar	1	2/04/2021	487755	6767509	21
Chamelaucium sp. Warriedar	1	2/04/2021	487741	6767507	8
Chamelaucium sp. Warriedar	1	2/04/2021	487725	6767508	19
Chamelaucium sp. Warriedar	1	2/04/2021	487724	6767500	32
					1106

**Appendix 5d: Priority flora locations – *Grevillea scabrida* P3**

Scientific Name	Code	Date	Easting	Northing	No.
<i>Grevillea scabrida</i>	3	2/04/2021	487911	6767307	1
<i>Grevillea scabrida</i>	3	2/04/2021	487918	6767304	1
<i>Grevillea scabrida</i>	3	2/04/2021	487907	6767336	1
					3



**Appendix 5e: Locations of priority flora – *Grevillea subtiliflora* P3**


Scientific Name	Code	Date	Easting	Northing	No.
<i>Grevillea subtiliflora</i>	3	2/04/2021	487859	6767272	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487846	6767268	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487754	6767278	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487745	6767282	3
<i>Grevillea subtiliflora</i>	3	2/04/2021	487736	6767301	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487740	6767301	3
<i>Grevillea subtiliflora</i>	3	2/04/2021	487765	6767307	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487883	6767319	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487818	6767332	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487781	6767329	3
<i>Grevillea subtiliflora</i>	3	2/04/2021	487716	6767349	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487777	6767368	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487817	6767362	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487871	6767353	2
<i>Grevillea subtiliflora</i>	3	2/04/2021	487883	6767355	3
<i>Grevillea subtiliflora</i>	3	2/04/2021	487826	6767389	2
<i>Grevillea subtiliflora</i>	3	2/04/2021	487733	6767412	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487745	6767423	2
<i>Grevillea subtiliflora</i>	3	2/04/2021	487754	6767416	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487846	6767440	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487908	6767442	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487924	6767463	2
<i>Grevillea subtiliflora</i>	3	2/04/2021	487803	6767471	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487769	6767463	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487753	6767456	6
<i>Grevillea subtiliflora</i>	3	2/04/2021	487746	6767455	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487730	6767492	2
<i>Grevillea subtiliflora</i>	3	2/04/2021	487831	6767491	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487789	6767498	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487813	6767494	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487907	6767536	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487864	6767527	1
<i>Grevillea subtiliflora</i>	3	2/04/2021	487770	6767512	2
<i>Grevillea subtiliflora</i>	3	2/04/2021	487725	6767505	2
					54

**Appendix 5f: Locations of priority flora – *Lepidosperma* sp. Blue Hills P1**

Scientific Name	Code	Date	Easting	Northing	No. tussocks
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487912	6767335	4
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487907	6767336	1
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487807	6767367	1
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487819	6767367	5
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487823	6767370	5
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487830	6767366	1
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487837	6767364	5
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487863	6767356	9
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487864	6767366	10
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487875	6767356	8
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487886	6767357	29
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487890	6767358	27
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487890	6767360	29
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487895	6767357	47
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487902	6767354	42
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487918	6767349	10
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487920	6767349	12
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487942	6767348	5
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487944	6767353	2
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487940	6767361	1
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487935	6767361	23
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487934	6767363	1
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487931	6767362	6
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487914	6767366	34
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487908	6767370	5
<i>Lepidosperma</i> sp. Blue Hills	1	2/04/2021	487902	6767369	42
					364

**Appendix 6: Quadrat descriptions on greenstone sites (Meissner & Coppen 2014)**

Scientific names have been updated

<p><b>ROTH05</b>                  DEC Greenstone Survey, ex Karara Station, survey site ROTH05, ca. 7 km north north-west (351°) of Rothsay and ca. 16.07 km east north-east (83°) of Karara Homestead.                  29.2211 S 116.8754 E</p>	
<p>North facing moderately inclined mid slope of basalt. Very slightly rocky basalt outcrop with red-brown shallow sandy clay soils.</p> <p>Open woodland of <i>Allocasuarina dielsiana</i> over open shrubland of <i>Allocasuarina tessellata</i> and <i>Acacia karina</i> over open forbland of <i>Podolepis gardneri</i>, <i>Ptilotus helipteroides</i>, <i>Schoenia cassiniana</i> and <i>Stenopetalum filifolium</i>.</p>	
<p><i>Acacia karina</i>  <i>Allocasuarina dielsiana</i>  <i>Allocasuarina tessellata</i>  <i>Aristida contorta</i>  <i>Arthropodium dyeri</i>  <i>Austrostipa blackii</i>  <i>Austrostipa nitida</i>  <i>Austrostipa trichophylla</i>  <i>Cheilanthes adiantoides</i>  <i>Cuscuta planiflora</i>  <i>Daucus glochidiatus</i>  <i>Euphorbia tannensis</i> subsp. <i>eremophila</i>  <i>Goodenia berardiana</i>  <i>Grevillea subtiliflora</i>  <i>Haloragis trigonocarpa</i></p>	<p><i>Lobelia rhytidosperma</i>  <i>Melaleuca hamata</i>  <i>Melaleuca radula</i>  <i>Millotia dimorpha</i>  <i>Pentameris airoides</i> subsp. <i>airoides</i>  <i>Phyllangium sulcatum</i>  <i>Podolepis gardneri</i>  <i>Ptilotus gaudichaudii</i> subsp. <i>eremita</i>  <i>Ptilotus helipteroides</i>  <i>Schoenia cassiniana</i>  <i>Schoenus nanus</i>  <i>Stenopetalum filifolium</i>  <i>Thysanotus pyramidalis</i>  <i>Velleia rosea</i>  <i>Waitzia acuminata</i> var. <i>acuminata</i></p>

**ROTH06**

DEC Greenstone Survey, ex Karara Station, survey site ROTH06, ca. 6.88 km north north-west (351°) of Rothsay and ca. 16.03 km east north-east (83°) of Karara Homestead.

29.2223 S 116.8750 E

West north-west facing moderately inclined crest of basalt. Very slightly rocky basalt outcrop with red-brown skeletal to shallow sandy clay soils

Open woodland of *Allocasuarina dielsiana*, *Allocasuarina tessellata* and *Melaleuca hamata* over open shrubland of *Melaleuca radula*, *Acacia burkittii* and *Allocasuarina tessellata* over sparse low shrubland and forbland of *Chamelaucium* sp. Warriedar (A.P. Brown & S. Patrick APB 1100), *Arthropodium dyeri*, *Lobelia rhytidosperma* and *Cheilanthes adiantoides*.



*Acacia burkittii*

*Acacia karina*

*Allocasuarina dielsiana*

*Allocasuarina tessellata*

*Arthropodium dyeri*

*Austrostipa blackii*

*Caesia* sp. Wongan (K.F. Kenneally 8820)

*Chamelaucium* sp. Warriedar (A.P. Brown & S. Patrick APB 1100)

*Cheilanthes adiantoides*

*Daucus glochidiatus*

*Erodium cygnorum*

*Euphorbia tannensis* subsp. *eremophila*

*Goodenia berardiana*

*Grevillea subtiliflora*

*Lobelia rhytidosperma*

*Melaleuca hamata*

*Melaleuca radula*

*Parietaria cardiostegia*

*Pentameris airoides* subsp. *airoides*

*Phyllangium sulcatum*

*Podolepis gardneri*

*Pogonolepis stricta*

*Pterostylis tryphera*

*Schoenia cassiniana*

*Stenopetalum filifolium*

*Thysanotus manglesianus*

*Trachymene ornata*

*Wahlenbergia preissii*



## Appendix 7: Conservation codes (DBCA 2019)



Department of Biodiversity,  
Conservation and Attractions

# CONSERVATION CODES

## For Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora<sup>1</sup> are species<sup>2</sup> which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

### T Threatened species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

**Threatened fauna** is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

**Threatened flora** is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

### CR Critically endangered species

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

### EN Endangered species

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

### VU Vulnerable species

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

### Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

#### **EX Extinct species**

Species where *"there is no reasonable doubt that the last member of the species has died"*, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

#### **EW Extinct in the wild species**

Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form"*, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

### Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

#### **MI Migratory species**

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

#### **CD Species of special conservation interest (conservation dependent fauna)**

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

#### **OS Other specially protected species**

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.



**P Priority species**

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

**1 Priority 1: Poorly-known species**

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

**2 Priority 2: Poorly-known species**

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

**3 Priority 3: Poorly-known species**

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

**4 Priority 4: Rare, Near Threatened and other species in need of monitoring**

- (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.
- (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.
- (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

<sup>1</sup>The definition of flora includes algae, fungi and lichens  
<sup>2</sup>Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

# Karara Mining Limited

## Fauna Assessment for Karara Telecommunication Tower (L59/191)

April 2021

<b>Prepared by:</b> Superintendent Environment	André Marais	Date: 30/04/2021 
<b>Reviewed by:</b> Senior Advisor Environment	Robert Wood	Date: 30/04/2021 (Sign).....
<b>Approved by:</b> General Manager HSEC	Gaomai Trench	Date: 30/04/2021 (Sign).....



## SYNOPSIS

This document has been prepared for inclusion in the application for approval to construct a Telecommunications Tower at KML tenement L59/191.

### **Disclaimer**

*“This document has been prepared by Karara Mining Limited for exclusive use (“the Purpose”). Use of this document other than for the Purpose is not permitted.”*

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<b>FAUNA SURVEY - KML TELECOMS TOWER</b>					
<b>REV</b>	<b>DESCRIPTION</b>	<b>ORIG</b>	<b>REVIEW</b>	<b>APPROVED</b>	<b>DATE</b>
A	Issued for Internal Review	<u>A Marais</u>	<u>R Wood</u>	<u>G Trench</u>	30-Apr-2021

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## 1 INTRODUCTION

### 1.1 Background

Karara Mining Limited (KML), a joint venture between Gindalbie Metals Limited and Anshan Iron & Steel Group, operates the Karara Iron Ore Project (KIOP). The project includes processing infrastructure and a rail terminal immediately to the west of the Karara mine, with associated waste and tailings stockpiles.

A need for an improved telecommunication network capability requires the erection and construction of a new tower on a natural ridge located on tenement L59/191.

The survey area is located within the Yalgoo (358) IBRA (Interim Biogeographic Regionalisation Australia) Subregion (Department of Agriculture, Water and the Environment 2021). This region is an interzone between South-western Bioregions and Murchison Region, and the rocky ridge part of the survey area is characterised by Karara Regional Floristic Community 21a while the lower lying surrounds is covered by Community 31. Floristic Community 21a is identified by low woodlands to open woodlands of *Eucalyptus salubris* over mid sparse shrubland of mixed species including *Acacia acanthoclada subsp. glaucescens* and *Rhagodia drummondii* over low sparse chenopod shrubland of mixed species including *Sclerolaena fusiformis* and *Maireana trichoptera* on red to red-brown clay loam or sandy clay loam on flats to midslopes.

Floristic Community 31 is characterized by tall shrubland to tall open shrubland of mixed species including *Acacia burkittii*, *A. karina*, *A. tetragonophylla*, *Allocasuarina tessellata* and *A. dielsiana* over low sparse shrubland of species including *Ptilotus obovatus* over low sparse forbland of *Borya sphaerocephala* on red clay loams on hillslopes with granite and/or ironstone outcropping. (Woodman Environmental 2011).

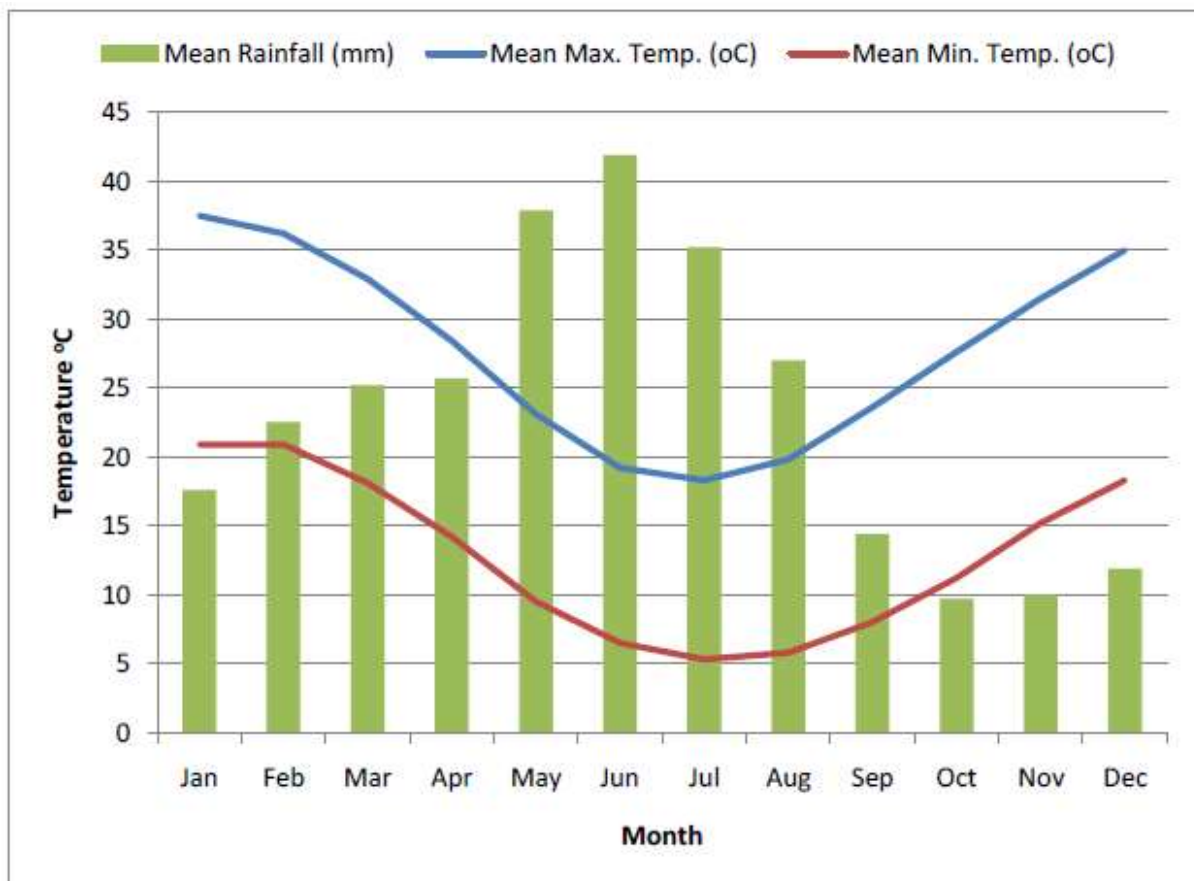
The dominant land use of the Yalgoo Subregion is grazing of natural grasses (pastoral stations), with a significant proportion of the land under conservation and mining leases. Geological surveys have mapped 76 land systems across the Sandstone-Yalgoo-Paynes Find survey area. Karara is located on the Yilgarn Plateau, particularly within the Salinaland Plateau physiogeographic unit, which is characterised by sandplains and laterite

breakaways, granitic and alluvial plains, ridges of metamorphic rocks and granitic hills and rises, calcretes, large salt lakes and dunes along valleys (Payne *et al.*, 1998).

The survey area experiences a Semi-Desert Mediterranean climate, characterised by 9 to 11 months of dry weather, with mild wet winters and hot dry summers (Beard 1990).

Historically the highest rainfall is experienced during June, with the driest months being October – December (BOM 2020; Paynes Find). Figure 1 presents the average monthly rainfall, plus maximum and minimum temperatures.

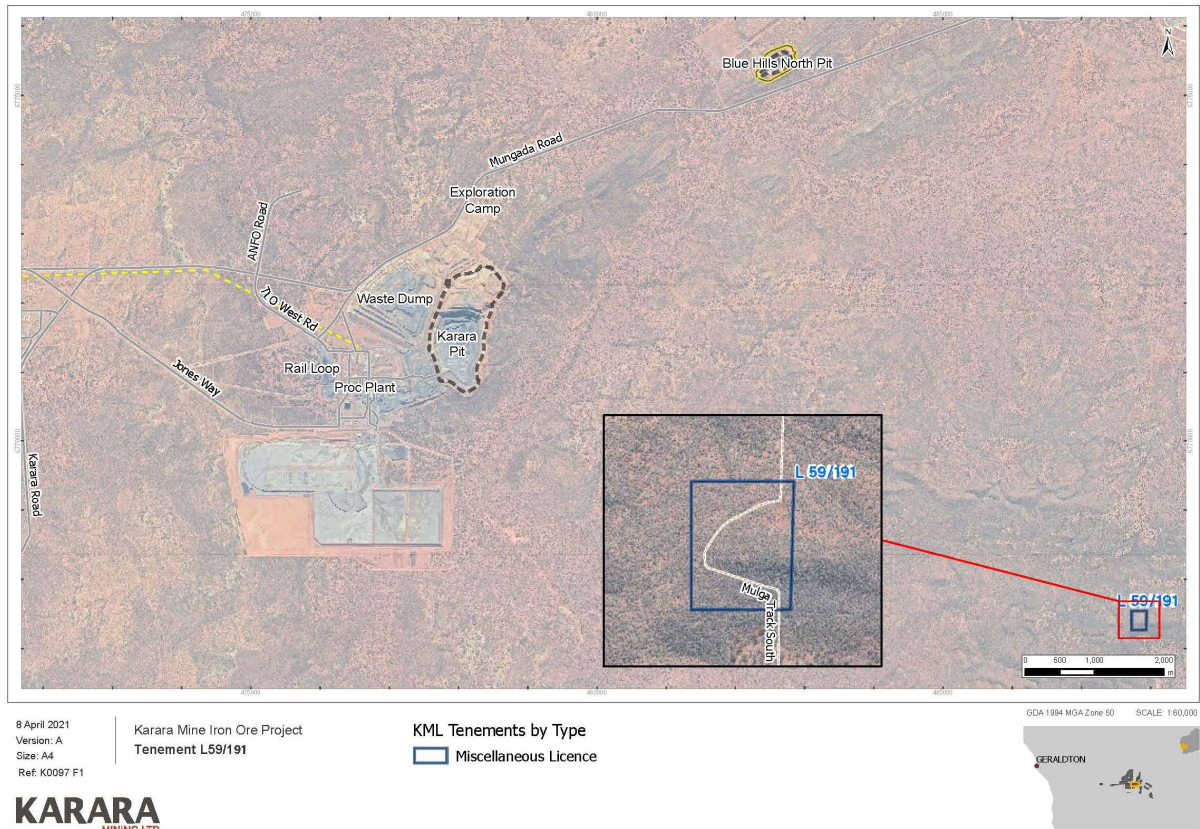
Figure 1. Monthly Mean Maximum and Minimum Temperatures (°C) (1991 – 2020) and Mean Rainfall (1991 – 2020), Paynes Find (BOM 2020).



## 1.2 Location

The project area is located on and around Karara Station, 55km north-east of Perenjori in Western Australia. KML tenement L59/191 is situated approximately 11km South-east of the Karara processing plant (see Figure 2).

Figure 2. Location of the proposed telecommunications tower.



The tenement covers an area of 6ha, a maximum height of 444m and has the following coordinates.

Table 1. Tenement L59/191 boundary coordinates.

<b>L59/191 COORDINATES UTM – (50J)</b>	
North East corner	0487985 // 6767579
North West corner	0487708 // 6767579
South East corner	0487986 // 6767233
South West corner	0487708 // 6767233
<b>Boundary Dimensions</b>	
East West	210m
North South	270m

The field survey for fauna covered the entire six ha of tenement L59/191. Environmental Investigations have previously been conducted along Mungada Road (Bamford and Smith, 2011; Woodman Environmental Consulting, 2011).

### 1.3 Study Objectives

The purpose of the assessment is to provide government agencies with the information needed to assess the significance of impacts under State and Federal Government legislation. The values and impacts approach drawn from Gleeson and Gleeson (2012) was used in the assessment.

The level of the survey is based on the EPA recommendations and determined as Desktop and Basic Survey. A basic survey is a low-intensity survey, completed to gather broad fauna and habitat information at the local scale. The main objectives are to verify the appropriateness of the desktop study, describe and map habitats, identify future survey site locations and determine site logistics / access. The results from the basic survey are also used to determine whether a detailed and/or targeted survey is required. (EPA, 2020).

This approach includes the following components:

- The identification of fauna values:
  - Assemblage characteristics: uniqueness, completeness and richness;
  - Species of conservation significance;
  - Recognition of ecotypes or vegetation/substrate associations (VSAs) that provide habitat for fauna, particularly those that are rare, unusual and/or support significant fauna;
  - Patterns of biodiversity across the landscape; and
  - Ecological processes upon which the fauna depend.
- The review of impacting processes such as:
  - Habitat loss leading to population decline;
  - Habitat loss leading to population fragmentation;
  - Degradation of habitat due to weed invasion and *Phytophthora* infestation leading to population decline;
  - Ongoing mortality from operations;
  - Species interactions including feral and overabundant native species;
  - Hydrological change;
  - Altered fire regimes; and



- Disturbance (dust, light, noise).
- The recommendation of actions to mitigate impacts.

Descriptions and background information on these values and processes can be found in Appendices A to D as described by Bamford and Smith (2020).

This report presents the results of a field surveys undertaken during April 2021. The species of conservation significance that were targeted were the Malleefowl *Leipoa ocellata* (Vulnerable under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act); Schedule under *WA Biodiversity Conservation Act 2016* (BC Act)), The Western Spiny-tailed Skink (WStS) *Egernia stokesii badia* (Endangered (EPBC Act); Schedule 3 (BC Act)), and trapdoor spiders of the genus *Idiosoma*.

The Northern Shield-backed Trapdoor Spider *Idiosoma clypeatum* (listed as Priority 3 by the DBCA) has been found to be fairly common in the KIOP area, usually found in gravelly loam soils close to ironstone ridges (Bancroft and Bamford 2019). The Gilled Slender Blue-tongue *Cyclodomorphus branchialis* (Schedule 3 – *Biodiversity Conservation Act, 2016*) was included among the target species because it has previously been found in the area by Bamford Consulting Ecologists (BCE).

## **2 APPROACH AND METHODS**

### **2.1 Desktop Assessment**

According to the WA EPA Technical Guidance – *Terrestrial vertebrate fauna surveys for environmental impact assessment* (2020), a desktop study is a typical prerequisite for surveys. The Desktop Assessment is not a survey and should be undertaken to inform the choice of field survey type and to provide background information for the survey and subsequent reporting. The purpose of a desktop study is to gather contextual information about an area from existing surveys, database searches, available literature and spatial datasets. At the completion of a desktop study there should be sufficient information collated to identify the potential fauna species, habitats that may be present and set them in a regional context.

#### **2.1.1 Sources of Information**

Sources of information incorporate previous records of all fauna on KML files, *Naturemap* review (Appendix F) and 15 reports completed by BCE between 2004 and 2020. The surveys and assessments completed by BCE over the past 17 years included two level 2 studies and

targeted work on significant species: Malleefowl, Shield-backed Trapdoor Spiders, Western spiny-tailed Skinks, the Gilled Slender Blue-tongue and Short Range Endemic (SRE) invertebrates.

In addition to the above, the most recent database review sourced information from BirdData, Atlas of Living Australia and the EPBC Protected Matter Search tool. KML and BCE records contain more species and more information about these species than the databases as observed in Appendix E (Bamford and Smith, 2020).

The above-mentioned multiple surveys allowed for the accumulation of additional fauna observations with the result that the Karara project area has a noteworthy list of confirmed vertebrate species. KML (with assistance from BCE, Curtin University and other contributors), has maintained an ongoing annotated species list which includes 3 frogs, 47 reptiles, 111 birds, 25 native mammals and 3 invertebrates of significance.

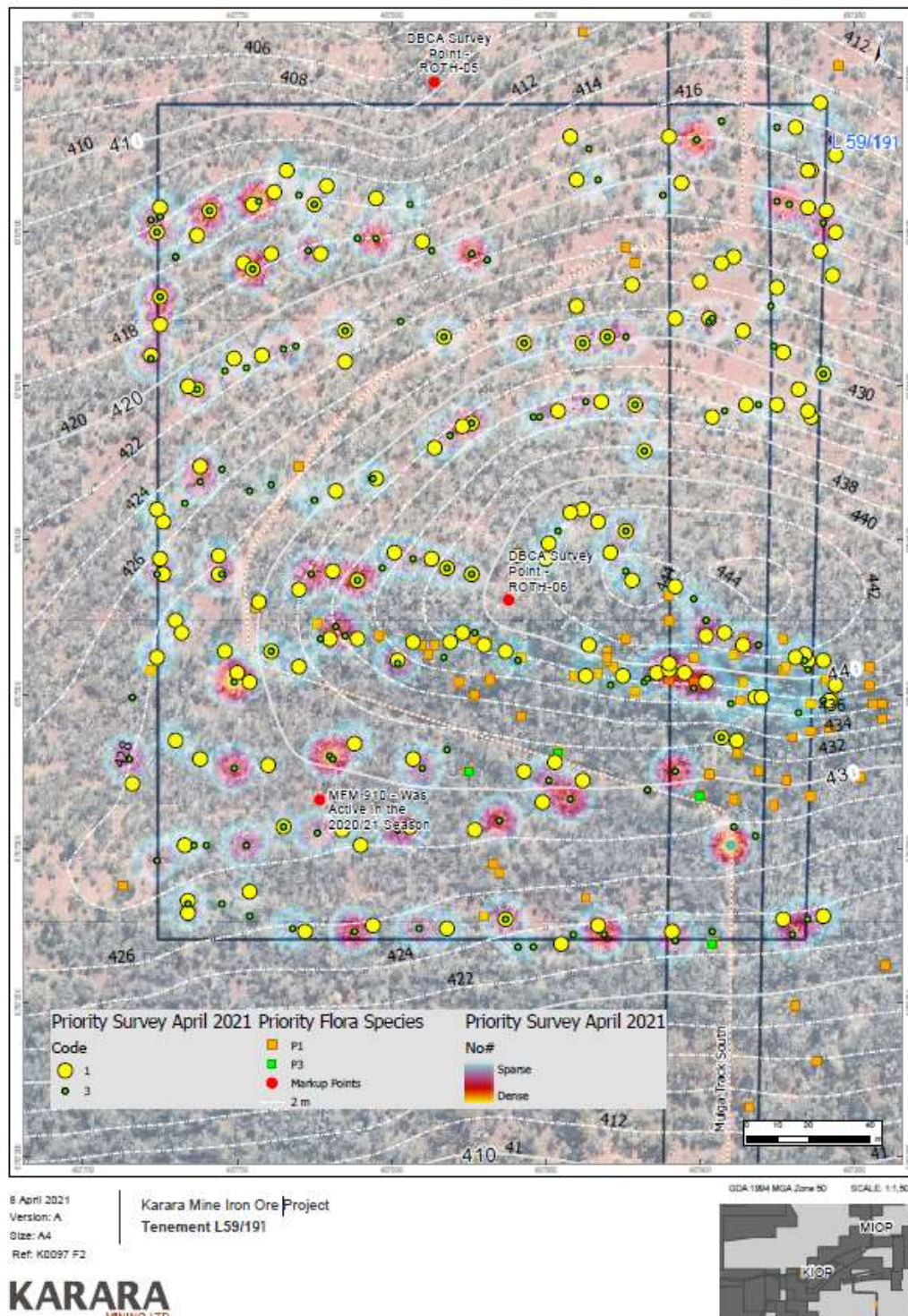
## 2.2 Field Survey

Field surveys for signs or presence of fauna was conducted on the 2<sup>nd</sup> and 20<sup>th</sup> of April 2021 by Adam Freeman (M.Sc. Environmental Science) and André Marais (B.Sc. Zoology and Animal Physiology, M.Sc. MEM). Adam Freeman has 10 years+ environmental management experience at Karara and Marais has 1 year+ experience at KML. Both have completed the DBCA Fauna Handling and Snake Handling courses.

The field investigations involved the personnel walking across tenement L59/191 in transects. Opportunistic searches were conducted at all noteworthy locations of interest or suitable habitat for any of the targeted species and other fauna.

- For Malleefowl, the mound was recorded with GPS coordinates in the KML Malleefowl Register, described and photographed as indicated in Figure 3.
- Searching for habitat and evidence of Western Spiny-tailed Skink presence within the study area included the assessment of any suitable habitat/log pile for the characteristic piles of scats in latrines. No suitable logs were observed or recorded during the walked transects.
- *Idiosoma* spiders. Opportunistic surveys were conducted at all vegetation sites of suitable habitat searching for burrows with distinctive lid architecture, including decorations on the lid and a fan of twigs or leaves. No burrows were recorded during the field survey.

Figure 3. Active Malleefowl Mound in relation to significant flora on tenement L59/191.



- The Gilled Slender Blue-tongue. This reptile species was searched for in rocky areas by turning over rocks, BEC reported that it had been previously recorded on Karara and Mungada ridges using this technique. No specimens were noted.

- Other fauna. Opportunistic observations on other fauna were made during all site visits, this included bird sightings and recording evidence such as tracks, bones, feathers, diggings and scats.

In addition to the above, field cameras were deployed for a total of 18 monitoring days and nights. Cameras were set up to face baiting stations (peanut butter and oats bait balls) – with exception of ants no species were recorded to have any interest in the bait provided at the site (L59/191).

### 2.3 Survey Limitations

The Environmental Protection Authority (2020). Technical Guidance – *Terrestrial vertebrate fauna surveys for environmental impact assessment*, describes several limitations that may arise during surveying. These survey limitations are discussed in the context of the KML investigation of the Telecommunication Tower area in Table 2.

Table 2. Survey limitations as outlined by EPA (2020).

EPA Limitation	Comment
Availability of data and information	A large number of information is available from previous surveys conducted by BEC and others over a period from 2004 to date.
Competency/experience of the survey team, including experience in the bioregion surveyed	Both environmental staff of the survey team has more than a decade experience in monitoring and surveying fauna in WA. One advisor has more than a decade of experience at KML.
Scope of the survey, e.g. where faunal groups were excluded from the survey	The survey focused on significant vertebrate and invertebrate fauna, targeting known threatened species.
Timing, weather and season	Mid-autumn was ideal in terms of reptile movement (peak season) and good in terms of other fauna, weather was warm and mild during the days surveyed.



EPA Limitation	Comment
Disturbance that may have affected results e.g. fire, flood	There has been no fire, floods or other disturbance that could have affected survey results.
The proportion of fauna identified, recorded or collected	No specimens were collected, the proportion of fauna identified and recorded is not considered a limitation due to the relatively small area of survey (6ha).
Adequacy of the survey intensity and proportion of survey achieved, e.g. the extent to which the area was surveyed	The extent to which the area was surveyed is considered appropriate to the level of proposed disturbance (0.1ha of 6 ha area).
Access problems	There were no access problems, a track/road runs through the survey area.
Problems with data and analysis, including sampling biases.	There are no known problems with the data and analyses or sampling biases.

## 2.4 Habitats and Vegetation Associations

Vegetation and Soil Associations (VSAs) combine broad vegetation types, the soils or other substrate with which they are associated, and the landform. VSAs are the environments that provide habitats for fauna. A single VSA was identified during the field investigation.

VSA 1 - This landform consists of an ironstone-based ridge with outcropping rock and slopes with cobbles and gravel supporting a mixed shrubland dominated by *Allocasuarina* spp., *Acacia* spp., and *Melaleuca* spp. Although this VSA is well represented locally it is not common on a regional basis. This Vegetation and Soil Association appears fit for both Malleefowl and Shield-backed Trapdoor Spiders, one active Malleefowl Mound was found at the foot of the hill, but no Spiders or burrows were noted during the field survey.

The proposed hill top area of the tenement is unsuitable for Malleefowl mound habitat as seen from the photos below and the limited clearing is unlikely to impact on the species.

Photos 1 and 2: Habitat and Vegetation associations on the ridge at L59/191. (Photo 1 facing south and 2 is facing north).



### 3. RESULTS

#### 3.1 Observations on significant species

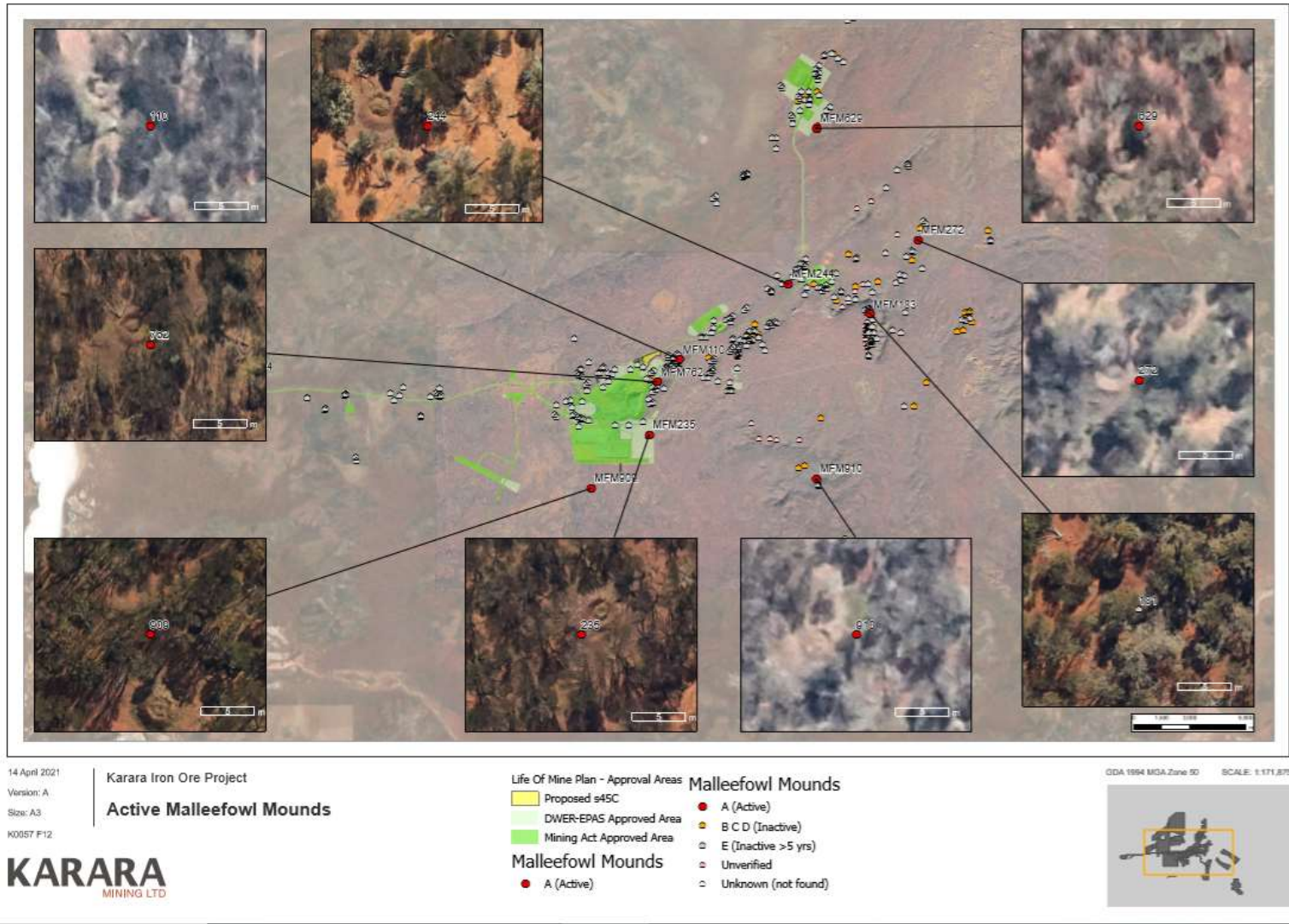
The findings of this survey results were that a detailed fauna survey is not required. The Basic field survey conducted identified one active Malleefowl mound, and no Western Spiny-tailed Skinks, Gilled Slender Bluetongue or Shield-backed Trapdoor Spiders was noted.

##### 3.1.1 Malleefowl

One active Malleefowl mound was located within tenement L59/191. Fresh tracks, pieces of egg shell, feathers and scats were recorded at the mound on both survey dates (2<sup>nd</sup> and 20<sup>th</sup> of April 2021).

The active mound is located on the lower southern slope with doleritic gravel, the location of the mound (910) is provided in Figure 4. [Location: UTM (50J) 0487781 // 6767304].

Figure 4. Location of the active Malleefowl mound (MFM 910) SE - in relation to the other 8 active mounds.





Photos 3 and 4: The active Malleefowl mound and fresh scat.



### 3.1.2 Western Spiny-tailed Skink

No suitable habitat were found in relation to WStS at the survey site, no appropriate fallen logs were found and thus no scat piles of WStS. The closest suitable skink habitat to the survey site is approximately 1.2km to the north as indicated by the map in Figure 5 on the next page.

WStS monitoring sites and suitable or potential Gilled Slender Blue tongue Skink habitat is also depicted on the map.

### 3.1.3 Shield-backed Trapdoor Spider

No evidence of any of the three *Idiosoma* spp. were recorded. However, Wolf Spider (*Lycosa* spp.) and Golden Orb Weaving Spider (*Nephila* spp.) were documented during the survey.

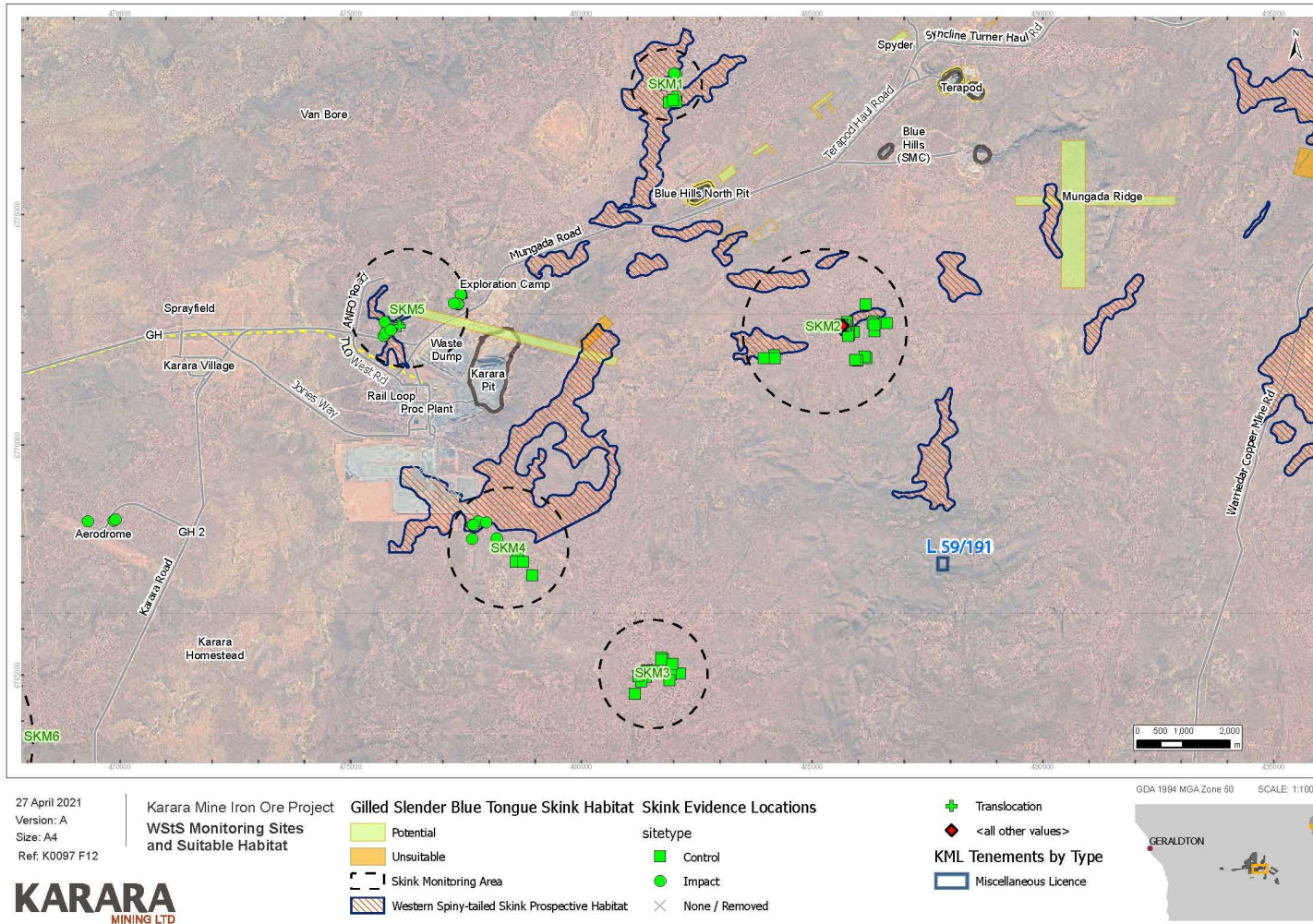


Photo 5 and 6: Wolf spider burrow and motion camera deployed during survey.





Figure 5. Current WStS monitoring sites, suitable habitat and Gilled Slender Blue Tongue habitat in relation to the survey site.





### 3.2 Observation of other Fauna

Amphibians: With water not common at this site, the presence of amphibians were not expected or noted.

Reptiles: Two reptile scats were recorded but these are yet to be identified (scats were verified by Curtin herpetology researcher as not being WStS or Gilled Slender Blue tongue lizard).

Birds: Evidence of Malleefowl, Emu and Australian Ringneck parrot were found on site (tracks/feathers/scats).

Mammals: Evidence of kangaroo, dog/dingo, cat, rabbit and echidna were found as scats and diggings.

Photos 7 and 8: Unidentified reptile scat and echidna scat.





Table 3 below indicates the number of species per taxon recorded at KML since 2004 and the number noted at this six ha tenement during the recent survey.

Table 3. Composition of vertebrate fauna assemblage of the survey area.

Taxon	Number of potential KML species	Species recorded during the survey
Frogs	7	0
Reptiles	57	0 (2*)
Birds	117	3
Native Mammals	24	2
Introduced Mammals	5	3
<b>TOTAL</b>	<b>210</b>	<b>8</b>

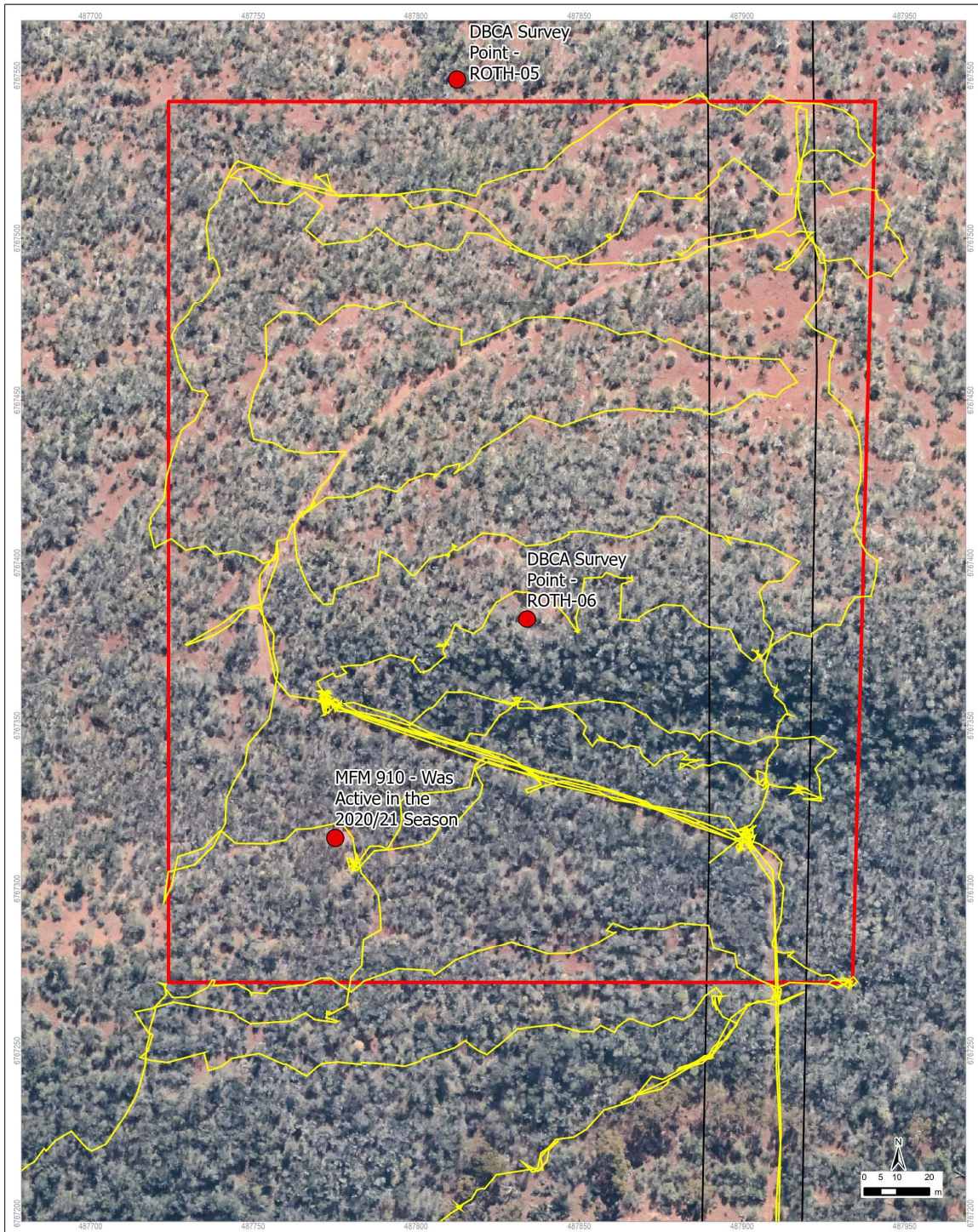
*Reptiles (2\*) – two scat samples/photos (yet to be identified)*

Photos 9 and 10: Rabbit and dog/dingo scats.





Figure 6. The GPS track log of the survey conducted on 02/04/2021.



Karara Iron Ore Project

Fauna Track Logs

**KARARA**  
 MINING LTD

- MarkupPoints
- Fauna Track Log (Indy 210402)
- L59/191



Ref: K0097 F18 Proj: GDA94 MGAZ50  
 Version: A Scale: 1:1,500  
 27 July 2021 Size: A4

## 4. CONCLUSIONS

### 4.1 Summary of Fauna Values

The desktop study identified 210 vertebrate fauna species as potentially occurring in the two expansion areas: 7 frogs, 57 reptiles, 117 birds, and 24 native and 5 introduced mammals. Of these, 3 frogs, 47 reptiles, 102 birds and 20 native and 5 introduced mammals have been confirmed in the greater Karara area by Bamford Consulting Ecologists (BCE) over the past 13 years.

Fauna values within the survey area can be summed up as:

- Fauna assemblage is moderately intact. The relative small size of the tenement area and even smaller potential impact area did not necessitate an intensive study, thus the limited number of species recorded is considered to be consistent with the available habitat and size of the survey area.
- Across KML a total of 26 potential species of conservation significance are expected to be present. Of these only one – the Malleefowl, listed under state and federal legislation (Vulnerable) were found on the survey area. No evidence was found of any of the other listed fauna species previously recorded at KML.
- Patterns of biodiversity, the vegetation type is fairly homogenous across the study area and includes a number of Priority floristic species. The distinctive patterns associated with the rocky hill and outcrop were considered to be associated with SRE invertebrates but none of the *Idiosoma* species were noted during the survey. Malleefowl signs (feathers, tracks and scats), and presence of the mound was limited to the lower lying slope.

### 4.2 Impacts

The proposed development area is small (0.1ha) in the regional landscape and therefore impacts on fauna in general should be minimal. Impacts upon significant species is thus considered to be negligible because of the extent of surrounding intact landscapes and assuming key management actions are taken: minimise mortality/impact on Malleefowl and their mound. Potential impacts to the Malleefowl were assessed against federal significant impact guidelines 1.1 (DotE 2014), as shown in Table 4. The conclusion is that no significant impacts will occur but stress the importance of management to avoid fauna mortality or mound disturbance during clearing for the tower construction.



Table 4. Malleefowl assessed as per Guidelines 1.1 (DotE, 2014).

Significance Criteria under Guidelines 1.1	Likelihood and rationale
	Malleefowl
Lead to a long-term decrease in the size of a population <sup>1</sup> (or an important population <sup>2</sup> ).	<b>Unlikely to occur.</b> No Malleefowl will be displaced by clearing or the altering of extensive alternative habitat. No long-term change is envisaged.
Reduce the area of occupancy of the species (or an important population).	<b>Unlikely to occur.</b> Area of loss of habitat will be small (0.1ha) relative to the available habitat in the region.
Fragment an existing population (or important population) into two or more populations.	<b>Unlikely to occur.</b> This is a mobile species and clearing within the proposed area is unlikely to affect its ability to move through the landscape.
Adversely affect habitat critical to the survival of a species <sup>3</sup> .	<b>Unlikely to occur.</b> No nesting habitat will be lost, proposed clearing area is on crest with bedrock. Suitable habitat is regionally extensive.
Disrupt the breeding cycle of a population (or important population).	<b>Unlikely to occur.</b> One pair may be temporarily disrupted but unlikely if the disturbance is planned outside of the breeding period.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	<b>Unlikely to occur.</b> No loss of breeding habitat expected (clearing of 0.1ha of rocky substrate area) no impact at the regional population scale.
Result in invasive species that are harmful to a threatened species becoming established in the threatened species' habitat.	<b>Unlikely to occur.</b> Feral predators (e.g. cats and foxes) are likely to be present in the region already and management is recommended to ensure these species do not adversely affect Malleefowl. (Trapping of feral predators is an ongoing project).
Introduce disease that may cause the species to decline.	<b>Unlikely to occur.</b> Vehicle and equipment hygiene management plan will be implemented.
Interfere with the recovery of the species.	<b>Unlikely to occur.</b> Localised impacts only. Broad-scale threatening processes (such as feral predators and herbivores) are of greatest concern for the species.

<sup>1</sup> A 'population of a species' is defined under the EPBC Act as an occurrence of the species in a particular area (includes a geographically distinct regional population, or collection of local populations, or a population, or collection of local populations, that occurs within a particular bioregion). Pertains to endangered and vulnerable species.

<sup>2</sup> An 'important population' is a population that is necessary for a species' long-term survival and recovery (includes populations identified as such in recovery plans, and/or key source populations either for breeding or dispersal, populations that are necessary for maintaining genetic diversity, and/or populations that are near the limit of the species range). Pertains to vulnerable species.

<sup>3</sup> 'Habitat critical to the survival of a species' refers to areas that are necessary: for activities such as foraging, breeding, roosting, or dispersal; for the long-term maintenance of the species; to maintain genetic diversity and long term evolutionary development; or for the reintroduction of populations or recovery of the species or ecological community. Pertains to endangered and vulnerable species.

Due to the fact that no WStS or *Idiosoma* species were recorded during the survey, these species were not assessed as for Malleefowl per Guidelines 1.1.

### 4.3 Recommendations

Effects of impacting processes are mostly considered to be negligible (Bamford and Smith, 2020); this is mainly due to the scale and type of impact and the continuous, extensive and fairly uniform environment. Impacts that may need to be addressed are:

- Mortality of fauna or disturbance of nesting Malleefowl during construction.
- Possibility of off-site impacts such as disturbance to vegetation (fauna habitat) during access improvement to the site.
- Potential of introducing weeds or pathogens to the area from equipment or vehicles used in the construction of the tower.

Management actions that can be taken to minimise impacts are summarised by the following recommendations:

- Minimise footprint on the site, access route and rehabilitate where possible.
- Implement the existing KML management procedures for minimising impacts on the Malleefowl during clearing and operations (*CORP-EN-PRO-1035 - Malleefowl Management and Monitoring Procedure*).
- Employ industry standard hygiene to avoid introducing weeds into the project areas.



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## 6. GLOSSARY

An alphabetical list of terms and acronyms used in this report are documented below in Table 5. Glossary.

Table 5. Glossary

Term	Definition
BC	Biodiversity Conservation
BCE	Bamford Consulting Ecologists (M.J. and A.R. Bamford)
BOM	Bureau of Meteorology
CAMBA	China Australia Migratory Bird Agreement
CMS	Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
DBCA	Department of Biodiversity, Conservation and Attractions
DoEE	Department of the Environment and Energy
DOtE	Department of the Environment
DPaW	Department of Parks and Wildlife
EPA	Environmental Protection Authority
EPBC	Environment Protection and Biodiversity Conservation
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for the Conservation of Nature and Natural Resources
JAMBA	Japan Australia Migratory Bird Agreement
KML	Karara Mining Limited
MEM	Masters Environmental Management
ROKAMBA	Republic of South Korea Australia Migratory Bird Agreement
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SER	Short Range Endemics
VSA	Vegetation and Soil Associations
WA	Western Australia
WEC	Woodman Environmental Consulting

## Appendices

### Appendix A.

#### Explanation of fauna values.

Bamford and Smith (2020) describe the fauna values as the features of a site and its fauna that contribute to biodiversity, and it is these values that are potentially at threat from a development proposal. Fauna values can be examined under the five headings outlined below. Understanding fauna values provides opportunities to predict and therefore mitigate impacts.

#### Assemblage characteristics

Uniqueness. This refers to the combination of species present at a site. For example, a site may support an unusual assemblage that has elements from adjacent biogeographic zones, it may have species present or absent that might be otherwise expected, or it may have an assemblage that is typical of a very large region. For the purposes of impact assessment, an unusual assemblage has greater value for biodiversity than a typical assemblage.

Completeness. An assemblage may be complete (i.e., has all the species that would have been present at the time of European settlement) or it may have lost species due to a variety of factors. Note that a complete assemblage, such as on an island, may have fewer species than an incomplete assemblage (such as in a species-rich but degraded site on the mainland).

Richness. This is a measure of the number of species at a site. At a simple level, a species-rich site is more valuable than a species-poor site, but value is also determined by other factors, for example, by the sorts of species present.

#### Vegetation and Substrate Associations

Vegetation and Substrate Associations (VSAs) combine broad vegetation types, the soils or other substrate with which they are associated, and the landform. In the context of fauna assessment, VSAs are the environments that provide habitats for fauna. By definition an animal's habitat is the environment that it utilises, not the environment as a whole. Habitat is a function of the animal and its ecology, rather than being a function of the environment. For example, a species may occur in eucalypt canopy or in leaf-litter on sand, and that habitat may be found in only one or in several VSAs. VSAs are not the same as vegetation types since these may not incorporate soil and landform, and recognise floristics to a degree that VSAs do not. Vegetation types may also not recognise minor but often significant (for fauna) structural differences in the environment, which VSAs will recognise.

Because VSAs provide the habitat for fauna, they are important in determining assemblage characteristics. For the purposes of impact assessment, VSAs can also provide a surrogate for detailed information on the fauna assemblage. For example, rare or restricted VSAs should automatically be considered a significant fauna value. Impacts may be significant if the VSA is rare, a large proportion of the VSA is affected and/or the VSA supports significant fauna. The disturbance of even small amounts of habitat in a localised area can have significant impacts to fauna if rare or unusual habitats are disturbed.

#### Patterns of biodiversity across the landscape

This fauna value relates to how the assemblage is organised across the landscape. Generally, the fauna assemblage is not distributed evenly across the landscape or even within one VSA. There may be zones of high biodiversity, such as particular environments or ecotones (transitions between VSAs). There may also be zones of low biodiversity. Impacts may be significant if a wide range of species is affected even if most of those species are not significant per se.



### Species of conservation significance

Species of conservation significance are of special importance in impact assessment. The conservation status of fauna species in Australia is assessed under Commonwealth and State Acts such as the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Western Australian Biodiversity Conservation Act 2016* (Biodiversity Conservation Act). In addition, the Western Australian Department of Biodiversity, Conservation and Attractions (DBCA) recognises priority levels, while local populations of some species may be significant even if the species as a whole has no formal recognition. Therefore, three broad levels of conservation significance can be recognised and are used for the purposes of this report and are outlined below. A full description of the conservation significance levels, schedules and priority levels mentioned below is provided in Appendix 3.

#### Conservation Significance (CS) level 1: Species listed under State or Commonwealth Acts.

Species listed under the EPBC Act are assigned to categories recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN) or are listed as migratory. Migratory species are recognised under international treaties such as the China Australia Migratory Bird Agreement (CAMBA), the Japan Australia Migratory Bird Agreement (JAMBA), the Republic of South Korea Australia Migratory Bird Agreement (ROKAMBA), and/or the Convention on the Conservation of Migratory Species of Wild Animals (CMS; also referred to as the Bonn Convention).

#### Conservation Significance (CS) level 2: Species listed as Priority by the DBCA but not listed under State or Commonwealth Acts.

In Western Australia, the DBCA has produced a supplementary list of Priority Fauna, being species that are not considered threatened under the Biodiversity Conservation Act but for which the DBCA believes there is cause for concern. Some Priority species are also assigned to the Conservation Dependent category of the IUCN.

#### Conservation Significance (CS) level 3: Species not listed under Acts or in publications, but considered of at least local significance because of their pattern of distribution.

This level of significance has no legislative or published recognition and is based on interpretation of distribution information and expert judgment, but is used here as it may have links to preserving biodiversity at the genetic level. If a population is isolated but a subset of a widespread (common) species, then it may not be recognised as threatened, but may have unique genetic characteristics. Conservation significance is applied to allow for the preservation of genetic richness at a population level, and not just at a species level. Species on the edge of their range, or that are sensitive to impacts such as habitat fragmentation, may also be classed as CS3, as may colonies of waterbirds. The Western Australian Department of Environmental Protection, now DBCA, used this sort of interpretation to identify significant bird species in the Perth metropolitan area as part of the Perth Bushplan.

Invertebrate species considered to be short range endemics (SREs) also fall within the CS3 category, as they have no legislative or published recognition and their significance is based on interpretation of distribution information. The majority of species that have been classified as short-range endemics have common life history characteristics such as poor powers of dispersal or confinement to discontinuous habitats. Several groups, therefore, have particularly high instances of short-range endemic species: Gastropoda (snails and slugs), Oligochaeta (earthworms), Onychophora (velvet worms), Araneae (mygalomorph spiders), Pseudoscorpionida (pseudoscorpions), Schizomida (schizomids), Diplopoda (millipedes), Phreatoicidea (phreatoicidean crustaceans), and Decapoda (freshwater crayfish).

### Introduced species

In addition to these conservation levels, species that have been introduced (INT) are indicated throughout the report. Introduced species may be important to the native fauna assemblage through effects by predation and/or competition.

### **Ecological processes upon which the fauna depend**

These are the processes that affect and maintain fauna populations in an area and as such are very complex; for example, populations are maintained through the dynamic of mortality, survival and recruitment being more or less in balance, and these are affected by a myriad of factors. The dynamics of fauna populations in a project may be affected by processes such as fire regime, landscape patterns (such as fragmentation and/or linkage), the presence of feral species and hydrology. Impacts may be significant if processes are altered such that fauna populations are adversely affected, resulting in declines and even localised loss of species. Threatening processes as outlined below are effectively the ecological processes that can be altered to result in impacts upon fauna.

## **Appendix B. Explanation of threatening processes.**

Bamford and Smith (2020), provides the following in terms of threatening processes. Potential impacts of proposed developments upon fauna values can be related to threatening processes. This is recognised in the literature and under the EPBC Act, in which threatening processes are listed. Processes that may impact fauna values are discussed below. Rather than being independent of one another, processes are complex and often interrelated. They are the mechanisms by which fauna can be affected by development. Impacts may be significant if large numbers of species or large proportions of populations are affected.

Note that the terms direct and indirect impacts are used by the Department of DotE, SEWPaC and EPA, but there is some inconsistency in how these are defined. The federal guidance does not define direct impact but has a very broad definition of indirect, and makes the statement (DotE 2013) *'Consideration should be given to all adverse impacts that could reasonably be predicted to follow from the action, whether these impacts are within the control of the person proposing to take the action or not. Indirect impacts will be relevant where they are sufficiently close to the proposed action to be said to be a consequence of the action, and they can reasonably be imputed to be within the contemplation of the person proposing to take the action.'* Indirect impacts therefore can even include what the DotE (2013) calls facilitated impacts, which are the result of third party actions triggered by the primary action. In contrast, the EPA defines direct impacts to *'include the removal, fragmentation or modification of habitat, and mortality or displacement of individuals or populations.'* This document then lists as indirect impacts what in many cases are the consequences of the removal, fragmentation or modification of habitat. For example, *'disruption of the dispersal of individuals required to colonise new areas inhibiting maintenance of genetic diversity between populations'* is a consequence of habitat fragmentation. Impacts of light, noise and even roadkill are defined as indirect but they are clearly the result of the action and in control of the person taking the action. Roadkill is as direct a form of mortality as can be observed, but it is considered as an indirect impact in the context of a development presumably because it is not directly linked to land clearing. The EPA makes a strong distinction between removal of vegetation (direct impact) and the consequences of such clearing and other aspects of a development (indirect impacts). It is not obvious how this distinction between direct and indirect impacts is helpful in the EIA process, as the key aim is to ensure that all impacts that result from a project are addressed in this assessment process. Interestingly, Gleeson and Gleeson, in a major review of impacts of development on wildlife, do not use the terms direct or indirect. In the following outlines of threatening processes that can cause impacts, the emphasis is upon interpreting how a threatening process will cause an impact. For example, loss of habitat (threatening process) can lead to population decline and to population fragmentation, which are two distinct impacts.

### **Loss of habitat affecting population survival**

Clearing for a development can lead to habitat loss for a species with a consequent decline in population size. This may be significant if the smaller population has reduced viability. Conservation significant species or species that already occur at low densities may be particularly sensitive to habitat loss affecting population survival.

### **Loss of habitat leading to population fragmentation**

Loss of habitat can affect population movements by limiting movement of individuals throughout the landscape as a result of fragmentation. Obstructions associated with the development, such as roads, pipes and drainage channels, may also affect movement of small, terrestrial species. Fragmented populations may not be sustainable and may be sensitive to effects such as reduced gene flow.

### **Degradation of habitat due to weed invasion leading to population decline**

Weed invasion, such as through introduction by human boots or vehicle tyres, can occur as a result of development and if this alters habitat quality, can lead to effects similar to habitat loss.

### **Increased mortality**

Increased mortality can occur during project operations; for example, roadkill, animals striking infrastructure, and entrapment in trenches. Roadkill as a cause of population decline has been documented for several medium-sized mammals in eastern Australia. Increased mortality due to roadkill is often more prevalent in habitats that have been fragmented. Increased mortality of common species during development is unavoidable and may not be significant for a population. However, the cumulative impacts of increased mortality of conservation significant species or species that already occur at low densities may have a significant impact on the population.

### **Species interactions, including predation and competition**

Changes in species interactions often occur with development. Introduced species, including the feral Cat, Red Fox and Rabbit, may have adverse impacts upon native species and development can alter their abundance. In particular, some mammal species are very sensitive to introduced predators and the decline of many mammals in Australia has been linked to predation by the Red Fox, and to a lesser extent, the feral cat. Introduced grazing species, such as the Rabbit, Goat, Camel and domestic livestock, can also degrade habitats and deplete vegetation that may be a food source for other species.

Changes in the abundance of some native species at the expense of others, due to the provision of fresh watering points, can also be a concern. The presence of artificial fresh water points in the semi-arid mallee rangelands was found to influence the abundance and distribution of certain bird species. Common, water-dependent birds were found to out-compete some less common, water-independent species. Similarly a decline in some bird species but an increase in others in the vicinity of active mines was noted and concluded this was due to the mine attracting large and aggressive species that displaced other species. Over-abundant native herbivores, such as kangaroos, can also adversely affect less abundant native species through competition and displacement.

### **Hydroecology**

Interruptions of hydroecological processes can have major effects because they underpin primary production in ecosystems and there are specific, generally rare habitats that are hydrology-dependent. Fauna may be impacted by potential changes to groundwater level and chemistry and altered flow regime. These changes may alter vegetation across large areas and may lead to habitat degradation or loss. Impacts upon fauna can be widespread and major. Changes to flow regime across the landscape may alter vegetation and may lead to habitat degradation or loss, affecting fauna. For example, Mulga has a shallow root system and relies on surface sheet flow during flood events. If surface sheet flow is impeded, Mulga can die, which may impact on a range of fauna associated with this vegetation type.

### **Fire**

The role of fire in the Australian environment and its importance to vertebrate fauna has been widely acknowledged. It is also one of the factors that has contributed to the decline and local extinction of some mammal and bird species. Fire is a natural feature of the environment but frequent, extensive fires may adversely impact some fauna, particularly mammals and short-range endemic species. Changes in fire regime, whether to more frequent or less frequent fires, may be significant to some



fauna. Impacts of severe fire may be devastating to species already occurring at low densities or to species requiring long unburnt habitats to survive. In terms of conservation management, it is not fire *per se* but the fire regime that is important, with evidence that infrequent, extensive and intense fires adversely affect biodiversity, whereas frequent fires that cover small areas and are variable in both season and intensity can enhance biodiversity. Fire management may be considered the responsibility of managers of large tracts of land, including managers of mining tenements.

### **Dust, light, noise and vibration**

Impacts of dust, light, noise and vibration upon fauna are difficult to predict. Some studies have demonstrated the impact of artificial night lighting on fauna, with lighting affecting fauna behaviour more than noise. Effects can include impacts on predator-prey interactions, changes to mating and nesting behaviour, and increased competition and predation within and between invertebrates, frogs, birds and mammals.

The death of very large numbers of insects has been observed around some remote mine sites and attracts other fauna, notably native and introduced predators (M. Bamford, pers. obs). The abundance of some insects can decline due to mortality around lights, although this has previously been recorded in fragmented landscapes where populations are already under stress. Artificial night lighting may also lead to disorientation of migratory birds. Aquatic habitats and open habitats such as grasslands and dunes may be vulnerable to light spill.

## Appendix C. Categories used in the assessment of conservation status.

IUCN categories as used for the Western Australian *Biodiversity Conservation Act 2016*.

<b>Extinct</b>	Taxa not definitely located in the wild during the past 50 years.
<b>Extinct in the Wild (Ex)</b>	Taxa known to survive only in captivity.
<b>Critically Endangered (CR)</b>	Taxa facing an extremely high risk of extinction in the wild in the immediate future.
<b>Endangered (E)</b>	Taxa facing a very high risk of extinction in the wild in the near future.
<b>Vulnerable (V)</b>	Taxa facing a high risk of extinction in the wild in the medium-term future.
<b>Near Threatened</b>	Taxa that risk becoming Vulnerable in the wild.
<b>Conservation Dependent</b>	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classed as Vulnerable or more severely threatened.
<b>Data Deficient (Insufficiently Known)</b>	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
<b>Least Concern</b>	Taxa that are not Threatened.

Schedules used in the WA *Biodiversity Conservation Act 2016*.

<b>Schedule 1 (S1)</b>	Critically Endangered fauna
<b>Schedule 2 (S2)</b>	Endangered fauna
<b>Schedule 3 (S3)</b>	Vulnerable Migratory species listed under international treaties
<b>Schedule 4 (S4)</b>	Presumed extinct fauna
<b>Schedule 5 (S5)</b>	Migratory birds under international agreement
<b>Schedule 6 (S6)</b>	Conservation dependent fauna
<b>Schedule 7 (S7)</b>	Other specially protected fauna

WA Department of Biodiversity, Conservation and Attractions Priority species (species not listed under the *Biodiversity Conservation Act 2016*, but for which there is some concern).

<b>Priority 1 (P1)</b>	Taxa with few, poorly known populations on threatened lands.
<b>Priority 2 (P2)</b>	Taxa with few, poorly known populations on conservation lands; or taxa with several, poorly known populations not on conservation lands.
<b>Priority 3 (P3)</b>	Taxa with several, poorly known populations, some on conservation lands.  Taxa in need of monitoring.
<b>Priority 4. (P4)</b>	Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change.
<b>Priority 5 (P5)</b>	Taxa in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years (IUCN Conservation Dependent).

## Appendix D. Ecological and threatening processes identified under legislation and in the literature (Bamford and Smith, 2020).

Ecological processes are processes that maintain ecosystems and biodiversity. They are important for the assessment of impacts of development proposals because ecological processes make ecosystems sensitive to change. The interaction of ecological processes with impacts and conservation of biodiversity has an extensive literature. Following are examples of the sorts of ecological processes that need to be considered (Bamford and Smith, 2020).

### Ecological processes relevant to the conservation of biodiversity in Australia (Soule *et al.* 2004):

- Critical species interactions (highly interactive species);
- Long distance biological movement;
- Disturbance at local and regional scales;
- Global climate change;
- Hydroecology;
- Coastal zone fluxes;
- Spatially-dependent evolutionary processes (range expansion and gene flow); and
- Geographic and temporal variation of plant productivity across Australia.

### Threatening processes (EPBC Act)

Under the EPBC Act, a key threatening process is an ecological interaction that threatens or may threaten the survival, abundance or evolutionary development of a threatened species or ecological community. There are currently 20 key threatening processes listed by the federal Department of the Environment and Energy (DoEE 2019):

- Competition and land degradation by rabbits.
- Competition and land degradation by unmanaged goats.
- Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*).
- Incidental catch (bycatch) of Sea Turtle during coastal otter-trawling operations within Australian waters north of 28 degrees South.
- Incidental catch (or bycatch) of seabirds during oceanic longline fishing operations.
- Infection of amphibians with chytrid fungus resulting in chytridiomycosis.
- Injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris.
- Invasion of northern Australia by Gamba Grass and other introduced grasses.
- Land clearance.
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants.
- Loss of biodiversity and ecosystem integrity following invasion by the Yellow Crazy Ant (*Anoplolepis gracilipes*) on Christmas Island, Indian Ocean.
- Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases.
- Novel biota and their impact on biodiversity.
- Predation by European red fox.
- Predation by exotic rats on Australian offshore islands of less than 1000 km<sup>2</sup> (100,000 ha).
- Predation by feral cats.
- Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs.
- Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species.



- The biological effects, including lethal toxic ingestion, caused by Cane Toads (*Bufo marinus*).
- The reduction in the biodiversity of Australian native fauna and flora due to the red imported fire ant, *Solenopsis invicta* (fire ant).

**General processes that threaten biodiversity across Australia** (The National Land and Water Resources Audit, 2008):

- Vegetation clearing;
- Increasing fragmentation, loss of remnants and lack of recruitment;
- Firewood collection;
- Grazing pressure;
- Feral animals;
- Exotic weeds;
- Changed fire regimes;
- Pathogens;
- Changed hydrology—dryland salinity and salt water intrusion;
- Changed hydrology— such as altered flow regimes affecting riparian vegetation; and
- Pollution.

In addition to the above processes, DSEWPaC (2013) (now DAWE) has produced Significant Impact Guidelines that provide criteria for the assessment of the significance of impacts. These criteria provide a framework for the assessment of significant impacts. The criteria are:

- Will the proposed action lead to a long-term decrease in the size of a population?
- Will the proposed action reduce the area of occupancy of the species?
- Will the proposed action fragment an existing population?
- Will the proposed action adversely affect habitat critical to the survival of a species?
- Will the proposed action disrupt the breeding cycle of a population?
- Will the proposed action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?
- Will the proposed action result in introducing invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?
- Will the proposed action introduce disease that may cause the species to decline?
- Will the proposed action interfere with the recovery of the species?

**Appendix E. Comprehensive species list of fauna recorded at Karara since 2004 (Bamford and Smith, 2020). (KML Fauna Register, 2021) including the species noted during the survey (scats, feathers, tracks, etc.).**

These lists are derived from the results of database and literature searches and from previous field surveys conducted in the local area by BCE and KML recent surveys. These are:

- Nat Map = Naturemap Database, searched April, 2021 (KML);
- Bird Data = Birdlife Australia's Birddata database, searched January 2017 (BCE);
- Karara Surveys = BCE surveys undertaken for Karara Mining Limited 2004 to 2019 (BCE); and
- KML April 2021 (Physical survey of tenement L59/191).

**Frogs**

Latin Name	English Name	CS1	CS2	CS3	Int	Potential status in survey area	Nat. Map	KML Surveys	KML 2021*
Hylidae (Tree frogs)									
<i>Cyclorana platycephala</i>	Water-holding Frog					Resident			
<i>Litoria rubella</i>	Desert Tree Frog				X	Irregular visitor		X	
Myobatrachidae (Ground frogs)									
<i>Neobatrachus centralis</i>	Desert Trilling Frog			CS3		Resident?; uncertain		X	
<i>Neobatrachus kunapalari</i>	Kunapalari Frog					Resident			
<i>Neobatrachus pelobatoides</i>	Humming Frog					Resident			
<i>Neobatrachus sutor</i>	Shoemaker Frog					Resident			
<i>Pseudophryne occidentalis</i>	Western Toadlet					Resident		X	
<b>Total Species : 7</b>				<b>1</b>	<b>1</b>		<b>-</b>	<b>2</b>	<b>-</b>

KML 2021\* - No frogs or signs of frogs were noted during the survey.

**Reptiles**

Latin Name	English Name	CS1	CS2	CS3	Int	Potential status in survey area	Nat. Map	KML Surveys	KML 2021*
Gekkonidae (geckoes)									
<i>Diplodactylus granariensis</i>	Western Stone Gecko					Resident		X	
<i>Diplodactylus pulcher</i>						Resident		X	
<i>Lucasium maini</i>						Resident			
<i>Lucasium squarossum</i>						Resident		X	
<i>Hesperoedura reticulata</i>	Reticulated Velvet Gecko			CS3		Resident		X	
<i>Rhynchoedura ornata</i>	Beaked Gecko					Resident		X	

Latin Name	English Name	CS1	CS2	CS3	Int	Potential status in survey area	Nat. Map	KML Surveys	KML 2021*
<i>Underwoodisaurus milii</i>	Barking Gecko					Resident		X	
<i>Gehyra variegata</i>	Variegated Dtella					Resident		X	
<i>Heteronotia binoei</i>	Bynoe's Gecko					Resident		X	
Pygopodidae (legless lizards)									
<i>Delma australis</i>						Resident		X	
<i>Lialis burtonis</i>	Burton's Legless Lizard					Resident		X	
<i>Pygopus lepidopodus</i>	Common Scaly-foot					Resident			
Agamidae (dragon lizards)									
<i>Caimanops (Diporiphora) amphibolurooides</i>	Mulga Dragon			CS3		Resident		X	
<i>Ctenophorus nuchalis</i>	Central Netted Dragon					Resident		X	
<i>Ctenophorus reticulatus</i>	Western Netted Dragon					Resident		X	
<i>Ctenophorus scutulatus</i>	Lozenge-marked Dragon					Resident		X	
<i>Moloch horridus</i>	Thorny Devil					Resident		X	
<i>Pogona minor</i>	Western Bearded Dragon					Resident		X	
Varanidae (monitors or goannas)									
<i>Varanus caudolineatus</i>	Stripe-tailed Monitor					Resident		X	
<i>Varanus giganteus</i>	Perentie					Resident		X	
<i>Varanus gouldii</i>	Sand Goanna					Resident		X	
<i>Varanus tristis</i>	Black-headed Monitor					Resident		X	
<i>Varanus panoptes</i>	Yellow-spotted Monitor					Resident		X	
Scincidae (skink lizards)									
<i>Cryptoblepharus buchananii</i>	Buchanan's snake-eyed skink					Resident		X	
<i>Ctenotus mimetes</i>						Resident		X	
<i>Ctenotus schomburgkii</i>						Resident		X	
<i>Ctenotus severus</i>						Resident			
<i>Ctenotus uber</i>						Resident		X	
<i>Cyclodomorphus branchialis</i>	Gilled Slender Blue-tongue	S3				Resident		X	
<i>Egernia depressa</i>						Resident		X	
<i>Egernia stokesii badia</i>	Western Spiny-tailed Skink	E S3				Resident		X	
<i>Eremiascincus richardsonii</i>	Broad-banded Sand-swimmer					Resident		X	
<i>Liopholis inornata</i>	Desert Skink					Resident			
<i>Lerista gerrardii</i>						Resident		X	
<i>Lerista kingi</i>						Resident		X	
<i>Lerista macropisthopus</i>						Resident			
<i>Lerista nichollsi</i>						Resident			

Latin Name	English Name	CS1	CS2	CS3	Int	Potential status in survey area	Nat. Map	KML Surveys	KML 2021*
<i>Lerista timida</i>						Resident		X	
<i>Menetia greyii</i>	Common Dwarf Skink					Resident		X	
<i>Morethia butleri</i>						Resident		X	
<i>Morethia obscura</i>	Dusky Morethia					Resident			
<i>Tiliqua occipitalis</i>	Western Blue-tongue					Resident		X	
Typhlopidae (blind snakes)									
<i>Anilius australis</i>	Southern Blind Snake					Resident			
<i>Anilius hamatus</i>						Resident		X	
<i>Anilius waitii</i>	Beaked Blind Snake					Resident		X	
Boidae (pythons)									
<i>Antaresia stimsoni</i>	Stimson's Python					Resident		X	
<i>Morelia spilota</i>	Carpet Python			CS3		Irregular Visitor			
Elapidae (front-fanged snakes)									
<i>Brachyuropsis semifasciata</i>	Shovel-nosed Snake					Resident			
<i>Demansia psammophis</i>	Yellow-faced Whipsnake					Resident		X	
<i>Furina ornata</i>	Moon Snake					Resident			
<i>Parasuta monachus</i>	Monk Snake					Resident		X	
<i>Pseudechis australis</i>	Mulga Snake					Resident		X	
<i>Pseudechis butleri</i>	Yellow-spotted Mulga Snake					Resident		X	
<i>Pseudonaja mengdeni</i>	Mengden's Snake					Resident		X	
<i>Pseudonaja modesta</i>	Ringed Brown Snake					Resident		X	
<i>Simoselaps bertholdi</i>	Jan's Banded Snake					Resident		X	
<i>Suta fasciata</i>	Rosen's Snake					Resident		X	
<b>Total Species: 57</b>		<b>2</b>	<b>-</b>	<b>3</b>	<b>-</b>		<b>-</b>	<b>47</b>	<b>-</b>

KML 2021\* - No reptiles were recorded during the survey but scats of two unidentified species were noted/samples and photographed.

### Birds

Latin Name	English Name	CS 1	CS 2	CS 3	Int	Potential status in survey area	Nat. Map	Bird Data	KML Surveys	KML 2021*
CASUARIIDAE (Cassowaries and emus)										
<i>Dromaius novaehollandiae</i>	Emu					Resident		X	X	X
MEGAPODIIDAE (Megapodes)										
<i>Leipoa ocellata</i>	Malleefowl	V S3				Resident	X	X	X	X
COLUMBIDAE (Pigeons and doves)										
<i>Phaps chalcoptera</i>	Common Bronzewing					Resident		X	X	



Latin Name	English Name	CS 1	CS 2	CS 3	Int	Potential status in survey area	Nat. Map	Bird Data	KML Surveys	KML 2021 *
<i>Ocyphaps lophotes</i>	Crested Pigeon					Resident		X	X	
<i>Geopelia cuneata</i>	Diamond Dove					Resident			X	
PODARGIDAE (Australian frogmouths)										
<i>Podargus strigoides</i>	Tawny Frogmouth					Resident			X	
CAPRIMULGIDAE (Nightjars and allies)										
<i>Eurostopodus argus</i>	Spotted Nightjar					Resident			X	
AEGOTHELIDAE (Owlet-nightjars)										
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar					Resident		X	X	
APODIDAE (Typical swifts)										
<i>Apus pacificus</i>	Fork-tailed Swift					Irregular visitor				
ACCIPITRIDAE (Osprey, hawks and eagles)										
<i>Elanus axillaris</i>	Black-shouldered Kite					Visitor				
<i>Lophoictinia isura</i>	Square-tailed Kite					Visitor			X	
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard					Irregular visitor			X	
<i>Milvus migrans</i>	Black Kite					Vagrant			X	
<i>Haliastur sphenurus</i>	Whistling Kite					Visitor			X	
<i>Circus assimilis</i>	Spotted Harrier					Visitor				
<i>Accipiter fasciatus</i>	Brown Goshawk					Resident		X	X	
<i>Accipiter cirrhocephalus</i>	Collared Sparrowhawk					Resident		X	X	
<i>Aquila audax</i>	Wedge-tailed Eagle					Resident		X	X	
<i>Hieraaetus morphnoides</i>	Little Eagle					Resident			X	
FALCONIDAE (Falcons)										
<i>Falco berigora</i>	Brown Falcon					Resident		X	X	
<i>Falco longipennis</i>	Australian Hobby					Resident			X	
<i>Falco peregrinus</i>	Peregrine Falcon					Visitor			X	
<i>Falco cenchroides</i>	Nankeen Kestrel					Visitor		X	X	
OTIDIDAE (Bustards)										
<i>Ardeotis australis</i>	Australian Bustard				CS 3	Irregular visitor			X	

Latin Name	English Name	CS 1	CS 2	CS 3	Int	Potential status in survey area	Nat. Map	Bird Data	KML Surveys	KML 2021 *
<b>BURHINIDAE (Stone-curlews)</b>										
<i>Burhinus grallarius</i>	Bush Stone-curlew			CS 3		Irregular visitor			X	
<b>TURNICIDAE (Button-quails)</b>										
<i>Turnix velox</i>	Little Button-quail					Visitor			X	
<i>Turnix varia</i>	Painted Button-quail					Resident			X	
<b>CACATUIDAE (Cockatoos)</b>										
<i>Calyptorhynchus banksii escondidus</i>	Inland Red-tailed Black-Cockatoo					Resident		X	X	
<i>Eolophus roseicapilla</i>	Galah					Resident	X	X	X	
<i>Cacatua sanguinea</i>	Little Corella					Vagrant				
<i>Cacatua leadbeateri</i>	Major Mitchell's Cockatoo			CS 3		Resident		X	X	
<i>Nymphicus hollandicus</i>	Cockatiel					Irregular visitor			X	
<b>PSITTACIDAE (Parrots)</b>										
<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet					Vagrant			X	
<i>Polytelis anthopeplus</i>	Regent Parrot			CS 3		Visitor		X	X	
<i>Barnardius zonarius</i>	Australian Ringneck					Resident	X	X	X	X
<i>Psephotus varius</i>	Mulga Parrot					Resident		X	X	
<i>Melopsittacus undulatus</i>	Budgerigar					Vagrant			X	
<i>Neosephotus bourkii</i>	Bourke's Parrot					Visitor		X	X	
<i>Neophema splendida</i>	Scarlet-chested Parrot			CS 3		Vagrant				
<b>CUCULIDAE (Old world cuckoos)</b>										
<i>Cuculus pallidus</i>	Pallid Cuckoo					Migrant		X	X	
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo					Migrant			X	
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo					Migrant		X	X	
<i>Chrysococcyx basalis</i>	Horsfield's Bronze-Cuckoo					Migrant		X	X	
<i>Chrysococcyx lucidus</i>	Shining Bronze-Cuckoo					Migrant			X	
<b>STRIGIDAE (Hawk owls)</b>										

Latin Name	English Name	CS 1	CS 2	CS 3	Int	Potential status in survey area	Nat. Map	Bird Data	KML Surveys	KML 2021 *
<i>Ninox novaeseelandiae</i>	Southern Boobook					Resident			X	
TYTONIDAE (Barn owls)										
<i>Tyto alba</i>	Barn Owl					Visitor		X		
HALCYONIDAE (Kingfishers)										
<i>Todiramphus pyrrhopygia</i>	Red-backed Kingfisher					Resident		X	X	
<i>Todiramphus sanctus</i>	Sacred Kingfisher					Migrant			X	
MEROPIDAE (Bee-eaters)										
<i>Merops ornatus</i>	Rainbow Bee-eater					Migrant		X	X	
CLIMACTERIDAE (Australo-Papuan treecreepers)										
<i>Climacteris affinis</i>	White-browed Treecreeper			CS 3		Resident			X	
<i>Climacteris rufa</i>	Rufous Treecreeper			CS 3		Visitor		X	X	
PTILINORHYNCHIDAE										
<i>Ptilonorhynchus guttatus</i>	Western Bowerbird					Irregular visitor		X		
MALURIDAE (Fairy-wrens, emu-wrens, grasswrens)										
<i>Malurus splendens</i>	Splendid Fairy-wren					Resident		X	X	
<i>Malurus lamberti</i>	Variiegated Fairy-wren					Resident		X	X	
<i>Malurus leucopterus</i>	White-winged Fairy-wren					Resident		X	X	
PARDALOTIDAE (Pardalotes, scrubwrens, thornbills)										
<i>Pardalotus striatus</i>	Striated Pardalote					Resident	X	X	X	
<i>Calamanthus campestris</i>	Rufous Fieldwren			CS 3		Irregular visitor				
<i>Pyrrholaemus brunneus</i>	Redthroat			CS 3		Resident		X	X	
<i>Smicromnis brevirostris</i>	Weebill					Resident	X	X	X	
<i>Gerygone fusca</i>	Western Gerygone					Resident	X	X	X	
<i>Acanthiza apicalis</i>	Inland Thornbill					Resident		X	X	
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill					Resident	X	X	X	
<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill					Resident		X	X	

Latin Name	English Name	CS 1	CS 2	CS 3	Int	Potential status in survey area	Nat. Map	Bird Data	KML Surveys	KML 2021 *
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill					Resident		X	X	
<i>Aphelocephala leucopsis</i>	Southern Whiteface					Resident		X	X	
MELIPHAGIDAE (Honeyeaters)										
<i>Anthochaera carunculata</i>	Red Wattlebird					Resident	X	X	X	
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater					Resident	X	X	X	
<i>Manorina flavigula</i>	Yellow-throated Miner					Resident	X	X	X	
<i>Lichenostomus virescens</i>	Singing Honeyeater					Resident		X	X	
<i>Lichenostomus leucotis</i>	White-eared Honeyeater					Resident		X	X	
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater					Resident		X	X	
<i>Lichmera indistincta</i>	Brown Honeyeater					Resident		X	X	
<i>Phylidonyris albifrons</i>	White-fronted Honeyeater					Visitor		X	X	
<i>Certhionyx niger</i>	Black Honeyeater					Visitor		X	X	
<i>Certhionyx variegatus</i>	Pied Honeyeater					Visitor		X	X	
<i>Epthianura tricolor</i>	Crimson Chat					Visitor		X		
<i>Epthianura albifrons</i>	White-fronted Chat					Visitor		X		
POMATOSTOMIDAE (Babblers)										
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler					Irregular visitor				
<i>Pomatostomus superciliosus</i>	White-browed Babbler			CS 3		Resident		X	X	
CINCLOSOMATIDAE (Quail-thrushes and allies)										
<i>Cinclosoma castanotum</i>	Chestnut Quail-thrush					Resident		X	X	
NEOSITTIDAE (Sittellas)										
<i>Daphoenositta chrysoptera</i>	Varied Sittella					Resident			X	
CAMPEPHAGIDAE (Cuckoo-shrikes and trillers)										
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike					Resident		X	X	
<i>Coracina maxima</i>	Ground Cuckoo-shrike					Irregular visitor				
<i>Lalage sueurii</i>	White-winged Triller					Resident		X	X	
PACHYCEPHALIDAE (Whistlers, shrike-thrushes)										



Latin Name	English Name	CS 1	CS 2	CS 3	Int	Potential status in survey area	Nat. Map	Bird Data	KML Surveys	KML 2021 *
<i>Oreoica gutturalis</i>	Crested Bellbird			CS 3		Resident	X	X	X	
<i>Pachycephala pectoralis</i>	Golden Whistler					Resident		X	X	
<i>Pachycephala rufiventris</i>	Rufous Whistler					Resident	X	X	X	
<i>Colluricincla harmonica</i>	Grey Shrike-thrush					Resident		X	X	
ARTAMIDAE (Woodswallows, butcherbirds, currawongs)										
<i>Artamus cyanopterus</i>	Dusky Woodswallow					Visitor		X	X	
<i>Artamus personatus</i>	Masked Woodswallow					Irregular visitor		X	X	
<i>Artamus cinereus</i>	Black-faced Woodswallow					Resident		X	X	
<i>Artamus minor</i>	Little Woodswallow					Resident		X	X	
<i>Cracticus torquatus</i>	Grey Butcherbird					Resident	X	X	X	
<i>Cracticus nigrogularis</i>	Pied Butcherbird					Resident	X	X	X	
<i>Gymnorhina tibicen</i>	Australian Magpie					Resident		X	X	
<i>Strepera versicolor</i>	Grey Currawong					Resident		X	X	
DICRURIDAE (Monarchs, fantails and drongoes)										
<i>Grallina cyanoleuca</i>	Magpie-lark					Resident		X	X	
<i>Rhipidura albiscapa</i>	Grey Fantail					Visitor		X	X	
<i>Rhipidura leucophrys</i>	Willie Wagtail					Resident		X	X	
CORVIDAE (Crows and allies)										
<i>Corvus coronoides</i>	Australian Raven					Resident		X	X	
<i>Corvus bennetti</i>	Little Crow					Resident		X	X	
<i>Corvus orru</i>	Torresian Crow					Visitor		X	X	
PETROICIDAE (Robins)										
<i>Microeca leucophaea</i>	Jacky Winter					Irregular visitor			X	
<i>Petroica goodenovii</i>	Red-capped Robin					Resident	X	X	X	
<i>Melanodryas cucullata</i>	Hooded Robin					Irregular visitor				
<i>Eopsaltria griseogularis</i>	Western Yellow Robin			CS 3		Resident		X	X	
SYLVIIDAE (Old world warblers)										

Latin Name	English Name	CS 1	CS 2	CS 3	Int	Potential status in survey area	Nat. Map	Bird Data	KML Surveys	KML 2021 *
<i>Cinclorhampus mathewsi</i>	Rufous Songlark					Migrant			X	
<i>Cinclorhampus cruralis</i>	Brown Songlark					Migrant				
ZOSTEROPIDAE (White-eyes)										
<i>Zosterops lateralis</i>	Silvereye					Irregular visitor		X		
HIRUNDINIDAE (Swallows and martins)										
<i>Cheramoeca leucosternum</i>	White-backed Swallow					Visitor			X	
<i>Hirundo neoxena</i>	Welcome Swallow					Resident		X	X	
<i>Hirundo nigricans</i>	Tree Martin					Resident		X	X	
<i>Hirundo ariel</i>	Fairy Martin					Visitor		X	X	
DICAEIDAE (Flowerpeckers)										
<i>Dicaeum hirundinaceum</i>	Mistletoebird					Resident		X	X	
PASSERIDAE (Finches)										
<i>Taeniopygia guttata</i>	Zebra Finch					Visitor	X	X	X	
MOTACILLIDAE (Old world wagtails and pipits)										
<i>Anthus novaeseelandiae</i>	Australasian Pipit					Resident		X	X	
<b>Total Species Expected: 116</b>		<b>3</b>	<b>-</b>	<b>13</b>	<b>-</b>		<b>16</b>	<b>80</b>	<b>102</b>	<b>3</b>

KML 2021\* - Evidence of 3 bird species found during the survey (feathers/tracks/scats)

### Mammals

Species Name	Common Name	CS1	CS2	CS3	Int	Potential status in survey area	Nat. Map	KML Surveys	KML 2021*
TACHYGLOSSIDAE (Echidnas)									
<i>Tachyglossus aculeatus</i>	Echidna					Resident		X	X
DASYURIDAE (Dasyurids)									
<i>Antechinomys laniger</i>	Kultarr			CS3		Resident		X	
<i>Pseudantechinus woolleyae</i>	Woolley's Pseudantechinus			CS3		Resident		X	
<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart					Visitor			
<i>Sminthopsis dolichura</i>	Little Long-tailed Dunnart					Resident		X	

Species Name	Common Name	CS1	CS2	CS3	Int	Potential status in survey area	Nat. Map	KML Surveys	KML 2021*
MACROPODIDAE (Kangaroos, wallabies)									
<i>Macropus fuliginosus</i>	Western Grey Kangaroo					Resident		X	
<i>Macropus robustus</i>	Euro, Biggada					Resident		X	X
<i>Macropus rufus</i>	Red Kangaroo, Marlu					Resident		X	
<i>Notamacropus irma</i>	Brush Wallaby		P4			Irregular visitor		X	
BURRAMYIDAE (pygmy-possums)									
<i>Cercartetus concinnus</i>	Western Pygmy-possum					Resident			
PHALANGERIDAE (brush-tailed possums)									
<i>Trichosurus vulpecula</i>	Brush-tailed Possum			CS3		Irregular visitor		X	
EMBALLONURIDAE (Sheath-tail bats)									
<i>Taphozous hillii</i>	Hill's Sheath-tail-bat					Resident			
VESPERTILIONIDAE (Vesper bats)									
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat					Resident		X	
<i>Chalinolobus morio</i>	Chocolate Wattled Bat					Resident		X*	
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat					Resident		X	
<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat					Resident		X*	
<i>Scotorepens greyii</i>	Little Broad-nosed Bat					Resident		X	
<i>Vespadelus baverstocki</i>	Inland Forest Bat					Resident		X	
<i>Vespadelus finlaysoni</i>	Finlayson's Cave Bat					Resident			
MOLOSSIDAE (Freetail bats)									
<i>Mormopterus sp.</i> <i>Listed as Species 3 by Adams et al. (1988).</i>	Inland Freetail-bat					Resident		X*	
<i>Austronomus (Tadarida) australis</i>	White-striped Freetail-bat					Migrant		X	
MURIDAE (Rats and mice)									
<i>Mus musculus</i>	House Mouse				Int	Resident		X	
<i>Notomys mitchellii</i>	Mitchell's Hopping-mouse					Resident		X	
<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse					Resident		X	
LEPORIDAE (Rabbits and hares)									
<i>Oryctolagus cuniculus</i>	Rabbit				Int	Resident		X	X

Species Name	Common Name	CS1	CS2	CS3	Int	Potential status in survey area	Nat. Map	KML Surveys	KML 2021*
CANIDAE (Dogs and foxes)									
<i>Canis lupus</i>	Dog/Dingo					Resident		X	X
<i>Vulpes</i>	Red Fox				Int	Resident		X	
FELIDAE (Cats)									
<i>Felis catus</i>	Cat				Int	Resident		X	X
BOVIDAE (Horned ruminants)									
<i>Capra hircus</i>	Goat				Int	Visitor		X	
<b>Total Species: 29</b>		-	1	3	5		-	25*	5

KML 2021\* - Evidence of five mammals were found in the form of tracks/scats.

### Invertebrates

Species Name	Common Name	CS1	CS2	CS3	Potential status in survey area	Nat. Map	KML Surveys	KML 2021*
Mygalamorph spiders								
<i>Idiosoma clypeatum</i>	Northern Shield-backed Trapdoor Spider		P3		Resident		X	
<i>Idiosoma formosum</i>	Ornate Trapdoor Spider	S2			Resident		X	
<i>Idiosoma (Aganippe) sp.</i>				X	Resident			
<b>Total Species: 3</b>		1	1	1		-	2	-

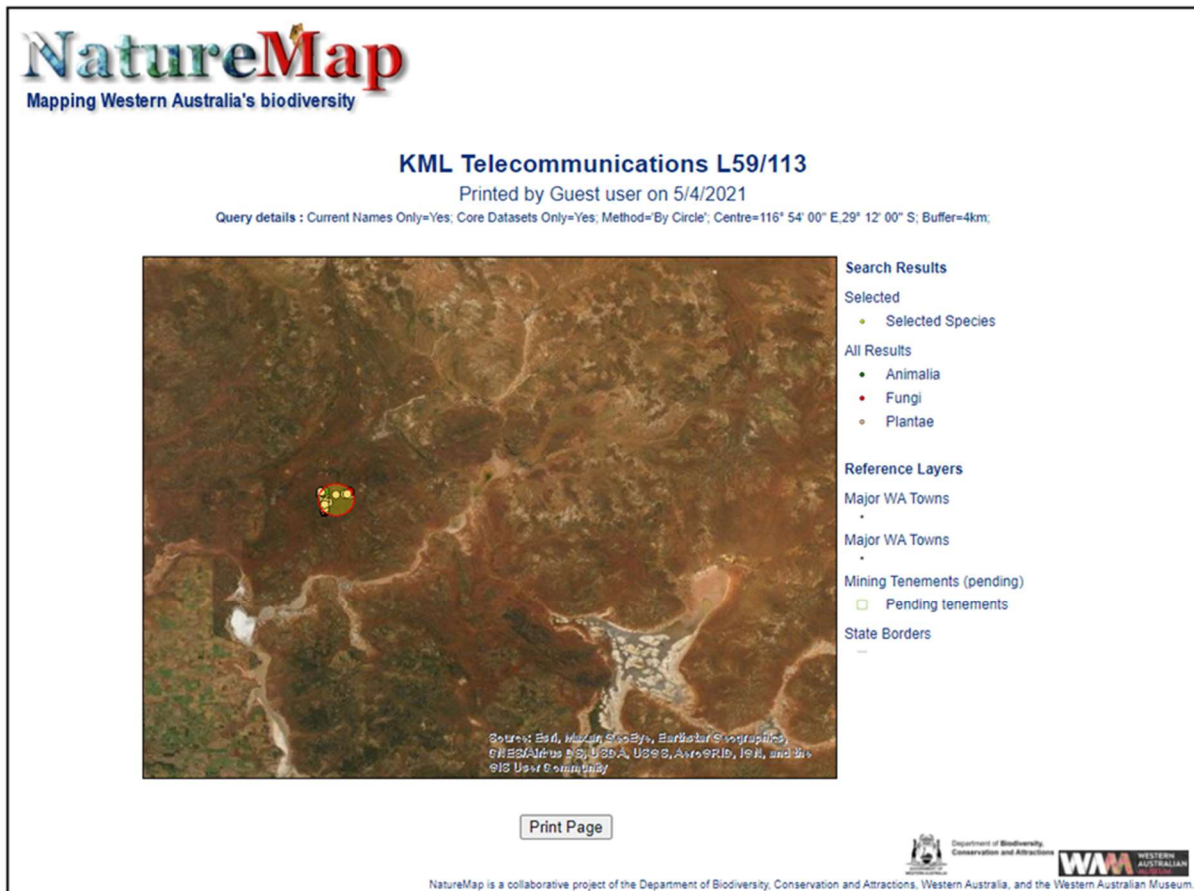
KML 2021\* - None of the three potential *Idiosoma* species were noted, evidence of Wolf Spider (*Lycosa* spp.) and Golden Orb Weaving Spider (*Nephila* spp.) during the survey.

### Status codes:

- CS1, CS2, CS3 = (summary) levels of conservation significance. See Appendix A for full explanation. Int = introduced.
- EPBC Act listings: E = Endangered, V = Vulnerable, Mig = Migratory, (see Appendix C).
- Biodiversity Conservation Act listings: for all CS1 species S1 to 7 = Schedules 1 to 7 respectively, (see Appendix C) with rankings shown in square parentheses: [e] = endangered, [v] = vulnerable.
- DPaW Priority species: P1 to P5 = Priority 1 to 5 (see Appendix C).



**Appendix F: L59/113 (L59/191) assessment on DBCA's Naturemap April 2021.**



The NatureMap report generated from the search on 5/4/2021 and 21/4/2021 identified 16 fauna species (all birds) of which one is Threatened – Malleefowl (*Leipoa ocellata*).

Search was set at 4km circular buffer around a central point on the 6ha tenement.



# NatureMap Species Report

Created By Guest user on 21/04/2021

Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	116° 54' 00" E, 29° 12' 00" S
Buffer	4km
Group By	Kingdom

Kingdom	Species	Records
Animalia	16	16
Fungi	8	10
Plantae	123	338
<b>TOTAL</b>	<b>147</b>	<b>364</b>

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
<b>Animalia</b>				
1.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
2.	24265 <i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
3.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
4.	<i>Barnardius zonarius</i>			
5.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
6.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
7.	<i>Eolophus roseicapillus</i>			
8.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
9.	24557 <i>Leipoa ocellata</i> (Malleefowl)		T	
10.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
11.	24618 <i>Oreolca gutturalis</i> (Crested Bellbird)			
12.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
13.	25682 <i>Pardaliparus striatus</i> (Striated Pardalote)			
14.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
15.	30948 <i>Smicromis brevirostris</i> (Weebill)			
16.	30870 <i>Taenopygia guttata</i> (Zebra Finch)			
<b>Fungi</b>				
17.	27579 <i>Acarospora sinopica</i>			
18.	<i>Caloplatea</i> sp.			
19.	<i>Lecidea</i> sp.			
20.	46014 <i>Myriophora smaragdula</i>			
21.	18001 <i>Xanthoparmelia claytona</i>		P3	
22.	28172 <i>Xanthoparmelia reptans</i>			
23.	<i>Xanthoparmelia</i> sp.			
24.	28356 <i>Xanthoparmelia verrucella</i>			
<b>Plantae</b>				
25.	14613 <i>Acacia acanthoclada</i> subsp. <i>glaucescens</i>			
26.	3248 <i>Acacia burkittii</i> (Sandhill Wattle)			
27.	31925 <i>Acacia dilalaga</i>		P1	
28.	3324 <i>Acacia erinacea</i>			
29.	3330 <i>Acacia exocarpolides</i>			
30.	30632 <i>Acacia karra</i>		P1	
31.	19499 <i>Acacia ramulosa</i> var. <i>ramulosa</i>			
32.	3577 <i>Acacia tetragonophylla</i> (Kurara, Wakaipuka)			
33.	31071 <i>Acacia umbraculiformis</i>			
34.	1725 <i>Allocasuarina olesiana</i> (Northern Sheoak)			
35.	1738 <i>Allocasuarina tessellata</i>		P1	
36.	6565 <i>Alyxia buxifolia</i> (Dysentery Bush)			
37.	38501 <i>Anthosachne scabra</i>			
38.	207 <i>Aristida contorta</i> (Bunched Kerosene Grass)			
39.	1266 <i>Artropodium oyeri</i>			
40.	17232 <i>Austrostipa blackii</i>		P3	





Name ID	Species Name	Naturalized	Conservation Code	Endemic To Query Area
41.	17237 <i>Austrostipa elegantissima</i>			
42.	17246 <i>Austrostipa nitida</i>			
43.	17255 <i>Austrostipa trichophylla</i>			
44.	7852 <i>Bellida graminea</i> (Rosy Bellida)			
45.	7856 <i>Blennospora drummondii</i>			
46.	1273 <i>Borya sphaerocephala</i> (Pincushions)			
47.	7871 <i>Brachyscome ciliaris</i>			
48.	29439 <i>Caesia</i> sp. Wongan (K.F. Kenneally 0520)			
49.	2846 <i>Calandrinia calyptata</i> (Pink Purslane)			
50.	2853 <i>Calandrinia eremaea</i> (Twining Purslane)			
51.	7995 <i>Calocephalus multiflorus</i> (Yellow-top)			
52.	7903 <i>Calotis hispida</i> (Blind Eye)			
53.	7922 <i>Cephalopterum drummondii</i> (Pompom Head)			
54.	32016 <i>Chamaelucum</i> sp. Wartedra (A.P. Brown & S. Patrick APB 1100)		P1	
55.	12796 <i>Chellanthes adiantoides</i>			
56.	7933 <i>Chthonocephalus pseudovar</i> (Woolly Groundheads)			
57.	4555 <i>Comesperma integerrimum</i>			
58.	11709 <i>Crassula colorata</i> var. <i>acuminata</i>			
59.	11563 <i>Crassula colorata</i> var. <i>colorata</i>			
60.	11021 <i>Cuscuta planiflora</i>	Y		
61.	6218 <i>Daucus glochidiatus</i> (Australian Carrot)			
62.	11636 <i>Dianella revoluta</i> var. <i>divaricata</i>			
63.	4766 <i>Dodonaea inaequifolia</i>			
64.	2510 <i>Enchylaena lanata</i>			
65.	7189 <i>Eremophila clarkii</i> (Turpentine Bush)			
66.	17168 <i>Eremophila olfieldii</i> subsp. <i>olfieldii</i>			
67.	49081 <i>Eremophila olfieldii</i> subsp. <i>papula</i>		P1	Y
68.	18570 <i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>			
69.	7250 <i>Eremophila pantonii</i>			
70.	49082 <i>Eremophila sericea</i>		P1	
71.	<i>Eremophila</i> sp.			
72.	4335 <i>Erodium cynonum</i> (Blue Heronsbill)			
73.	12720 <i>Erymophyllum gossanthis</i>			
74.	13038 <i>Eucalyptus loxophleba</i> subsp. <i>supraelevata</i>			
75.	5767 <i>Eucalyptus salubris</i> (Gimlet)			
76.	12097 <i>Euphorbia tannensis</i> subsp. <i>eremophila</i> (Desert Spurge)			
77.	8002 <i>Gnephosis tenuisulca</i>			
78.	6159 <i>Gonocarpus nodulosus</i>			
79.	7495 <i>Goodenia beardiana</i>			
80.	7519 <i>Goodenia krauseana</i>			
81.	7527 <i>Goodenia mimuloides</i>			
82.	7531 <i>Goodenia occidentalis</i>			
83.	2090 <i>Grevillea scabrida</i>		P1	
84.	2100 <i>Grevillea subdiffusa</i>		P3	
85.	6180 <i>Haloragis trigonocarpa</i>			
86.	46414 <i>Hemigenia yalpenis</i>			
87.	12742 <i>Hyalosperma demissum</i>			
88.	15448 <i>Hyalosperma glutinosum</i> subsp. <i>venustum</i>			
89.	11546 <i>Hydrocotyle plicifera</i> var. <i>glabrata</i>			
90.	8087 <i>Isoetes graminifolia</i> (Cushion Grass)			
91.	13284 <i>Lawrencella rosea</i>			
92.	7407 <i>Lobelia rhytidisperma</i> (Wrinkled-seeded Lobelia)			
93.	2544 <i>Malreana georgei</i> (Soddy Bluebush)			
94.	2590 <i>Malreana marginata</i>			
95.	2568 <i>Malreana trichoptera</i> (Downy Bluebush)			
96.	5908 <i>Melaleuca eleuterostachya</i>			
97.	15486 <i>Melaleuca hamata</i>			
98.	5958 <i>Melaleuca radula</i> (Graceful Honeymyrtle)			
99.	30412 <i>Micromyrtus acuta</i>		P3	
100.	31845 <i>Micromyrtus trudgenii</i>		P3	
101.	14335 <i>Mitella dimorpha</i>		P1	
102.	4094 <i>Mitella microphylla</i>			
103.	8145 <i>Olearia pimeleoides</i> (Pimelea Daisybush, Burrobunga)			
104.	12670 <i>Panzeria carlostegia</i>			
105.	40424 <i>Pentameris alroides</i> subsp. <i>alroides</i>	Y		
106.	14569 <i>Persoonia pentasticha</i>		P3	
107.	18508 <i>Phlotocha sericea</i>			
108.	16824 <i>Phyllangium sulcatum</i>			
109.	7299 <i>Plantago debilis</i>			
110.	8174 <i>Podolepis gardneri</i>			



Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
111.	8177 <i>Podolepis lessonii</i>			
112.	8188 <i>Pogonolepis stricta</i>			
113.	34154 <i>Prostanthera</i> sp. Karara (D. Coultas & K. Greenacre Opp 5)		P1	
114.	10878 <i>Pterostylis insectifera</i>			
115.	2721 <i>Ptilotus exaltatus</i> (Tail Mulla Mulla)			
116.	2731 <i>Ptilotus helipteroides</i> (Hairy Mulla Mulla)			
117.	2747 <i>Ptilotus obovatus</i> (Cotton Bush)			
118.	2757 <i>Ptilotus schwartzii</i>			
119.	2581 <i>Rhagodia drummondii</i>			
120.	13243 <i>Rhodanthe collina</i>		P3	
121.	13294 <i>Rhodanthe laevis</i>			
122.	13234 <i>Rhodanthe manglesi</i>			
123.	13296 <i>Rhodanthe polyccephala</i>			
124.	48898 <i>Roepera ovata</i>			
125.	40425 <i>Rydiosperma caespitosum</i>			
126.	2359 <i>Santalum spicatum</i> (Sandalwood, Wilarak)			
127.	7544 <i>Scaevola sphrescens</i> (Currant Bush, Maroon)			
128.	8200 <i>Schoenia cassiniana</i> (Schoenia)			
129.	1002 <i>Schoenus nanus</i> (Tiny Bog Rush)			
130.	2607 <i>Scivolaena densiflora</i>			
131.	2609 <i>Scivolaena diacantha</i> (Grey Copperburr)			
132.	12276 <i>Senna artemisioides</i> subsp. <i>filifolia</i>			
133.	18444 <i>Senna charlesiata</i>			
134.	14579 <i>Senna</i> sp. Austr (A. Strid 20210)			
135.	19712 <i>Sida</i> sp. dark green fruits (S. van Leeuwen 2050)			
136.	7018 <i>Solanum lasiophyllum</i> (Flannel Bush, Mndjulu)			
137.	14233 <i>Stenanthemum pollicum</i>		P3	
138.	3076 <i>Stenopetalum filifolium</i>			
139.	1338 <i>Thysanotus manglesianus</i> (Fringed Lily)			
140.	1346 <i>Thysanotus pyramidalis</i>			
141.	6268 <i>Trachymene cyanopetala</i>			
142.	6279 <i>Trachymene ornata</i> (Spongefruit)			
143.	7654 <i>Velleia rosea</i> (Pink Velleia)			
144.	8268 <i>Vittadinia humerata</i>			
145.	7389 <i>Wahlenbergia preissii</i>			
146.	13331 <i>Waltzia acuminata</i> var. <i>acuminata</i>			
147.	31272 <i>Wurmbia</i> sp. <i>Paynes Find</i> (C.J. French 1237)			

**Conservation Codes**  
 T - Rare or likely to become extinct  
 X - Presumed extinct  
 IA - Protected under international agreement  
 S - Other specially protected fauna  
 1 - Priority 1  
 2 - Priority 2  
 3 - Priority 3  
 4 - Priority 4  
 5 - Priority 5

<sup>1</sup> For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific database, only records from that database are used to determine if a species is restricted to the query area.