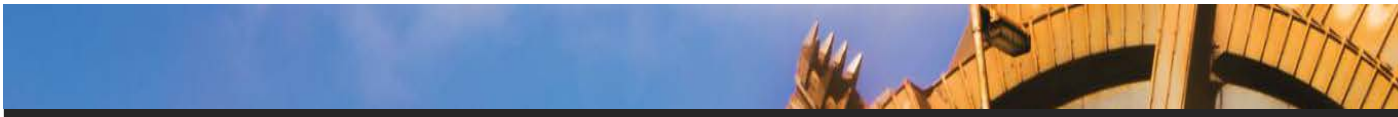

Parker Range (Mount Caudan) Iron Ore

FAUNA OFFSETS STRATEGY REVISION 0

Proponent:	Mineral Resources Pty Ltd
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19 May 2020

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Revision History

Revision Number	Issue Date	Prepared By	Checked By	Approved By	Signature
0	19/5/2020	L Whitley (Strategen JBS&G)	K Moyle (Strategen JBS&G)	T Berryman	

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Declaration of Accuracy

I declare that:

1. To the best of my knowledge, all the information contained in, or accompanying this Offset Strategy (*Parker Range (Mount Caudan) Iron Ore Project Offset Strategy Revision 0*) is complete, current and correct.

2. I am duly authorised to sign this declaration on behalf of the approval holder.

3. I am aware that:

   a. Section 490 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.

   b. Section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth) where the person knows the information or document is false or misleading.

   c. The above offences are punishable on conviction by imprisonment, a fine or both.

Signed 

Timothy Berryman

Full name (please print)

Mineral Resources Limited

Organisation (please print)

Date 19/05/20

1. EXECUTIVE SUMMARY

Polaris Metal Pty Ltd, a subsidiary of Mineral Resources Limited (MRL), is planning commencement of the Parker Range (Mount Caudan) Iron Ore Project (Parker Range; the Project) in June 2020. The Project is located 15 km south-east of Marvel Loch within the Shire of Yilgarn and the Great Western Woodlands. The Project has the following approvals which include the requirements for offsets for impacts to conservation significant flora, fauna and vegetation communities:

- Ministerial Statement (MS892) issued under *Environmental Protection Act 1986* (WA) (EP Act); and
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) approval (EPBC 2010/5435)

The abovementioned approvals include offset conditions, requiring the creation of the Parker Range Conservation Trust (PRCT) and acquisition and rehabilitation of 630 ha of land; ratified in the 2011 Cazaly Offset Strategy. However, the Cazaly Offset Strategy is not considered to align with current State and Commonwealth offset policies and guidelines. This revised Offset Strategy seeks to align the Project offsets with current policy and guidance and includes an alternative site (Lot 451) which consists of the following:

- 648 ha of remnant vegetation including.
    - 538 ha of Malleefowl habitat.
- 547 ha of disturbed land.

The objective of the Offset Strategy is to provide continuous habitat for conservation significant species within the eastern Wheatbelt. This involves enhancing the current fragmented remnant vegetation through rehabilitation. The Offset Strategy includes the following:

- Acquisition of Lot 451.
- Protection and enhancement of 648 ha of conservation significant species habitat, particularly Malleefowl habitat within Lot 451.
- Rehabilitating 115 ha of disturbed land within Lot 451 to create a habitat corridor linking existing remnant vegetation (648 ha) and meet the Commonwealth requirement for no less than 630 ha of Malleefowl habitat.

Following approval of the Offset Strategy, an Offsets Management Plan (OMP) will be developed and submitted for approval by the Commonwealth Minister within 12 months of Project commencement. The OMP would include specific details of the final offset area and ongoing management.

2. INTRODUCTION AND PURPOSE

2.1 Background

MRL has approvals in place under the EP Act and the EPBC Act to conduct mining operations at the Project. The Project is located 15 km south-east of Marvel Loch within the Shire of Yilgarn and the Great Western Woodlands, as shown in Figure 1.

The Project was previously referred under the EPBC Act to the Department of Sustainability, Environment, Water, Population and Communities, now Department of Agriculture, Water and Environment (DAWE), classified as a "controlled action" and approved in November 2011 (EPBC 2010/5435). The Project was assessed by the WA Environmental Protection Authority (EPA) and approved under MS892 in April 2012. In July 2017, a section 46 application was submitted to extend the time limit for proposal implementation, resulting in approval of Ministerial Statement 1060.

The Project was determined to have impacts to the following:

- *Leipoa ocellata* (Malleefowl; Vulnerable, EPBC Act) with direct impacts to 49 ha
- *Platycercus icterotis* (Western Rosella) and *Pomatostomus superciliosus* (White-browed Babbler). The White-browed Babbler is now delisted and Western Rosella is a Priority 4 species. 247 ha of Western Rosella habitat would be directly impacted by the Project
- Clearing of 418 ha of vegetation communities which form part of the Parker Range Priority Ecological Community (PEC) (Priority 3). Upon Project closure, 333 ha would be rehabilitated.
- *Isopogon robustus* (Critically Endangered) – indirect impacts to 64 ha of habitat
- *Baeckea grandibracteata* subsp. Parker Range (Priority 1) – indirect impacts to 22 individuals
- *Chamelaucium* sp. Parker Range (Priority 1)
- *Lepidosperma sp. Parker Range* (N. Gibson & M. Lyons 2094) (Priority 1) – indirect impacts to 219 individuals
- *Lepidosperma sp. Mt Caudan* (N. Gibson & M. Lyons 2081) (Priority 1) – indirect impacts to 3,629 individuals
- *Acacia concolorans* (Priority 2) – indirect impacts to 120 individuals
- *Hakea pendens* (Priority 2) – indirect impacts to 630 individuals
- *Cryptandra crispula* (Priority 3) – indirect impacts to 3 individuals
- *Banksia shanklandiorum* (Priority 4) – indirect impacts to 7,293 individuals

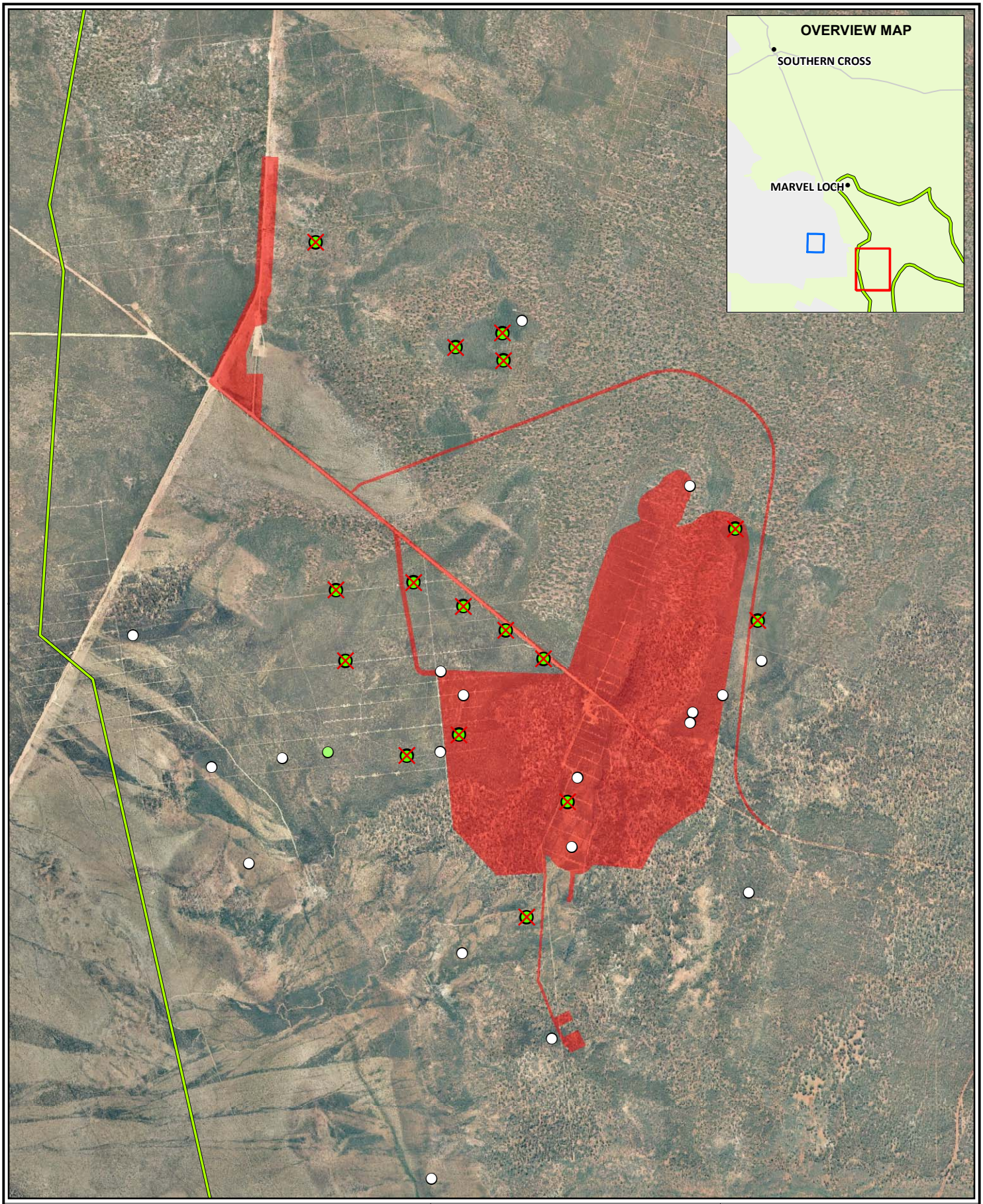
The Project area comprises Malleefowl habitat as determined by Phoenix (2020a) which is considered to be of a good quality:

- Condition - The Project consists of mallee woodland, open woodland and shrubland. Within the Project Development Envelope and surrounding 2km, 39 Malleefowl mounds were identified with one classified as active (Figure 1). All mounds were located in areas that have remained unburnt for at least five years. Some exploration disturbance was identified and evidence of feral animals. Therefore, the potential for grazing impacts to habitat or predation is considered.
- Context – The Project is located within the Great Western Woodlands, an area of ecological importance and significant remnant vegetation that provides Malleefowl habitat.

- Species Stocking Rate - The presence of Malleefowl has been confirmed through active mounds and historical sighting. The abundance/density of Malleefowl has not been determined.

The previous Cazaly Offset Strategy (Cazaly 2011) was drafted and approved prior to the release of current EPA and DAWE offset guidelines. These guidelines clarify the determination and application of environmental offsets in Western Australia. The PRCT has not yet been constituted, however, an extension of 12 months from date of substantial commencement to Condition 10-2 and 10-3 of MS892 has been approved by DWER (Letter 4 May 2020, Anthony Sutton, Executive Director, EPA Services).

MRL is proposing commencement of the Project in June 2020, therefore a revised Offset Strategy (the Strategy) is proposed that is more contemporary with current EPA and DAWE Offset policy and guideline requirements and meets the condition requirements of MS892 and EPBC 2010/5435. The estimated operational life of the Project is six years, however an additional closure period is expected.



Legend:

- Parker Range Project Infrastructure Footprint
- Parker Range PEC

Mallefowl Mound

- Active
- Inactive
- Long unused

Scale 1:35,000 at A4 (0 250 500 metres)		**Parker Range, WA**
Coord. Sys. GDA 1994 MGA Zone 50		**PARKER RANGE PROJECT**
Job No: 58196		
Client: Mineral Resources Limited		**FIGURE 1**
Version: A	Date: 18-Mar-2020	strategen JBS&G
Drawn By: cthatcher	Checked By: CT	

File Name: W:\Projects\1)Open\Mineral Resources\58196 Parker Range Offsets\GIS\Maps\R01_Rev_A\58196_03_1_ParkerRangeSite.mxd
Image Reference: SLIP Public Services Locate 2020.

2.2 Purpose of this document

This revised Offset Strategy supersedes the previous Cazaly Offset Strategy (Cazaly 2011) to align with more contemporary EPA and DAWE Offset policy and guidelines. The revised strategy will facilitate agreement between DAWE and MRL on the form of an updated, more modern offset, while allowing detailed plans to be developed during the remainder of 2020.

This Strategy involves acquiring Lot 451 on Deposited Plan 204149, Vol 5173 Folio 254 to offset the residual impacts associated with the Project. The scope of the Strategy is to provide details on the proposed offset in accordance with MS892 and EPBC 2010/5435.

The Strategy also aligns with the relevant State and Commonwealth guidelines for offset and recovery plans including:

- WA Environmental Offsets Guideline (EPA 2014)
- EPA WA Environmental Offsets Policy (EPA 2011)
- *Environment Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy (DSEWPC 2012)
- *Environment Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy Assessment Guide (October 2012)
- Department of Environment Environmental Management Plan Guidelines (2014)
- National Recovery Plan for Malleefowl (*Leipoa ocellata*) (Benshemesh J 2007)
- Interim Recovery Plan No. 240 for *Isopogon robustus* (DEC 2008)

2.3 Conditions of Approval

Table 1 details where the Strategy addresses the relevant offset conditions of MS892 and Table 2 details the relevant offset conditions of EPBC 2010/5435.

Table 1: MS892 Condition Requirements

Approval Condition	Recommendations	Reference
10-1	The proponent shall implement Project A, Project B and Project C set out in this condition to mitigate residual impacts to conservation significant fauna, eight priority flora, and potential indirect impacts to a Declared Rare Flora.	This Strategy
10-2	Project A - Prior to ground disturbing activities, unless otherwise agreed by the CEO, the proponent shall constitute PRCT with[1]:	Section 4
a)	a corporate trustee;	Section 4.1
b)	a board of directors comprising a representative of the proponent and an independent biodiversity expert with knowledge of the Parker Range region;	Section 4.1
c)	an advisory committee comprising environmental experts and representatives from interested stakeholder groups;	Section 4.1
d)	an initial purpose to strategically acquire land for rehabilitation and conservation;	Section 4.1, Section 4.3
e)	a broad charter to study, conserve, manage and rehabilitate ecological communities in the Yilgarn Shire; and	Section 4.1
f)	an obligation to report annually on its activities to the DEC and the CEO.	Section 4.3, Section 6.6
10-3	Project B — Prior to ground disturbing activities, unless otherwise agreed by the CEO, the proponent shall contribute funds to the PRCT consistent with schedule 2 for the purpose of acquiring (in consultation with the DEC and the Department of Mines and Petroleum) at least 630 hectares of land for rehabilitation that will[2]:	Section 3.2 Section 5.2, Section 6.2, Section 4.2
a)	provide habitat preferred by the Western Rosella and Malleefowl;	Section 5.2, Section 6.2
b)	be consistent with neighbouring native vegetation; and	Section 5.2, Section 6.2
c)	form habitat corridors between remnant native vegetation where appropriate.	Section 5.2, Section 6.2
10-4	If for any reason Project B is unsuccessful, the proponent will provide equivalent funds to the PRCT.	Section 4.2
10-5	Project C — The proponent shall contribute funds to the PRCT at intervals consistent with the funding schedule in schedule 2 for the purposes of undertaking rehabilitation work associated with Project B and/or for additional research, rehabilitation, management and conservation projects consistent with the charter of the PRCT.	Section 4.2
10-6	The proponent shall fund Projects A, B and C in accordance with the financial commitments in schedule 2 adjusted by reference to the Perth consumer price index, with indexation against the 2011 base year.	Section 4.2
10-7	Upon completion of the proposal, including mine closure, the proponent shall use its best endeavours to ensure that the PRCT transfers the land acquired in Project B, plus any remaining funds in the PRCT, to the DEC or an alternative organisation on approval of the CEO, and the PRCT will be terminated.	Section 4.4, Section 6.4

Table 2: EPBC 2010/5435 condition requirements

Approval Condition	Recommendations	Reference
5	To offset the impacts to the Malleefowl, the person taking the action must fund and implement the Parker Range Conservation Trust in accordance with the Fauna Offsets Strategy. The Fauna Offsets Strategy must include details of how the person taking the action will achieve the following objectives:	Section 4
a)	delivery of an offset area(s) with no less than 630 ha of Malleefowl habitat;	Section 5.2, Section 6.2
b)	delivery of an environmentally responsible offset scheme with a minimum standard of 'net conservation benefit';	Section 3.2, Section 4

[1] An extension of 12 months from date of substantial commencement approved by DWER (Letter 4 May 2020, Anthony Sutton, Executive Director, EPA Services)

[2] An extension of 12 months from date of substantial commencement approved by DWER (Letter 4 May 2020, Anthony Sutton, Executive Director, EPA Services)

Approval Condition	Recommendations	Reference
c)	achievement of positive and long-term environmental benefits;	Section 3.2, Section 4
d)	building on success, appropriate application of science, effective partnership arrangements and effecting positive change to the environment;	Section 4
e)	strategic acquisition of offset areas for conservation, restoration, study and research; and	Section 4, Section 6.1
f)	commitment to secure any offset areas that are acquired through a legally binding conservation mechanism approved by the Minister.	Section 4, Section 6.4
	The person taking the action must not commence operations unless the Fauna Offsets Strategy has been approved in writing by the Minister. The approved Fauna Offsets Strategy must be implemented.	This Strategy
5A	Within 12 months of commencement of operations the approval holder must submit for the approval of the Minister, an Offset Management Plan. The Offset Management Plan must be prepared in accordance with the EPBC Act Environmental Offsets Policy and Environmental Management Plan Guidelines and include:	Section 4.3
a)	confirmation of the legally binding conservation mechanism for the protection of the offset area(s);	Section 4.3
b)	a description of the proposed management measures and rehabilitation activities to be implemented on the offset area(s);	Section 4.3
c)	performance and completion criteria for evaluating the management of the offset area(s), and criteria for triggering remedial action (if necessary);	Section 4.3
d)	details of the timelines to monitor and report on the effectiveness of management measures and rehabilitation activities, and progress against performance and completion criteria, and to detect triggers for remedial action; and	Section 4.3
e)	a description of potential risks to the successful implementation of the plan, and a description of the contingency measures that will be implemented to mitigate against these risks, including a commitment to secure an additional offset area(s) if: i. Malleefowl are not present on the offset area(s) by 5 years after the approval of the Fauna Offsets Strategy; or ii. final rehabilitation performance criteria specified in the Offset Management Plan are not met by 10 years after the approval of the Fauna Offsets Strategy.	Section 4.3; Section 7.1
	The approved Offset Management Plan must be implemented.	Section 4.3
6	To offset the impact to the Malleefowl, the person taking the action must register a legally binding conservation mechanism for the protection and rehabilitation of no less than 630 ha of Malleefowl habitat. The legally binding conservation mechanism must be as approved by the Minister as required in condition 5. The legally binding conservation mechanism must be registered by no later than 2 years after the approval of the Fauna Offsets Strategy.	Section 6.4
7	Within six months of the registration of the legally binding conservation mechanism for the offset area(s) as required under condition 6, the person taking the action must provide the Department with the specification of the location and boundaries of the offset area(s) through maps and/or textual descriptions as well as an accompanying shapefile.	This Strategy
8	The person taking the action must provide the Minister on or before the first anniversary of the commencement of operations an initial work plan for the Parker Range Conservation Trust, specifying the work planned over the next 12 months to implement the objectives of the Trust. Subsequently, work plans are to be submitted within three months following every 12-month anniversary of the commencement of operations. The work plan must include: a) the desired outcomes/objectives of the work plan; b) details of the work actions and how the actions will be undertaken; c) a description of the potential risks associated with the work actions and a description of the contingency measures that would be implemented to mitigate these risks; and d) details of parties responsible for undertaking the work actions.	Section 4.3, Section 6.6

3. OBJECTIVES AND CONTEXT OF THE PROJECT

The Project is located within the Great Western Woodlands and the Parker Range Priority Ecological Community (PEC). Residual impacts occurred as a result of the Project and the objectives of the Offsets Strategy are:

- Net conservation benefit as a result of the Project and the Offset Strategy
- Strategic acquisition of offset area(s) for conservation, restoration, study and research within the local area

The Strategy is to protect and enhance habitat within the eastern Wheatbelt through the establishment of the PRCT, land acquisition and rehabilitation. Enhancement of the habitat will occur through rehabilitation of surrounding disturbed land and management measures. Upon completion of the Project, the land may be placed in conservation estate or managed by appropriate alternative management body.

3.1 Intended outcomes

The protection of the offset area(s) will secure conservation significant species habitat, particularly for the Malleefowl and Western Rosella. The ecological outcomes intended through this Strategy are:

- provide continuity and protection of Malleefowl and Western Rosella habitat within the eastern Wheatbelt;
- enhance Malleefowl and Western Rosella habitat within the eastern Wheatbelt; and
- maintain Malleefowl and Western Rosella habitat within the eastern Wheatbelt.

3.2 Rationale for offsets

MRL propose to commence ground disturbance activities on the Project in June 2020. The previously identified offset sites (Cazaly 2011) are not considered preferable due to the lack of remnant vegetation that meets the Project's direct offset requirements as per contemporary offset policy and guidelines, and are no longer available. This Strategy includes a revised approach that meets WA Environmental Offsets Policy (EPA 2011) and Commonwealth Environmental Offsets Policy (DSEWPC 2012).

The outcome of the Strategy is to provide continuous habitat for conservation significant species within the eastern Wheatbelt, particularly Malleefowl. This involves enhancing the current fragmented remnant vegetation on Lot 451 to improve the sites context in a highly cleared environment (the eastern Wheatbelt). The Strategy includes the following:

- acquisition of Lot 451;
- protection and enhancement of 648 ha of conservation significant species habitat, particularly 538 ha of Malleefowl habitat within Lot 451; and
- rehabilitating 115 ha of disturbed land within Lot 451 to create a corridor linking existing remnant vegetation (648 ha) and meet the Commonwealth requirement for no less than 630 ha of Malleefowl habitat.

In restoration ecology, rehabilitation is normally defined as a process where disturbed land is returned to a stable, productive and self-sustaining condition, taking future land use into account (EPA 2006). Based on the future land uses being conservation, the objectives of the rehabilitation are to repair the composition, structure, function and dynamics of pre-existing ecosystems (Cairns

1995, McDonald 2000) and provision of a new conservation benefit through enhancement of Malleefowl habitat. By this definition, rehabilitation activities would include:

- creation of a continuous habitat and removal of fragmentation;
- preventing third-party access reducing external threatening processes; and
- increasing the area to perimeter ratio, reducing edge effects.

It is considered that continuous habitat, particularly for Malleefowl, is a key ecological process required within the eastern Wheatbelt; an area which is highly cleared and supports agricultural practises. Lot 451 is within close proximity (1.5 km) to remnant vegetation associated with the Great Western Woodland, which the Project is impacting upon.

The acquisition of fragmented conservation significant species habitat (648 ha remnant vegetation within Lot 451) and revegetation of 115 ha of disturbed land within Lot 451 to create a habitat corridor is considered to promote a self-sustaining habitat. Revegetation will focus on creating habitat similar to existing remnant vegetation (*Allocasuarina spinosissima* and *Melaleuca uncinata* woodland with scattered Eucalypts) that Malleefowl can use as a corridor between existing, known Malleefowl habitat. Additional benefits of creating the 115 ha corridor include repairing and maintaining the composition, structure, function and dynamics of the pre-existing remnants of vegetation within the site.

The acquisition of Lot 451 and enhancement of existing remnant vegetation (648 ha), including 538 ha of Malleefowl habitat, plus rehabilitation of disturbed land (115 ha) is considered to meet the MS892 and EPBC 2010/5435 conditions, including the Commonwealth requirement for no less than 630 ha of Malleefowl habitat. If final completion criteria are not met 10 years from approval of this Strategy, additional offset area(s) will be required to ensure the 630 ha of Malleefowl habitat is attained. A justification is presented in Table 3.

Table 3: Offset Rationale

Approval	Condition	Summary	Offset
MS892	10-1	The proponent shall implement Project A, Project B and Project C set out in this condition to mitigate residual impacts to conservation significant fauna, eight priority flora, and potential indirect impacts to a Declared Rare Flora.	Lot 451 contains the following: • 538 ha of Malleefowl habitat • 648 ha of remnant vegetation • Suitable habitat for the Western Rosella and White-browed Babbler • Possible habitat for *Baeckea grandibracteata* subsp. Parker Range, *Chamelaucium* sp. Parker Range, *Acacia concolorans*, *Cryptandra crispula, Banksia shanklandiorum*
	10-2	Project A - Prior to ground disturbing activities, unless otherwise agreed by the CEO, the proponent shall constitute PRCT with[3]:	The PRCT will be established and implemented as per Section 4.
	a)	a corporate trustee;	
	b)	a board of directors comprising a representative of the proponent and an independent biodiversity expert with knowledge of the Parker Range region;	
	c)	an advisory committee comprising environmental experts and representatives from interested stakeholder groups;	
	d)	an initial purpose to strategically acquire land for rehabilitation and conservation;	

[3] An extension of 12 months from date of substantial commencement approved by DWER (Letter 4 May 2020, Anthony Sutton, Executive Director, EPA Services)

Approval	Condition	Summary	Offset
	e)	a broad charter to study, conserve, manage and rehabilitate ecological communities in the Yilgarn Shire; and	
	f)	an obligation to report annually on its activities to the DEC and the CEO.	
	10-3	Project B — Prior to ground disturbing activities, unless otherwise agreed by the CEO, the proponent shall contribute funds to the PRCT consistent with schedule 2 for the purpose of acquiring (in consultation with the DEC and the Department of Mines and Petroleum) at least 630 hectares of land for rehabilitation that will[4]:	The PRCT will be established and implemented as per Section 4. 648 ha of remnant vegetation will be enhanced through the rehabilitation of 115 ha of disturbed land to create 763 ha of continuous habitat for conservation significant flora and fauna species.
	a)	provide habitat preferred by the Western Rosella and Malleefowl;	538 ha of Malleefowl habitat has been confirmed and Lot 451 contains 31 ha suitable Western Rosella habitat. 115 ha of disturbed land will be rehabilitated (*Allocasuarina spinosissima* and *Melaleuca uncinata* woodland with scattered Eucalypts).
	b)	be consistent with neighbouring native vegetation; and	Rehabilitation of 115 ha of disturbed land will include an appropriate seed mix that reflects the current vegetation associations (*Allocasuarina spinosissima* and *Melaleuca uncinata* woodland with scattered Eucalypts)
	c)	form habitat corridors between remnant native vegetation where appropriate.	Lot 451 is 1.5 km from remnant vegetation that forms the Great Western Woodland and rehabilitation of 115 ha will provide habitat corridors within Lot 451. Enhancement and protection of offset area will provide habitat corridors within proximity to the Great Western Woodland, particularly for Malleefowl.
EPBC2010-5435	5	To offset the impacts to the Malleefowl, the person taking the action must fund and implement the Parker Range Conservation Trust in accordance with the Fauna Offsets Strategy. The Fauna Offsets Strategy must include details of how the person taking the action will achieve the following objectives:	The PRCT will be established and implemented as per Section 4.
	a)	delivery of an offset area(s) with no less than 630 ha of Malleefowl habitat;	The offset consists of acquisition of Lot 451 and enhancement of existing remnant vegetation (648 ha), including 538 ha of Malleefowl habitat and rehabilitation of disturbed land (115 ha). If final completion criteria are not met 10 years or Malleefowl presence is not confirmed with 5 years from approval of this Strategy, additional offset area(s) will be required to ensure the 630 ha of Malleefowl habitat is attained.
	b)	delivery of an environmentally responsible offset scheme with a minimum standard of 'net conservation benefit';	Enhancement of the existing habitat through removal of fragmentation via rehabilitation of 115 ha will further improve offset area conservation value, in the event Malleefowl utilise the offset area.

[4] An extension of 12 months from date of substantial commencement approved by DWER (Letter 4 May 2020, Anthony Sutton, Executive Director, EPA Services)

Approval	Condition	Summary	Offset
	c)	achievement of positive and long-term environmental benefits;	Rehabilitation of Lot 451 and conversion into conservation estate or registration of conservation covenant will provide long-term continuous habitat within a highly disturbed environment (the eastern Wheatbelt).
	d)	building on success, appropriate application of science, effective partnership arrangements and effecting positive change to the environment;	PRCT will be implemented as per Section 4 to provide input from a variety of organisations, in particular Malleefowl experts.
	e)	strategic acquisition of offset areas for conservation, restoration, study and research; and	Lot 451 is located within 1.5 km of remnant vegetation associated with the Great Western Woodland and approximately 14 km west of the Parker Range PEC. The site's proximity to these ecological communities provides an opportunity to provide additional protected habitat for conservation significant species. An option to purchase agreement is in place with respect to Lot 451.
	f)	commitment to secure any offset areas that are acquired through a legally binding conservation mechanism approved by the Minister	MRL is committed to consultation with DBCA regarding the potential conversion of the offset area(s) to conservation estate following successful rehabilitation or the application of a conservation covenant following acquisition.
		The person taking the action must not commence operations unless the Fauna Offsets Strategy has been approved in writing by the Minister. The approved Fauna Offsets Strategy must be implemented.	This strategy meets the requirement for the Fauna Offset Strategy and will be implemented.
	5A	Within 12 months of commencement of operations the approval holder must submit for the approval of the Minister, an Offset Management Plan. The Offset Management Plan must be prepared in accordance with the EPBC Act Environmental Offsets Policy and Environmental Management Plan Guidelines and include:	The OMP will be developed and implemented as per Section 4.3.
	a)	confirmation of the legally binding conservation mechanism for the protection of the offset area(s);	
	b)	a description of the proposed management measures and rehabilitation activities to be implemented on the offset area(s);	
	c)	performance and completion criteria for evaluating the management of the offset area(s), and criteria for triggering remedial action (if necessary);	
	d)	details of the timelines to monitor and report on the effectiveness of management measures and rehabilitation activities, and progress against performance and completion criteria, and to detect triggers for remedial action; and	

Approval	Condition	Summary	Offset
	e)	a description of potential risks to the successful implementation of the plan, and a description of the contingency measures that will be implemented to mitigate against these risks, including a commitment to secure an additional offset area(s) if: i. Malleefowl are not present on the offset area(s) by 5 years after the approval of the Fauna Offsets Strategy; or ii. final rehabilitation performance criteria is not met by 10 years after the approval of the Fauna Offsets Strategy.	
		The approved Offset Management Plan must be implemented.	
	6	To offset the impact to the Malleefowl, the person taking the action must register a legally binding conservation mechanism for the protection and rehabilitation of no less than 630 ha of Malleefowl habitat. The legally binding conservation mechanism must be as approved by the Minister as required in condition 5. The legally binding conservation mechanism must be registered by no later than 2 years after the approval of the Fauna Offsets Strategy.	538 ha of Malleefowl habitat will be protected, plus the rehabilitation of 115 ha of disturbed land to create 653 ha of Malleefowl habitat. In the event rehabilitation is unsuccessful or Malleefowl presence does not occur within five years of the approval of the offset strategy, alternative offset area(s) will be required. Due to project delays and changes to the Offset Strategy, a conservation mechanism has not been registered. MRL is committed to consultation with DBCA regarding the potential conversion of the offset area(s) to conservation estate following successful rehabilitation or the application of a conservation covenant following acquisition.
	7	Within six months of the registration of the legally binding conservation mechanism for the offset area(s) as required under condition 6, the person taking the action must provide the Department with the specification of the location and boundaries of the offset area(s) through maps and/or textual descriptions as well as an accompanying shapefile.	A conservation covenant will be submitted and approved within two years of approval of the Fauna Offsets Strategy.

Approval	Condition	Summary	Offset
	8	The person taking the action must provide the Minister on or before the first anniversary of the commencement of operations an initial work plan for the Parker Range Conservation Trust, specifying the work planned over the next 12 months to implement the objectives of the Trust. Subsequently, work plans are to be submitted within three months following every 12-month anniversary of the commencement of operations. The work plan must include: a) the desired outcomes/objectives of the work plan; b) details of the work actions and how the actions will be undertaken; c) a description of the potential risks associated with the work actions and a description of the contingency measures that would be implemented to mitigate these risks; and d) details of parties responsible for undertaking the work actions.	As detailed in Section 4.3, a work plan will be developed and submitted.

In addition to the offset requirements, MRL will be undertaking additional research associated with conservation significant flora species, as detailed below:

- As per MS892 Condition 7-2, seed collection, storage and research for *Lepidosperma* sp. Parker Range and *Lepidosperma* sp. Mt Caudan individuals directly impacted shall be undertaken.
- As per MS892 Condition 7-3, targeted surveys of *Chamelaucium* sp. Parker Range shall be undertaken to determine the local and regional impacts, however further information regarding population distribution will be obtained.
- A rehabilitation trial shall be developed to identify suitability of conservation significant flora species for inclusion in seed mixes. The rehabilitation trial shall be conducted in consultation with DBCA and Botanical Gardens and Park Authority (BGPA).

The outcome of these research programmes will be communicated to the PRCT for incorporation into the Lot 451 Offset Management Plan. Rehabilitation of *Allocasuarina spinosissima* and *Melaleuca uncinata* woodland with scattered Eucalypts has the potential to increase the area of suitable habitat for conservation significant flora species within the offset area that may be impacted by the Project.

3.3 Alignment of offset strategy with policy and guidelines

This Offset Strategy has been developed in alignment with Recovery Plans, State and Commonwealth Policy and Guidelines.

3.3.1 Malleefowl (*Leipoa ocellata*) Recovery Plan

Recovery of Malleefowl is guided by the *National Recovery Plan for Malleefowl (Leipoa ocellata)* (Benshemesh J 2007). The overall objective of this plan is to de-list Malleefowl as a threatened species under the EPBC Act. Recovery priorities and threat abatement priorities aligned to this Offset Strategy are detailed in **Table 4** and **Table 5**.

Table 4: Offset Strategy alignment with Malleefowl Recovery Plan

Priority	Priority Action	Offset Strategy
Reduce permanent habitat loss	Retain areas that support Malleefowl and protect them from incremental clearing, and report annually on clearing	Offset area(s) are proposed to be acquired for inclusion to the conservation estate or registration of a conservation covenant, to be managed and protected, improving habitat available for Malleefowl.
Reduce the threat of grazing pressure on Malleefowl populations	Erect adequate fencing to protect Malleefowl habitat	Offset area(s) are proposed to be acquired and added to the conservation estate or registration of a conservation covenant, to be managed, protected and improve habitat condition for Malleefowl.
Reduce predation	Reduce fox numbers in small and isolated habitat remnants where Malleefowl densities have declined and fox predation is a likely explanation for such declines	Involvement in regional feral animal management to minimise predation impacts on the offset area(s).
Reduce isolation of fragmented populations	Maintain and/or revegetate strategic corridors to link patches	Offset area(s) identified for potential offsets is adjacent to conservation estate or significant remanent vegetation, providing continuity of habitat.

Table 5: Offset Strategy alignment with Threat Abatement Plans

Priority	Priority Action	Offset Strategy
Red fox threat abatement plan (DEWHA 2008)		
Undertake fox control activities	Identify priority areas for fox control based on: • the significance of the population of the affected native species or of the ecological community • the degree of threat posed by foxes to species and ecological communities relative to other threats • the cost-effectiveness of maintaining fox populations below an identified 'damage threshold' in the region, and • the feasibility of effective remedial action. Conduct and monitor regional fox control, through new or existing programs, in priority areas identified	Whilst the offset area is not currently considered a priority area, particularly considering no foxes were identified, involvement in regional baiting programmes will be undertaken.
Feral Cat Threat Abatement Plan *(*DoEE 2015)		
Baiting of feral cats	Ensure broad-scale toxic baits targeting feral cats are developed, registered and available for use across all of Australia, including northern Australia.	Involvement in regional baiting programmes is expected as determined by the PRCT.

3.3.2 Offset policy and guidance

This Offset Strategy demonstrates consideration of the six offsets principles defined in the State Environmental Offset Policy and WA Environmental Offset Guidelines (EPA 2014) as detailed in Table 6. The eight principles defined in the Federal EPBC Act Environmental Offsets Policy are detailed in Table 7.

Table 6: Assessment of offset strategy against EPA offset principles

Offset principle	Offset Strategy
1. Environmental offsets will only be considered after avoidance and mitigation options have been pursued.	Faunal surveys of the offset area have been used in the design of Project to avoid direct and indirect impacts on conservation significant flora and fauna habitat. The Proposal has been designed to minimise clearing to the maximum extent practicable. The Proposal would result in clearing of a relatively small area of 418 ha within a bioregion which is almost fully vegetated.
2. Environmental offsets are not appropriate for all projects.	Offsets have been deemed appropriate for this Proposal as part of the EPA assessment. MS892 includes conditions associated with establishment of PRCT and acquisition of 630 ha for rehabilitation.
3. Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted.	The rehabilitation of 630 ha is considered a cost effective way of increasing vegetation within the Eastern Wheatbelt. The required offset area is mandated as per MS892.
4. Environmental offsets will be based on sound environmental information and knowledge.	Value and quality of offsets has been based on ecological surveys, which have been conducted by industry professionals with significant experience. The Lot 451 Offset Management Plan will be developed with the PRCT, which will consist of representatives from appropriate organisations.
5. Environmental offsets will be applied within a framework of adaptive management.	Offsets will be monitored according to the indicative times outlined in this strategy. Management measures for offsets will be reviewed based on data collected through the relevant monitoring programs and adapted if required.
6. Environmental offsets will be designed to be enduring, enforceable and deliver long term strategic outcomes.	The proposed offset area(s) will be: • acquired by the PRCT and an application for a conservation covenant submitted • managed by the PRCT until potential conversion to conservation estate, whereby the State government agency (DBCA) or an alternative appropriate management body will manage in perpetuity • contribute data regarding species phenology, habitat, and distribution to the existing body of knowledge.

Table 7: Assessment of offset strategy against DAWE offset principles

Offset principle	Offset Strategy
Suitable offsets must:	
1. deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action	The provision of additional Malleefowl habitat delivers additional continuity of habitat and an associated conservation outcome. The location and scale of the offset area secures habitat in perpetuity for the species and reduces the risk that the offset area will be cleared for agriculture or other purposes. The quality of the impact sites (Section 2.1) are similar to the offset area (Section 5.2).
2. be built around direct offsets but may include other compensatory measures	It is proposed that 100% of the offset will be a direct offset. The offset area provides habitat of equal or better value to that on the impact site and includes an area of 538 ha of Malleefowl habitat, with an additional 115 ha proposed for rehabilitation, to create more than 630 ha (653 ha). As Malleefowl have not been confirmed within the offset area, monitoring for Malleefowl will be undertaken as rehabilitation progresses. If Malleefowl are not identified within five years, an alternative offset area(s) will be sourced to achieve at least 630 ha of Malleefowl habitat.
3. be in proportion to the level of statutory protection that applies to the protected matter	Malleefowl is classified as Vulnerable under the EPBC Act and the offset area provides greater than 630 ha of potential Malleefowl habitat. The offsets proposed are consistent with DAWE policy. Statutory protection will be provided for the offset, being the placement under formal protection in perpetuity and managed by DBCA or an alternative appropriate management body, with contribution of funds to manage the offset area(s). Alternatively, a conservation covenant approved in writing by the Commonwealth Minister, will be placed over offset area(s) pending successful rehabilitation.
4. be of a size and scale proportionate to the residual impacts on the protected matter	Up to 653 ha of land (538 ha of Malleefowl habitat and rehabilitation of 115 ha of disturbed land) is proposed to deliver a conservation gain that compensates for the impact (49 ha).

Offset principle	Offset Strategy
5. effectively account for and manage the risks of the offset not succeeding	The risk of the offset option not fulfilling the aims for which it is designed is considered to be low (Section 7). Protection mechanisms, once established, will provide a higher level of certainty that the proposed offset area(s) will be conserved. Risk of the offset acquisition and protection of 538 ha is considered low given: • Greater than adequate suitable offset areas have been identified • Site acquisition discussions have progressed and a purchase agreement is in place • Fauna surveys have identified quality of fauna habitat that is suitable to offset the residual impacts to both species The risk of rehabilitation success for the additional 115 ha, based on completion criteria is considered moderate given: • Presence of Malleefowl within the offset area has not been confirmed, although recent mound activity was observed • Malleefowl utilisation of rehabilitated areas is uncertain • Rehabilitation within the Project timeframe (10 years) is uncertain • An additional offset area(s) will be required if Malleefowl are not identified and/or completion criteria for rehabilitation are not met
6. be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action)	The proposed offset area are additional to current conservation estate in this region and at this stage are not covered by any legally binding conservation mechanisms (i.e. conservation covenants). Portions of the site are currently used for agricultural purposes.
7. be efficient, effective, timely, transparent, scientifically robust and reasonable	The proposed offset area meet the requirements of EPBC Act Environmental Offsets Policy. The purchase and protection of the proposed offset area provides immediate and permanent protection for the significant values contained within the property.
8. have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	Section 6 details the land acquisition process with monitoring, audit and evaluation detailed in Section 6.5. PRCT will purchase and manage the offset area for the Project duration, with contingencies in place if rehabilitation is not successful (Section 7). MRL and PRCT will undertake consultation with DBCA regarding any ongoing management and conversion to conservation estate as per *Conservation and Land Management Act 1984* and *Land Administration Act 1997*. Progress against site acquisition and management will be reported in the annual Compliance Assessment Report. In the event rehabilitation or Malleefowl return is not successful, alternative offset area(s), approved in writing by the Commonwealth Minister, will be secured.

4. PARKER RANGE CONSERVATION TRUST

The previous Cazaly Offset Strategy (Cazaly 2011) included commitments associated with the establishment and funding of the PRCT. The establishment of PRCT was not initiated by Cazaly due to project delay, prior to MRL acquisition of the Project. MRL has received approval for an extension of 12 months from date of project commencement (Letter 4 May 2020, Anthony Sutton, Executive Director, EPA Services) to the timeframe for constituting the PRCT.

The PRCT will act within a Charter with a mandate to undertake environmentally beneficial activities within the local Parker Range Priority Ecological Community (PEC) region situated in the Southern Yilgarn. The Charter will be developed by the PRCT Board and Committee once established.

4.1 Establishment

MRL will establish the PRCT to deliver a net conservation benefit for the region and to administer this Offset Strategy. MRL will provide a resource to ensure PRCT deliverables are met during the initial 12 month period. Establishment actions are detailed in Table 8.

The structure of the PRCT will include a Trustee Board (the Board) which is advised by a committee of environmental experts (the Committee):

- The Board will include one MRL representative and one independent or DBCA representative with knowledge of the Parker Range PEC. The Board will ensure alignment with the Charter and this Strategy. Any deviations from either will require a “Change Notice” which includes justification, scope, funding and timing implications. The Change Notice will require approval from MRL and DBCA prior to implementation.
- The Committee may include one representative from each relevant conservation group (Conservation Council, Great Western Woodlands, National Malleefowl Recovery Team, Wildflower Society, etc) or any relevant government organisations (BGPA, Western Australian Museum). One representative may provide expert advice concerning Malleefowl and their habitat to assist with habitat management and rehabilitation.
- PRCT Program Manager as required to coordinate development and implementation of PRCT programmes. The Program Manager will engage administrators, consultants and contractors as required.

Table 8: PRCT establishment actions

Action	Details	Timing[5]	Responsible Party
Establish PRCT	MRL establishes PRCT (trust legal operating entity) and Board of Trustees	Within 12 months of project commencement (or as otherwise agreed)	MRL
Board establishment	Nominations to be received and MRL to confirm Board members	Upon PRCT establishment	MRL
Committee establishment	Nominations to be received and Board to confirm Committee members	Within three months of Board establishment (or as otherwise agreed)	PRCT Board
PRCT establishment meeting	Board and Committee meeting to establish meeting timeframe, PRCT charter, initial purpose, reporting obligations and develop work plan.	Within one month of Committee establishment (or as otherwise agreed)	PRCT Board and Committee

4.2 Funding

MRL proposes to contribute up to $2,444,558 (Consumer Price Index indexation applied) to the PRCT as per the schedule detailed in Table 9. MRL will fund the PRCT for the duration of the Project, including during closure activities. The PRCT may undertake additional programmes and receive funding from other sources, however, MRL will only provide funding as per this Offset Strategy.

The funding scheme is as per the previously approved Offset Strategy (Cazaly 2011) and is considered appropriate given the Project residual impacts. Funding will be provided for the following activities:

- Early seed funding to establish the PRCT entity and Board / Committee formation after certain Ministerial Approvals are received for the proposal.
- Cornerstone project land acquisition within a reasonable timeframe after certain Ministerial Approvals are received for the proposal.
- Establishment prior to native vegetation clearing for the Parker Range Project.
- Further payments based on native vegetation clearing actions associated with the dry plant phase and wet plant phases or Parker Range Operations.
- Performance payment linked to native vegetation clearing at the cessation of Parker Range operations and commencement of mine closure action.
- Performance payment based on restoration area achieved associated with rectifying native vegetation clearing (post rehabilitation of the proposal).

Funding contributions will be determined based on a preliminary funding estimate for the cornerstone project subject to PRCT Board approval. Contribution unit rates are expressed in real terms (base date 2020) and are to be pro-rata escalated by published CPI index rates to determine the actual unit contributions at milestone timeframe.

Payments from MRL to the PRCT will be forthcoming by way of PRCT invoice presented for payment within 20 standard working days at each milestone (as applicable).

[5] Timing to be confirmed following consultation with DAWE and EPA

Table 9: MRL funding contribution to PRCT

Milestone	Timeframe	MRL contribution to PRCT[6]
PRCT establishment	Within 12 months of project commencement or as otherwise agreed	All establishment costs (up to AUD$5,798)
PRCT Board established	Upon PRCT establishment	All nomination and establishment costs (up to AUD$5,798)
PRCT Committee established	Within three months of Board establishment or as otherwise agreed	All nomination and establishment costs (up to AUD$11,597)
Purchase of Lot 451	Within three months agreement for the sale and purchase of site and PRCT Board establishment or as otherwise agreed	All land acquisition costs and duty (approximately AUD$1,507,555)
Payment 1	30 days prior to Parker Range Project (Dry Plant) native vegetation clearing activities commencement	AUD$579,829
Payment 2	Within 90 days after Parker Range Project Dry Plant operations commencement	AUD$1,797 / ha of native vegetation cleared at end of Financial Year.
Payment 3	30 days prior to further native vegetation clearing above Payment 2 limits	A$2,319 / ha of additional cleared native vegetation (over and above clearing per Payment 2).
Payment 4	Within 60 days of Parker Range Operations Ceasing and Mine Closure Commencement	A$2,319 / ha of additional cleared native vegetation over and above 418 ha for the Parker Range Iron Ore (Mt Caudan) Project.
Payment 5	Within 60 days of Rehabilitation completion (EFA Performance Outcomes being achieved as per approved Mine Closure Plan).	A$2,319 / ha of pre-mine native vegetation cleared but not rehabilitated.
	Total estimate funding contributions	AUD$2,444,558

4.3 Implementation

PRCT's initial project would be the acquisition, rehabilitation and management of Lot 451 with further detail to be provided in the OMP. Known and ongoing actions associated with PRCT programmes are detailed in Table 10. Future work may include:

- involvement in research or rehabilitation of conservation significant flora species in the Yilgarn Shire;
- involvement in research of Malleefowl habitat requirements within the eastern Wheatbelt;
- ongoing management measures including feral animal control, stock removal, weed control within PRCT acquired land or DBCA managed land;
- undertake further botanical surveys for conservation significant flora species endemic and restricted to the region;
- taxonomic research into endemic flora species; and
- education activities.

As per EPBC 2010/5435 Condition 5A, the OMP will be developed and submitted for approval by the Commonwealth Minister within 12 months of commencement of operations and will include:

- confirmation of the legally binding conservation mechanism

[6] Funding contribution to be confirmed following DAWE and EPA consultation, as revision is required based on Consumer Price Index

- proposed management measures and rehabilitation activities to be implemented
- performance and completion criteria for evaluating the management of the offset area, and criteria for triggering remedial action;
- timelines to monitor and report on the effectiveness of management measures and rehabilitation activities, and progress against performance and completion criteria, and to detect triggers for remedial action; and
- potential risks to the successful implementation of the OMP, and a description of the contingency measures that will be implemented to mitigate against these risks

As per EPBC 2010/5435 Condition 8, an annual work plan will be developed by the PRCT within 12 months of project commencement and will include:

- Work planned over the next 12 months
- Desired outcome or objectives of the work plan
- Details of the work actions and how the actions will be undertaken
- A description of the potential risks associated with the work actions and a description of the contingency measures that would be implemented to mitigate these risks
- Details of the parties responsible for undertaking the work actions

Table 10: PRCT implementation actions

Action	Details	Timing
Lot 451 land acquisition	Purchase of Lot 451 site and include any subdivision requirements by PRCT	Within three months of agreement for sale and purchase of land and PRCT Board establishment or as otherwise agreed
Lot 451 Offset Management Plan	Development of the OMP for Lot 451 as per Section 4.3.	Within 12 months of Project commencement
Lot 451 rehabilitation implementation	Implementation of the Lot 451 OMP	Within six months of PRCT agreed OMP (or as otherwise agreed)
Lot 451 rehabilitation monitoring	Monitoring for rehabilitation success will occur as per the OMP, however annual frequency is expected	Annually
Lot 451 ongoing management measures	As per the Lot 451 OMP, ongoing management measures are expected, including feral animal management, weed control, fencing maintenance and inspections.	For Project duration
PRCT invite for programmes	If funding is available, invites for work programmes shall be distributed to relevant organisations to establish future work plans. Nominations will be reviewed by the PRCT and included in the next Annual Work Plan	Within three months of PRCT Committee establishment meeting and then annually (or as otherwise agreed)
Annual Work Plan	Development of a Work Plan for the next 12 months as per Section 4.3.	Submitted within 12 months of project commencement (or as otherwise agreed) and every year thereafter
Reporting	An annual report detailing budget and progress against Work Plan will be provided to DBCA, DAWE, DWER and MRL for review	Within 12 months of Project commencement and then within three months on an annual basis

4.4 Termination

MRL is committed to fund the conservation activities for the PRCT for the period of the Parker Range Project (Mt Caudan Deposit) development, operations, mine closure and rehabilitation life cycle as per Table 9.

Upon completion of MRL's funding contributions as per Table 9, and in the event supplementary funding is unable to be secured, the PRCT may be terminated by the Board in accordance with the following requirements:

- The Board is to prepare and issue a written Termination Notice for the PRCT (including supporting justification and plan for disposal of assets) to MRL, EPA, DAWE, DWER and DBCA.
- Written approval of the Termination Notice is received by the Board from MRL, EPA, DAWE, DWER and DBCA.
- All PRCT assets (including remaining funding) may be vested to the State of Western Australia, there-by administered by DBCA (pending DBCA acceptance) or vested in an alternate agreed mechanism as outlined in the approved Termination Notice.

The termination of the PRCT will represent the end of MRL's obligations to the offset scheme, provided all requirements for approvals have been met.

5. PROPOSED OFFSET AREA

The proposed offset area is within Lot 451 of Parcel 204149, located adjacent to Bennett Road and Patroni Road in the Shire of Yilgarn, Western Australia as shown in Figure 2.

5.1 Bioregional context

Lot 451 is located within the eastern Wheatbelt region and is surrounded by freehold land which is predominately cleared. The site is surrounded by parcels of land that consists of remnant vegetation and is situated 30 km west of the Jilbadji Nature Reserve. The site is located 1.5 km from the boundary of the Great Western Woodlands (GWW), an area considered an ecological hotspot.

The GWW are a 16 million ha area extending from the wheatbelt to the edge of the deserts and is the largest intact area of Mediterranean Woodland on earth. The GWW includes open eucalypt woodlands (63%), mallee eucalypt woodlands, shrublands and grasslands (Fox et al. 2016). Less common habitats in the GWW include granite outcrops, banded ironstone formations, salt lakes and freshwater wetlands (Fox et al. 2016). The relative intactness of the GWW is recognised as a key value by Fox et al. (2016), in that it provides connectivity for birds in a landscape that varies both spatially and temporally. The south-western half of the GWW provides habitat for many birds that are locally extinct or have reduced populations in the adjacent and substantially cleared wheatbelt (Fox et al. 2016).

5.2 Offset Area Values

Lot 451 contains remnant vegetation that is not currently protected from future impacts (mining or agriculture). MRL has undertaken flora and fauna surveys by Ecotec (WA) Pty Ltd in 2019.

The following information was determined for flora and vegetation:

- 648 ha of remnant vegetation is located within Lot 451
- Vegetation mapping concluded the presence of seven vegetation units as shown in Figure 3:
    - Two *Allocasuarina* woodland types (AsCc and AsMu)
    - One shrubland type (ExAh)
    - One *Melaleuca* and *Acacia* woodland type (MuAy)
    - Two *Eucalypt* woodland types (EcEr and EcEc)
    - One *Callitris* type (CcEe)
- Minimal disturbance and little evidence of grazing by livestock was noted, likely due to remnant vegetation being fenced.
- None of the vegetation types meet all of the assessment criteria to be considered *Eucalypt* Woodland of the WA Wheatbelt Threatened Ecological Community.
- Under normal rainfall conditions, overall vegetation is considered to be “excellent” as per the Keighery vegetation condition scale (1994) and under drought conditions “very good”
- The likely presence of conservation significant flora species potentially indirectly impacted by the Project is detailed in Table 11. Whilst no individuals were identified in the surveys, it is possible that five species may occur based on proximity of previous records and potential presence of suitable habitat.

Table 11: Lot 451 conservation significant flora likelihood

Species	Conservation Ranking	Preferred Habitat (soils and landforms)	Occurrence
Isopogon robustus	Critically Endangered, EPBC Act	Skeletal grey sandy loam, laterite. Ridges.	Unlikely based on absence of preferred habitat
Baeckea grandibracteata subsp. Parker Range	Priority 3	Clay, sandy clay, yellow sand. Rocky rises, granite outcrops, breakaways, sand plains, sand dunes.	Possible
Chamelaucium sp. Parker Range	Priority 1	Laterite and ironstone	Possible
Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)	Priority 1	Loam soils with banded ironstone rock and gravel	Unlikely based on absence of preferred habitat
Lepidosperma sp. Mt Caudan (N. Gibson & M. Lyons 2081)	Priority 1	Loam soils with banded ironstone rock and gravel	Unlikely based on absence of preferred habitat
Acacia concolorans	Priority 2	Red/brown loam, clay. Low lateritic hills, flats.	Possible
Hakea pendens	Priority 2	Stony loam. Ironstone ridges.	Unlikely based on absence of preferred habitat
Cryptandra crispula	Priority 3	Brown sandy clay, yellow loamy sand, red soil, pebbles. Dune ridges, hills, near salt lakes.	Possible
Banksia shanklandiorum	Priority 4	White/yellow sand with lateritic gravel.	Possible

The following information was determined for fauna:

- An initial search of publicly available records has identified that Malleefowl have been recorded within 20 km of Lot 451. This indicates there is good likelihood of the species occurring in the potential offset area. The widespread recordings of the species through the local area and highly mobile nature of the species indicates that the species is likely to use the proposed offsets.
- Eight inactive Malleefowl mounds were identified, with three mounds potentially active within the last 12 – 18 months, as shown in Figure 2.
- 538 ha of the vegetation on Lot 451 (Figure 2) were identified as suitable for Malleefowl habitat:
    - 411 ha of *Allocasuarina spinosissima* and *Melaleuca uncinata* woodland with scattered Eucalypts (AsMU) in excellent conditions with mounds identified. Very little disturbance and no evidence of grazing was identified.
    - 127 ha of *Melaleuca uncinata* and *Acacia yorkrakinensis* subsp. *acrita* +/- *Callitris columellaris* woodland (MuAy) in excellent condition which may also provide suitable nesting habitat. It was also deduced that additional Malleefowl mounds may be present in the area of existing native vegetation.
- Suitable habitat for the Western Rosella was identified and consists of:
    - open eucalypt forest and timbered areas, including cultivated land and orchards
    - 31.52 ha of *Eucalyptus calycogona +/- Eucalyptus eremophila, Eucalyptus moderata, Eucalyptus capillosa* woodland with almost no understory *(*EcEe vegetation type) in very good condition which is considered suitable nesting habitat.
- There are larger areas of suitable nesting habitat in the surrounding area and being highly mobile, it is possible the Western rosella may utilise suitable foraging habitat within Lot 451 as part of a larger range. Common food items for the species include seed and nectar from a

variety of native trees including Eucalyptus and Casuarina, as well as weed species (DEC 2009). As such, potentially suitable foraging habitat exists within and surrounding the Lot 451 survey area.

- Evidence of the Tree-stem Trapdoor Spider (*Agnipe catellum*, Priority 4) was identified and the White-browed Babbler (*Pomatostomus superciliosus*) was observed with suitable nesting and foraging habitat identified.
- The rainbow bee-eater is considered likely to be seasonally present in the area. Suitable nesting habitat (sand banks forming drains, windrows and dam walls) is present around the perimeter of the vegetated areas and in the surrounding area.
- Potentially suitable habitat exists for the red-tailed phascogale, being mature *Eucalypt* and *Allocasuarina* woodlands, however this is probably restricted to vegetation type EcEe.
- Evidence of dog activity was noted with foxes, cats and rabbits likely to be present.

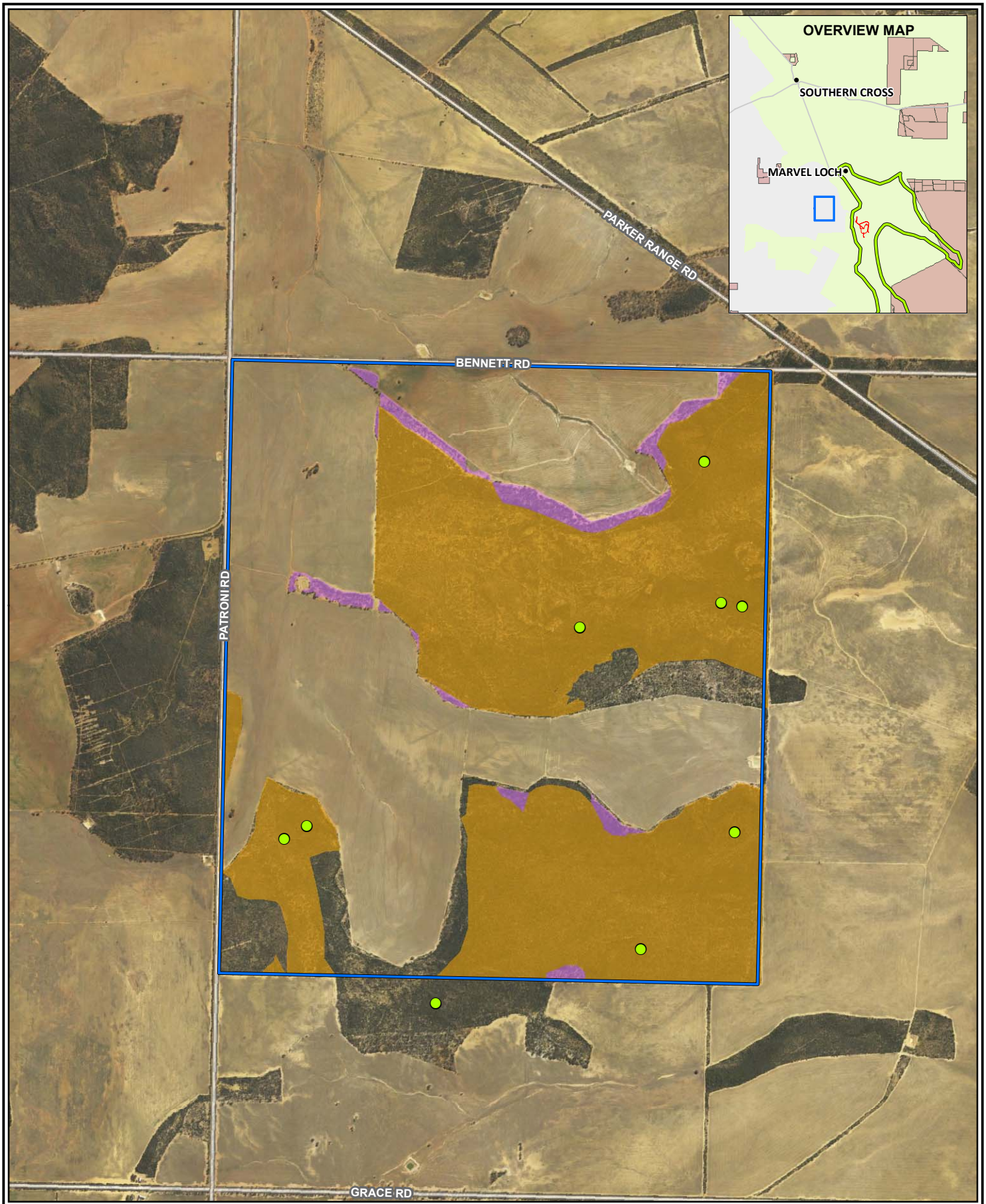
In excess of 13,000 ha of potentially suitable habitat is located within a 10 km radius of Lot 451. While much of the original Malleefowl habitat has been cleared for agriculture, there are corridors of remnant vegetation linking many of the larger vegetated areas. Malleefowl are also known to traverse paddocks and other cleared areas while foraging. It is therefore considered likely that a Malleefowl population could be supported by suitable habitat available in the remnant vegetation within and surrounding Lot 451 (Ecotec 2020; Figure 2). Regional Malleefowl records throughout the eastern Wheatbelt indicate that Malleefowl utilise existing corridors and cleared areas.

The quality of the offset area is broadly similar to that of the Project site (Section 2.1) based on ecological surveys. The offset area comprises a suitable Malleefowl habitat as determined by Ecotec (2020):

- Condition - The habitat assessment recorded habitat characteristics of vegetation structure and composition; presence of feral predators; and level of disturbance. The offset area would likely be considered good, which is comparable to the impact site. Factors that have led to this assessment include the lack of weeds and anthropogenic disturbance, general health of the vegetation with no sign of disease.
- Context – Lot 451 is located 1.5 km from remnant vegetation. The relatively small distance of cleared land from remnant vegetation is considered to be no impediment to Malleefowl access and use, if not already doing so.
- Species Stocking Rate - The presence and abundance/density of Malleefowl has not been determined. However, Malleefowl mounds have been identified with two potentially active in the previous 12 to 18 months. Malleefowl individuals have not been recorded, therefore no abundance/density data or stocking rate can be determined.

Consultation has occurred with DBCA (pers coms. Nicholas Woolfrey, 3 March 2020) regarding potential conversion of the offset area into conservation estate. DBCA agrees that Lot 451 contains suitable habitat for Malleefowl and Western Rosella, however, the offset area is not currently a priority for conservation estate inclusion. The offset area does not contain conservation significant flora and fauna values, communities and/or habitat that are not well represented in the current conservation estate system and does not contribute to better management outcomes for the existing conservation estate.

DBCA consultation will continue, particularly as rehabilitation activities progress. In the event the offset area is not suitable, alternatives have been provided (Section 6.1).



Legend:

- Lot 451 Site
- Parker Range Project Infrastructure Footprint
- Parker Range PEC
- Great Western Woodlands
- Conservation Estate

Fauna habitat

- Malleefowl
- Western Rosella
- Malleefowl Mounds
- Roads (MRWA)

Scale 1:30,000 at A4 (0 250 500 metres)		**Parker Range, WA**
Coord. Sys. GDA 1994 MGA Zone 50		**LOT 451 OVERVIEW**
Job No: 58196		
Client: Mineral Resources Limited		**FIGURE 2**
Version: A	Date: 18-Feb-2020	strategen JBS&G
Drawn By: hsullivan	Checked By: CT	

File Name: W:\Projects\1)Open\Mineral Resources\58196 Parker Range Offsets\GIS\Maps\R01_Rev_A\58196_05_1_Lot451Offset.mxd
Image Reference: SLIP Public Services Locate 2020.

6. OFFSET AREA MANAGEMENT

6.1 Land Acquisition Process

Land identification and evaluation has been completed, as presented in this Strategy. Purchase of the offset area(s) and implementation of this Strategy will be fully funded by MRL via the PRCT. Once key stakeholders (DAWE, EPA, DBCA) have evaluated the offset area(s) as suitable through the approval of this Strategy, MRL will negotiate with the relevant landowner to confirm the purchase price.

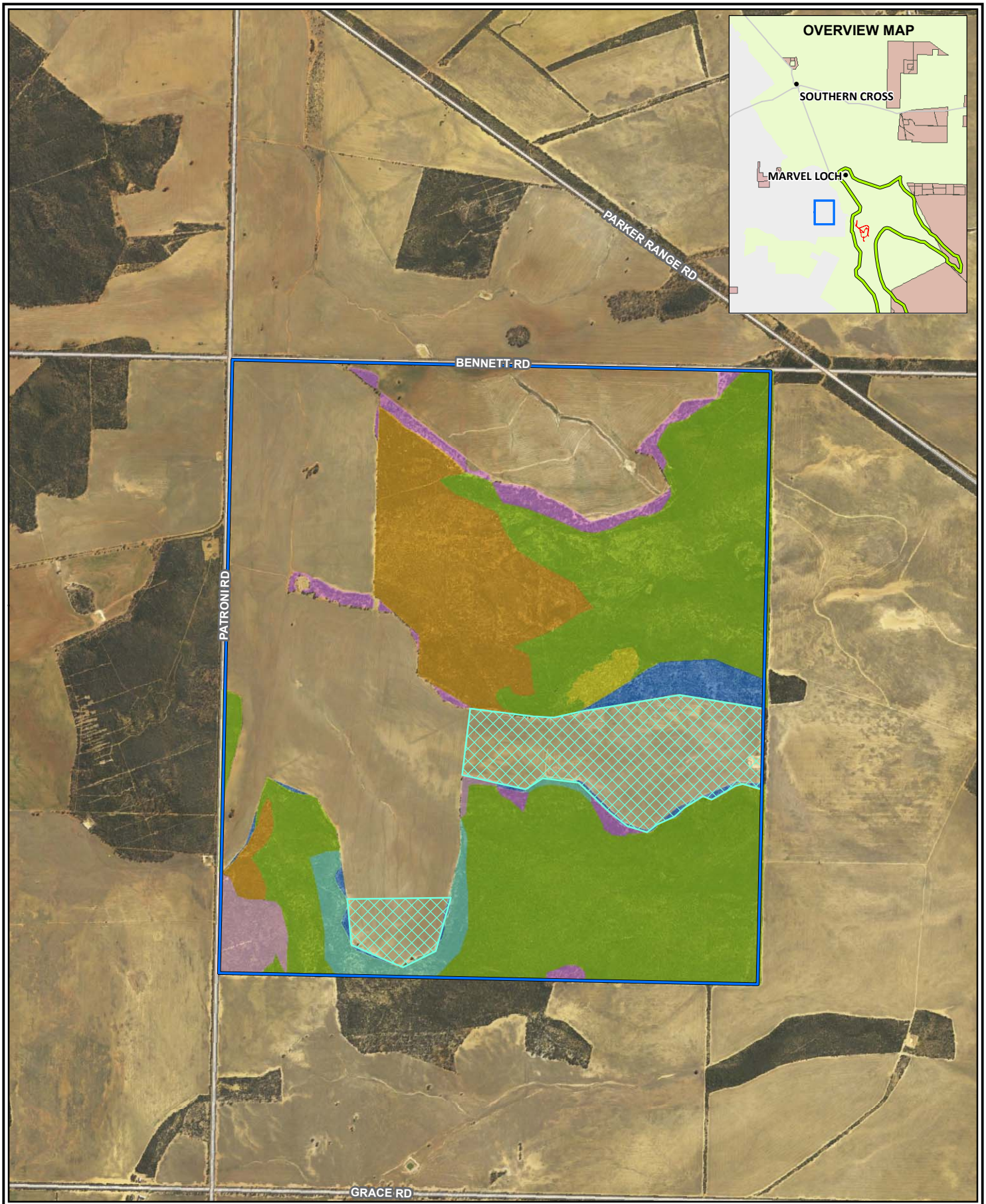
Consultation with the landowner to date has indicated they are receptive to selling the Lot 451. An option to purchase agreement with the landowner is in place with respect to Lot 451. Following agreement on a sale price, MRL will provide funds for the ongoing management of the offset area(s) as per a funding agreement with PRCT. PRCT will purchase the offset area(s) and is considered the land owner until transfer to DBCA or an alternative appropriate management authority.

6.2 Rehabilitation Strategy

It is proposed to rehabilitate 115 ha of previously disturbed land in addition to the enhancement and protection of Malleefowl and Western Rosella habitat to meet the requirement to protect, enhance and rehabilitate 630 ha. Lot 451 currently consists of 538 ha of Malleefowl habitat and 648 ha of remnant vegetation. Proposed rehabilitation areas are shown in Figure 3 and have been selected to provide continuity between existing remnant vegetation. By removing fragmentation associated with the existing remnant vegetation, the habitat quality will improve.

Rehabilitation will be undertaken by the PRCT and a detailed OMP developed following consultation with the PRCT committee. The OMP will need to be submitted for approval by the Commonwealth Minister within 12 months of commencement. The OMP will contain details on how the rehabilitation will be undertaken during the timeframe of the approval, including management measures and rehabilitation activities. It is expected that the OMP may consist of the following actions:

- Disturbed area soil analysis undertaken to identify any remediation actions required and recommended seed mixes
- Local provenance seed to be collected that reflects existing remnant vegetation, in particular Western Rosella and Malleefowl habitat
- Determination if conservation significant flora species seed can be included in seed mix or other rehabilitation activities (for example, translocation)
- Spraying of disturbed area to remove weeds
- Ripping of disturbed area
- Fencing and installation of fire management roads
- Seeding of disturbed area
- Ongoing monitoring and maintenance



Legend:

- Lot 451 Site
- Parker Range Project Infrastructure Footprint
- Proposed Rehabilitation Area
- Parker Range PEC Great Western Woodlands Nature Conservation Estate

Existing Vegetation communities

- AsMu
- AsCc
- CcEc
- EcEe
- EcEr
- ExAh
- MuAy
- Roads (MRWA)

Scale 1:30,000 at A4

0 250 500 metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 58196

Client: Mineral Resources Limited

Version: A | Date: 18-Feb-2020

Drawn By: hsullivan | Checked By: CT

Parker Range, WA

LOT 451 PROPOSED REHABILITATION AREA

FIGURE 3

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6.3 Management Measures

Detailed management measures, including preliminary and final completion criteria, will be outlined in the Offset Management Plan. PRCT will coordinate the ongoing management measures within the offset area(s) which will be funded as outlined in Section 4.2. Management measures are associated with three ecological objectives:

- The acquisition of Lot 451 to protect habitat
- The enhancement of existing habitat through rehabilitation
- Maintenance of Lot 451 offset area

It is expected that the management measures detailed in Table 12 will be undertaken by PRCT. The management measures, completion criteria and performance criteria should be considered preliminary and will be refined as the offset strategy progresses. Further defined management measures will be provided in the OMP within 12 months of Project commencement and are expected to maintain the offset area fauna habitat quality.

Table 12: Fauna Offset Area Preliminary Management Measures

Ecological outcome	Preliminary Management Measure[7]	Preliminary Completion criteria	When	Related Monitoring Activity	Preliminary Performance Criteria
Provide continuity and protection of Malleefowl and Western Rosella habitat in eastern Wheatbelt	1 - Acquisition of freehold land	PRCT acquisition of freehold land.	Within three months of agreement for sale and purchase of land and PRCT Board establishment or as otherwise agreed	N/A	PRCT Annual Report – confirmation of management measure
Enhance Malleefowl and Western Rosella habitat within the eastern Wheatbelt	2 - Rehabilitation of 115 ha of disturbed land to connect Malleefowl and Western Rosella habitat	Weed cover is consistent with neighbouring native vegetation	One year after rehabilitation completion for Project duration (estimated ten years)	Annual rehabilitation and fauna monitoring	Weed cover is not significantly greater than in existing remnant vegetation as measured within reference sites
		Vegetation structure is consistent with neighbouring native vegetation			Density of dominant species within each stratum is not significantly less than in existing remnant vegetation as measure within reference sites
		Leaf litter is consistent with neighbouring native vegetation			Percentage of leaf and vegetation litter is not significantly less than in existing remnant vegetation as measure within reference sites
		Presence of Malleefowl			Active Malleefowl mound (as per NMRT methodology) or Malleefowl sighting (via camera or fauna specialist) within five years of monitoring
		Meets completion criteria in the OMP			Meets the performance criteria in the OMP
Maintain Malleefowl and Western Rosella habitat within the eastern Wheatbelt	3 - Fencing of offset area(s) to prevent stock and inappropriate vehicle entry	Fencing of offset area(s) is established.	Within three months of offset area(s) acquisition	N/A	PRCT Annual Report – confirmation of management measure
		Offset area(s) fence maintenance commenced.	Within three months of identification	Annual inspection of fencing to confirm integrity	Annual inspection of fencing to confirm integrity
	4 - Involvement in regional feral animal management to minimise predation impacts	Feral animal management controls are implemented, particularly feral dog control.	Timing determined by regional feral animal management programmes, however annual basis is recommended	Annual rehabilitation and fauna monitoring	PRCT Annual Report – confirmation of management measure

[7] Management measures, completion criteria and performance criteria should be considered preliminary. The Offset Management Plan will provide detailed management measures.

Ecological outcome	Preliminary Management Measure[7]	Preliminary Completion criteria	When	Related Monitoring Activity	Preliminary Performance Criteria
	5 - Fire management to minimise fire risk	Fire management tracks are established	Within three months of offset area(s) acquisition	N/A	PRCT Annual Report – confirmation of management measure
		Fire management track maintenance commenced.	Within six months of identification	Annual inspection of fire break to confirm integrity	Fire access tracks are in good condition and easily accessible.
		No unplanned fire occurs within rehabilitation or remnant vegetations	Annually for Project duration (estimated ten years)	Annual rehabilitation and fauna monitoring Annual inspections	All fire events are scheduled controlled burns that do not adversely impact Malleefowl habitat quality

6.4 Long Term Management Arrangements

Once land acquisition is completed, consultation will occur with DBCA regarding the application of a conservation covenant over the offset area(s) to prevent native vegetation clearing. Following consultation, the necessary steps will be taken to lodge a conservation covenant over existing native vegetation and rehabilitation areas. A conservation covenant will be registered within two years of this strategy being approved. The process for obtaining a conservation covenant would include:

- Application to the Department of Primary Industries and Regional Development under the *Soil and Land Conservation Act 1945* for a perpetual conservation covenant; and
- Registration with Landgate

Details of the conservation covenant will be provided to DAWE within six months of registration as per EPBC 2010-5435 Condition 8.

Once rehabilitation is successful (i.e. meets the completion criteria detailed in the OMP), consultation will occur with DBCA to determine suitability of the offset area(s) to be incorporated into the conservation estate. Conversion to conservation estate will minimise potential for mining/exploration, grazing and development. Actions may include:

- transfer of land tenure of the offset area(s) from freehold to the conservation estate to be vested in the Conservation and Parks Commission, as required under the *Land Administration Act 1997* and *Conservation and Land Management Act 1984;*
- updating of Government databases to incorporate the land parcels, including the SLIP database; and
- updating of Government management plans to incorporate the land parcels.

In the event the offset area(s) are not considered suitable for conversion to conservation estate, an alternative appropriate managing body will be engaged for the long-term protection of the offset area(s). The managing body would likely be a conservation group with sufficient capacity to maintain the offset area(s).

6.5 Monitoring

Ongoing monitoring of the offset area(s) will be undertaken by PRCT and will consist of annual rehabilitation and fauna monitoring and annual inspections. Details of the monitoring activities to be undertaken will be included in the OMP. Annual rehabilitation inspections and fauna monitoring would commence one year after rehabilitation activities and include the following:

- Quadrats established in rehabilitation and reference (remnant vegetation)
- Species density
- Weed presence and cover
- Leaf and vegetation litter, specifically with reference to suitability for Malleefowl
- Vegetation impacts (species impacted and area) as a result of unplanned fires
- Monitoring of Malleefowl mounds

Annual inspections will be undertaken immediately upon acquisition and include the following:

- Inspections of fencing to ensure integrity and identify any repairs required
- Visual observations to identify any increases in weed or feral animal occurrences

- Inspections of fire management track to identify any maintenance required or any unplanned fires

In addition to the above, offset monitoring would be carried out as per the conditions stated in the Ministerial Statement and EPBC Act approval. A full description of conditions is provided in Table 1 and Table 2

6.6 Reporting

MRL will report annually against implementation of this Strategy and the Offsets Management Plan within the Compliance Assessment Report (CAR), following its approval as per condition 4 of MS892 and condition 11 and 12 of EPBC2010/5435. This will include:

- Establishment and funding of the PRCT
- Progress against Lot 451 acquisition and implementation of a legally binding conservation mechanism approved by the Minister for any offset area(s)
- Progress against the transfer of the offset area(s) to a conservation estate for management by PRCT/DBCA or an alternative conservation covenant arrangement.
- Management of the offset area(s) and progress against preliminary completion criteria

PRCT will report annually on the following (this report will be included in annual reporting by MRL):

- Work Plan that includes the following:
  - Work planned over the next 12 months
  - Desired outcome or objectives of the work plan
  - Details of the work actions and how the actions will be undertaken
  - A description of the potential risks associated with the work actions and a description of the contingency measures that would be implemented to mitigate these risks
  - Details of the parties responsible for undertaking the work actions
- Outcomes from annual rehabilitation and fauna monitoring
- Confirmation of fencing, fire and fire management track, and weed management measures

7. RISK ASSESSMENT

Risks and contingencies relating to the Strategy are described in Table 13. The risk assessment is completed in accordance with DAWE Environmental Management Plan Guidelines (DoE 2014).

Table 13: Risks and contingencies relating to Offset management for threatened fauna habitat

Management Objective	Event or circumstance	Relevant Management Measures[8]	Residual Risk			Trigger detection and monitoring activities	Feasible/effective corrective actions
			Likelihood	Consequence	Risk Level		
Maintain Malleefowl and Western Rosella habitat within the eastern Wheatbelt	Unplanned fire causing habitat degradation	5 – Fire management to minimise fire risk	Possible	Moderate	Medium	Unplanned fires Annual inspection of fire access tracks to identify any maintenance required or unplanned fires Annual vegetation monitoring to identify unplanned fire impacts	Maintain fire access tracks to ensure they are in good condition and cleared of vegetation at all times. Review of fire management measures with local shire, DFES and DBCA to prevent recurrence Rehabilitation of significantly impacted areas from unplanned fires
	Unauthorised access by vehicles or stock causing habitat degradation	3 – Fencing of offset area(s) to prevent stock and inappropriate vehicle entry	Unlikely	Minor	Low	Evidence of vehicle access and disturbance Annual inspection of fencing to confirm integrity	Reinstate damaged fencing. Investigation of vehicle and stock entry points, repair infrastructure Install no access signage and gate and lock accesses.
	Presence of foxes and cats increasing risk of predation	4 – Involvement in regional feral animal management to minimise predation impacts	Highly likely	Moderate	Medium	Monitoring identifies an increase in fox or cat presence Annual DBCA confirmation that feral animal management controls are implemented	Implement a pest control program. Contribute to regional feral animal baiting programme
Provide continuity and protection of Malleefowl and Western Rosella habitat within the eastern Wheatbelt	No suitable habitat present within proposed offset area(s)	1 – Acquisition of freehold land (Lot 451)	Unlikely	Minor	Low	No suitable habitat present within proposed offset area(s) Quarterly consultation with DBCA to review land acquisition process.	Review other parcels of land that may be appropriate. If no further land available for acquisition, liaise with DBCA, DAWE and EPA to discuss alternative suitable offset package.
	Land unavailable for purchase		Unlikely	Minor	Low	Existing purchase agreement is not progressed Quarterly consultation with DBCA to review land acquisition process.	

[8] Management measures should be considered preliminary. The Offset Management Plan will provide detailed management measures.

Management Objective	Event or circumstance	Relevant Management Measures[8]	Residual Risk			Trigger detection and monitoring activities	Feasible/effective corrective actions
			Likelihood	Consequence	Risk Level		
	Insufficient area of habitat available in proposed offset area(s)		Possible	Minor	Low	Insufficient area of habitat available in proposed offset area(s) Quarterly consultation with DBCA to review land acquisition process.	
Enhance Malleefowl and Western Rosella habitat within the eastern Wheatbelt	Rehabilitation is unsuccessful due to poor vegetation density and structure	2 – Rehabilitation of 115 ha of disturbed land to Malleefowl and Western Rosella habitat	Possible	Moderate	Medium	Density of dominant species within each stratum is significantly less than in existing remnant vegetation as measured within reference sites Annual rehabilitation monitoring	PRCT review Lot 451 OMP in conjunction with rehabilitation monitoring reports and identify remedial actions which may include additional seeding, weed control or ripping
	Rehabilitation is unsuccessful due to increased weeds		Possible	Moderate	Medium	Weed cover is significantly greater than in existing remnant vegetation as measured within reference sites Annual rehabilitation monitoring	Implement weed management measures
	Rehabilitation does not create Malleefowl or Western Rosella habitat		Possible	Moderate	Medium	Annual Fauna monitoring indicates unsuitable habitat through habitat assessment Malleefowl presence is not confirmed within five years of monitoring	Review Offset Strategy or OMP with EPA and DAWE and source alternative offset area(s)

7.1 Contingency Response and Corrective Actions

If final performance criteria, as detailed in the OMP, are not met within 10 years, MRL agrees to fund PRCT activities required for alternative offset area(s), as per the following:

- Undertake any further field surveys, environmental studies or research deemed necessary to support the definition of field contingency measures, as approved by MRL.
- Implementation of necessary field contingency measures, as approved by MRL.
- Completion of any extended environmental monitoring.

Alternative offsets area(s) will be required for the following scenarios, to ensure a total of 630 ha of Malleefowl habitat is achieved:

- Malleefowl presence is not confirmed on the offset area(s) within five years after approval of this Strategy
- Preliminary and final performance criteria is not met within 10 years after approval of this Strategy.

Additional risks are identified in Table 13 with corrective actions identified.

8. Adaptive Implementation

Section 7 (Risk Assessment) includes the current risks to achieving the Ecological Outcomes of this Offset Strategy and details corrective actions.

Monitoring as per Section 6.5 will include annual rehabilitation and fauna monitoring, in addition to inspections. Monitoring will be compared against the preliminary and final Completion Criteria detailed in the OMP, to determine if these have been met.

The OMP will include timeframes for preliminary and final completion criteria. Ongoing monitoring will provide an indication if performance is on an appropriate trajectory and will be reviewed against completion criteria. If any monitoring indicates that performance criteria will not be met within the expected timeframe, the management measures (Section 6.3 and to be provided in OMP) will be reviewed and amended accordingly. In the event significant changes to management measures, this Offset Strategy or OMP are required, a revised version will be developed and submitted to DAWE and DWER for review and approval.

9. ROLES AND RESPONSIBILITIES

Roles and responsibilities are discussed in detail throughout this Strategy, however, are detailed in Table 1.

Table 14: Offset Strategy roles and responsibilities

Role	Responsibility
DAWE	• Approval of this Strategy and the Offset Management Plan • Receipt of PRCT Annual Report and Work Plan
DBCA	• Provision of feedback on inclusion of offset area(s) in conservation estate • Coordination of inclusion of offset area(s) in conservation estate and then ongoing management
DWER	• Approval of this Strategy and the Offset Management Plan • Receipt of PRCT Annual Report and Work Plan
MRL	• Establishment and funding of PRCT • Development of the Offset Management Plan within 12 months of Project commencement
PRCT	• Purchase of offset area(s) • Lodgement of legally binding conservation mechanism approved by the Minister of any offset area(s) • Ongoing ownership of offset area(s) until transfer to DBCA or alternative appropriate management body • Coordination of offset area(s) rehabilitation • Coordination of offset area(s)annual monitoring • Coordination of offset area(s)ongoing management measures • If an alternative offset area(s) are required, acquisition and management of the identified offset area(s)
Department of Primary Industries and Regional Development	• Assessment of conservation covenant of any offset area(s) under s30 of *Soil and Land Conservation Act 1945* • Lodgement of signed conservation covenant document with Landgate

10. GLOSSARY OF TERMS

Table 15: Glossary of Terms

Term	Definition
Strategy	Parker Range Mount Caudan Fauna Offsets Strategy, Version H
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
EPBC 2010/5435	Approval EPBC No 2010/5435 issued under the EPBC Act
MS892	Ministerial Statement No. 892 issued under the EP Act
OMP	Offset Management Plan
PRCT	Parker Range Conservation Trust

11. REFERENCES

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Phoenix Environmental Sciences (2020a). Baseline Malleefowl monitoring report for the Parker Range Iron Ore Project.

Phoenix Environmental Sciences (2020b). Baseline health assessment of vegetation and weed monitoring for the Parker Range Iron Ore Project.

The Government of Western Australia Environmental Protection Authority (EPA) (2014) Environmental Offsets Guidelines. Published August 2014.

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Appendix A Fauna Habitat Assessment Report

Flora and Fauna Assessment of Lot 451 Parker Range Project December 2019

Revision 0. 16-02-2020

Prepared by
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Mineral Resources Ltd
1 Sleat Rd, Applecross, WA 6153
Koolyanobbing Operations.

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1.0 INTRODUCTION

1.1 Overview

In accordance with Condition 10 of MS 892, MRL is required to set up the Parker Range Conservation Trust and acquire land suitable for rehabilitation to offset the residual impacts to conservation significant fauna and flora. MRL has identified Lot 451 as a potential parcel of land that could meet the intent of the offset.

Ecotec (WA) Pty Ltd (Ecotec) was engaged to undertake an assessment of Lot 451 that included:

- high level vegetation-structure (NVIS Level 2) mapping
- identification of general location, extent and condition of potentially significant vegetation
- identification of general location, extent and condition of habitat for significant flora
- identification of general location, extent and condition of potential habitat for significant fauna including Malleefowl, Western Rosella and Chuditch
- ground truthing of potential Malleefowl mounds identified through LIDAR capture and data interrogation
- assessment of Eucalypt Woodland against DOEE Conservation Advice (diagnostic criteria) as a EPBC Act TEC
- observations and high- level mapping of potential weed occurrences.

Ecologia Environment Pty Ltd (*ecologia*) was engaged by Ecotec to assist with the survey. The flora and vegetation components of this survey were undertaken by *ecologia.* This report provides a summary of the findings of the flora and vegetation survey, which is included as Attachment 1. The fauna and habitat assessment was undertaken by Ecotec.

1.2 Location

Lot 451 is located approximately 38 km south-south-east of Southern Cross in the Shire of Yilgarn, Western Australia. The block has a total area of approximately 1200 ha, with approximately 648 ha vegetated. The remainder is active pastoral land (cropping and grazing). Figure 1.1 shows Lot 451 in relation to nearby towns and other landmarks. Figure 1.2 shows the study area.

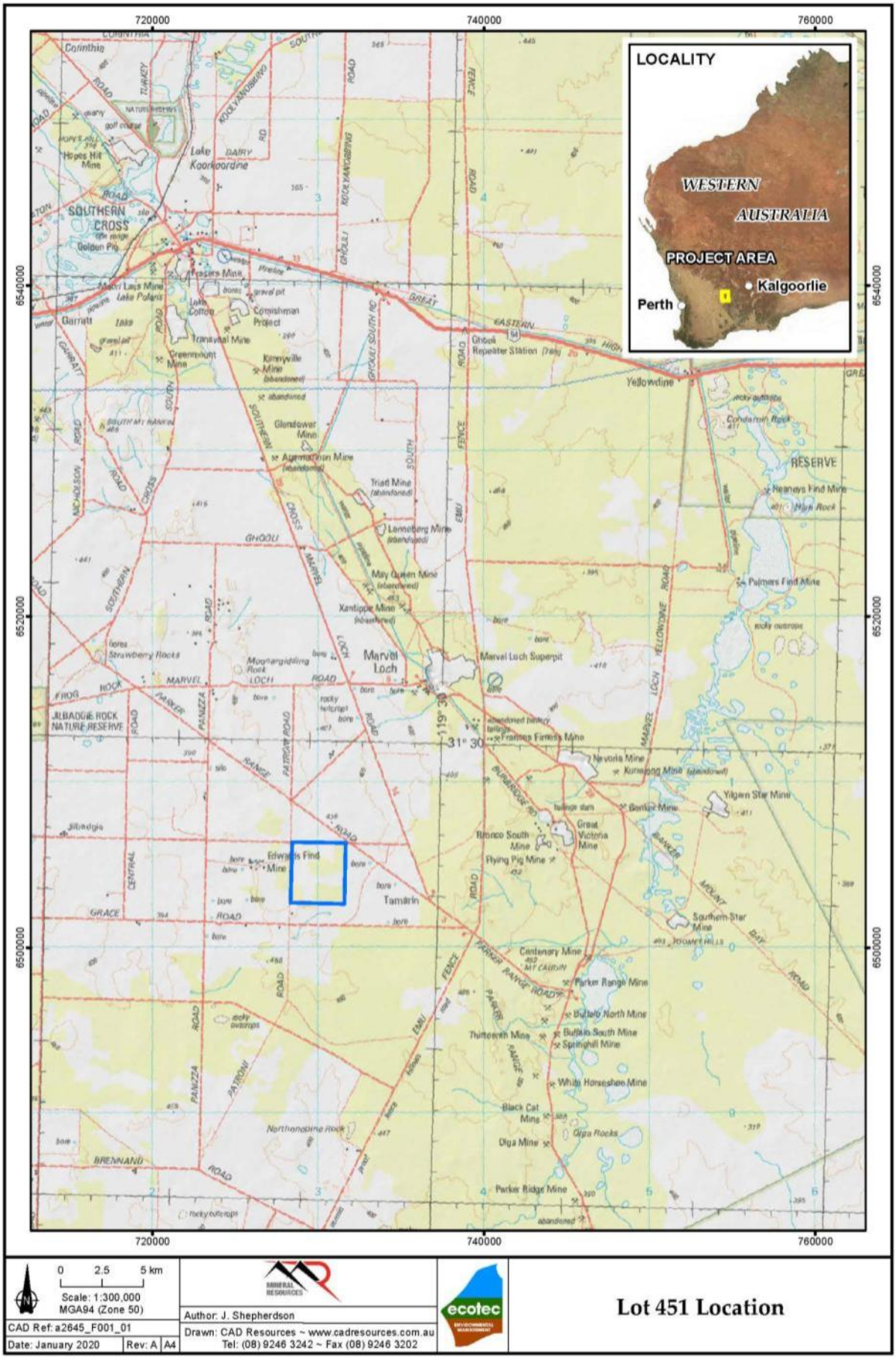

Figure 1.1: Regional location of Lot 451.

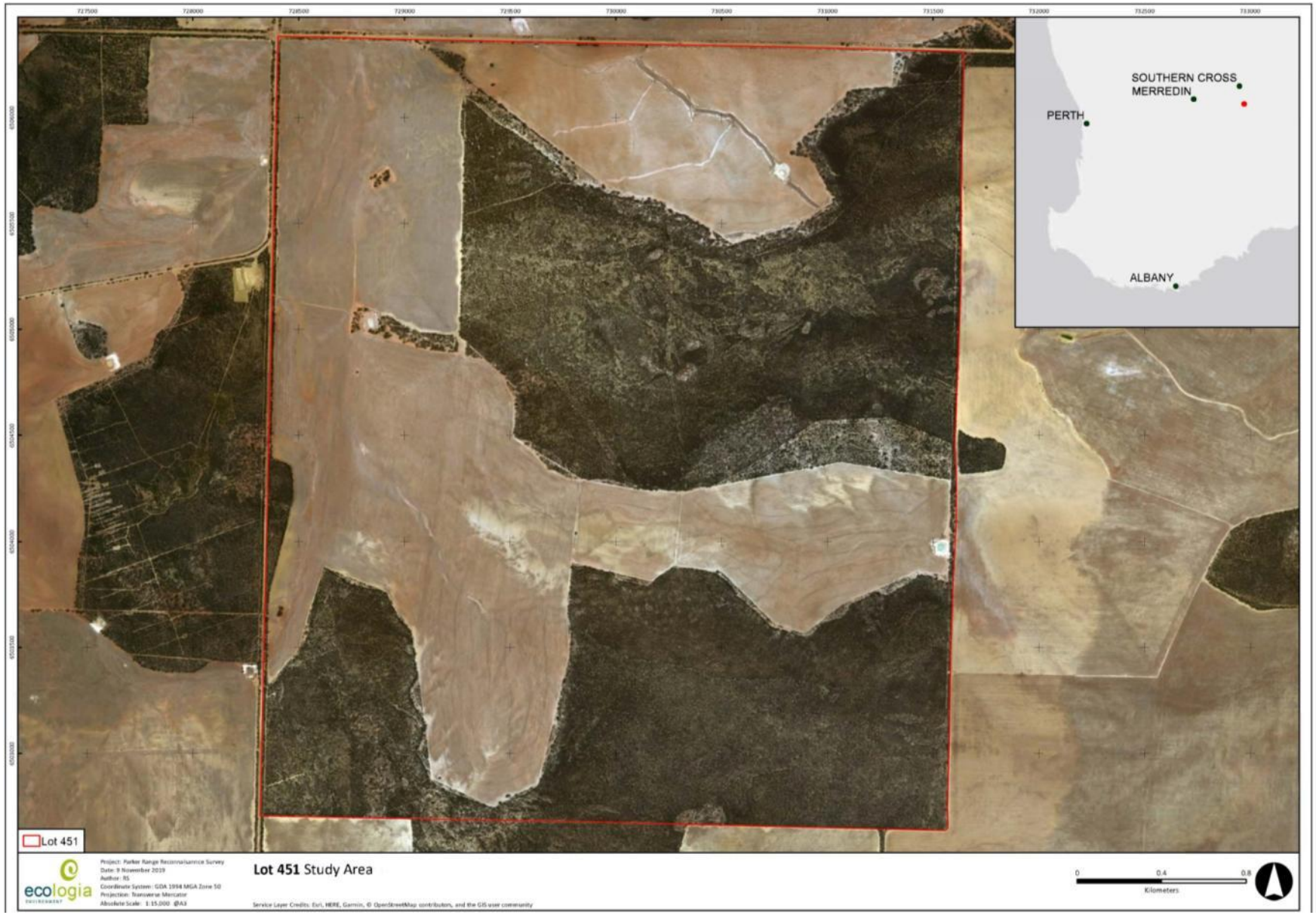

Figure 1.2: The Lot 451 study area.

2.0 METHODOLOGY

2.1 Desktop assessment

The methodology adopted for the desktop assessment was consistent with that recommended by the Environmental Protection Authority (2016). A review of background environmental information for the study area, including climate (BoM), biogeography (IBRA 7) (Department of Sustainability Environment Water Population and Communities 2012), soils (Department of Primary Industries and Regional Development 2016), and pre-European vegetation (Shepherd et al. 2001) was conducted and included in the *ecologia* report.

The likelihood of occurrence of significant species and communities occurring within the study area was determined given the likely landforms and broad habitats present. The desktop review of the survey area was undertaken using a 20 km search radius from the centre of the survey area. A number of publicly available databases were interrogated, including:

- DBCA NatureMap database
- DBCA Threatened and Priority Flora database (TPFL)
- Western Australian Herbarium Specimen database (WAHERB)
- Protected Matters Search Tool database.

2.2 Field work

The field work component of this survey was undertaken on 16 and 17 December 2019.

The flora assessment involved a series of relevés through the vegetated areas to determine the vegetation types present and assess the areas for the likelihood of conservation significant flora being present.

The fauna assessment required each of the potential malleefowl mounds identified by the LIDAR survey to be visited to determine whether or not each was a mound. This was undertaken by a series of foot traverses through the vegetated areas. Available fauna habitat was observed during the traverses.

An assessment of survey-specific issues and limitations (as per EPA 2016) is detailed in Table 2.1.

Table 2.1: Survey limitations.

Aspect	Constraint	Comment
Availability of contextual information at a regional and local scale	Nil	Broad scale vegetation, soil, and geology mapping data were available for the study area, in addition to Threatened and Priority flora and fauna database records, and conservation significant vegetation community records. This information was adequate to provide appropriate contextual information for the current survey.
Competency/experience of the team carrying out the survey, including experience in the bioregion surveyed	Nil	The level 2 Botanist undertaking the survey has conducted numerous botanical surveys in the South West and the Pilbara. The Principal Botanist undertaking the specimen identification for the survey has conducted numerous botanical surveys in the Avon Wheatbelt region. The biologist undertaking the fauna and habitat assessment has over 20 years experience in similar assessments throughout Western Australia.
Proportion of flora recorded and/or collected, any identification issues	Minor	Representative specimens of all taxa identified in the field were collected for confirmation. Seven of these could not be confidently identified to species level due to a lack of required reproductive material. However, the small number of unidentified samples are unlikely to have had any significant impact on the classification of vegetation communities, and none of these specimens were believed to correspond to any conservation significant species.
Was the appropriate area fully surveyed (effort and extent)	Nil	A targeted search was conducted for conservation significant flora during traverses. The level of survey was not sufficient to rule out the occurrence of any conservation significant flora.

		A targeted search for malleefowl nest mounds was undertaken based on LIDAR survey results. A systematic search of the area was not undertaken as part of this survey. The foot traverse provided adequate coverage of the area to determine general fauna habitat distribution and condition.
Access restrictions within the survey area	Nil	All parts of the study area were accessible by walking from existing vehicle tracks.
Survey timing, rainfall, season of survey	Minor	The survey was conducted in December 2019, which is outside the optimal timing for flora and vegetation survey in the Avon Wheatbelt region. Timing of the survey did not have an impact on the targeted search for malleefowl nesting mounds or assessment of habitat.
Disturbance that may have affected the results of survey such as fire, flood or clearing	Nil	There were no natural or human interventions that constrained the survey of the study area.

2.3 Personnel

The fauna assessment was undertaken by Jeremy Shepherdson, a biologist and environmental consultant with more than 20 years' experience in biological surveys and environmental consulting in the Goldfields, and a very good knowledge of flora and fauna of the region.

The flora assessment was undertaken by botanist Rob Sellers (*ecologia*). Rob has experience with the flora of the Swan Coastal Plain, the Geraldton Sandplains, Pilbara and Wheatbelt regions of Western Australia and has undertaken specific targeted flora and TEC/PEC surveys and mapping, including numerous Eucalyptus Woodlands of the Western Australian Wheatbelt TEC assessments for Main Roads WA.

3.0 DESKTOP SURVEY RESULTS

3.1 Climate

The study area is located within the Yilgarn region of Western Australia, a region that experiences a dry Mediterranean climate with temperate, wet winters and warm dry summers. Most of the winter rainfall is derived from frontal systems originating in the south-west.

Rainfall data from the nearest long-term (since 1984) Bureau of Meteorology (BOM) weather station were obtained from Mulgara (Station No. 12298) (BOM 2019) which is located approximately 20 km west of the study area. Rainfall in Mulgara over the 12 months prior to the survey was 73% of mean annual rainfall (328.5 mm).

Temperature data (Figure 3.1) were obtained from Southern Cross Aero BOM station (Station No. 12320) (Bureau of Meteorology 2019) which is located approximately 38 km north of the study area. Maximum daytime temperature is usually above 30°C during the summer months and minimum temperatures frequently drop below 5°C in winter.

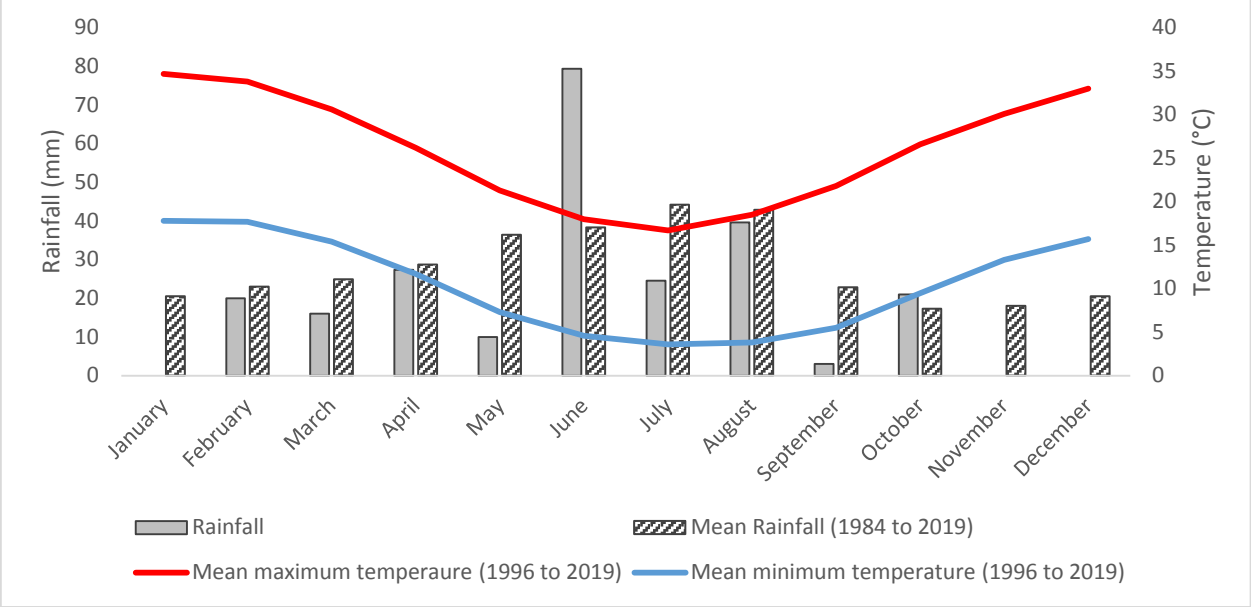

Figure 3.1: Climate data for Mulgara Station and Southern Cross airfield.

3.2 Interim Biogeographic Regionalisation for Australia

The survey area is situated at the eastern extent of the Merredin subregion (AVW01) of the Avon Wheatbelt Interim Biogeographic Regionalisation for Australia (IBRA) region. The Merredin subregion covers a total area of approximately 6,566,022 ha. The area has a dry and warm Mediterranean climate. Land use is dominated by a mixture of dryland agriculture and grazing. Undulating plain and disconnected drainage of salt lakes dissect a Tertiary plateau in Yilgarn Craton (Beecham 2001). Lateritic uplands are dominated by yellow sandplain and are vegetated with Proteacous scrub-heaths. Quaternary alluvials and eluvials contain mixed eucalypt, *Allocasuarina huegeliana* and Jam-York Gum woodlands (Beecham 2001).

The survey site is close to the boundary of the Southern Cross subregion of the Coolgardie Bioregion (COO2), therefore traits of both subregions can be expected in the study area.

3.3 Geology, land systems and soils

The study area is located in the Yilgarn Craton and its geology is dominated by Archaean sedimentary rocks and granulite-facies metamorphics.

The study area is associated with eight soil-landscape systems and comprises primarily underlying laterite covered by loamy earths, duplexes and sandplains.

Detailed discussion of the geology, land systems and soils is included in the *ecologia* report (Attachment 1).

3.4 Conservation Reserves and Nationally Important Wetlands

The Commonwealth Department of the Environment and Energy's (DoEE) Protected Matters Search Tool (DoEE 2018) and the DBCA's managed lands and waters database were queried for Ramsar Wetlands, Nationally Important Wetlands, and DBCA managed lands and waters occurring near the study area.

There are no Nationally Important Wetlands or Ramsar wetlands in the vicinity of the study area. No State and Territory Reserves are located within 10 km of the study area. The closest Nature reserve is Frog Rock located approximately 16 km to the west of the study area. The Merredin subregion (AVW02) has 1.91% of its area in conservation reserves.

3.5 Existing land uses and disturbance

Lot 451 occupies an area of approximately 1200 ha, with 647.9 ha of this being undisturbed remnant native vegetation. The remainder is active agricultural land currently used for stock grazing and cropping (Figure 1.2).

3.6 Flora and Vegetation

3.6.1 Floristic Diversity

A total of 319 vascular plant taxa (including species, infraspecific taxa, and phrase name taxa) were identified from the desktop assessment within the study area (Appendix 1 and 2), representing 43 families and 125 genera. The most diverse families are the Myrtaceae (Myrtales) (83 taxa), Fabaceae (peas) (40 taxa), Orchidaceae (orchids) (23 taxa), Asteraceae (daisies) (23 taxa) and Proteaceae (22 taxa). The most diverse genera are *Eucalyptus* (38), *Acacia* (25), *Verticordia* (12), *Eremophila* (12), *Melaleuca* (12) and *Caladenia* (11).

3.6.2 Conservation Significant Species

The NatureMap, TPFL and WAHERB database searches identified 29 conservation significant plant taxa within the 20 km buffer search area, including one Threatened species, nine Priority 1 taxa, five Priority 2 taxa, ten Priority 3 taxa and four Priority 4 taxa. The EPBC Act Protected Matters Report identified three EPBC Act listed plant species as potentially occurring within the search area.

No Threatened or Priority listed plant species have previously been recorded within the study area. Based on the close proximity of previous records and the potential presence of suitable habitat, five taxa were considered likely to occur and 26 taxa were considered possible occur within the study area. Five taxa were considered unlikely to occur due to the probable absence of suitable habitat within the study area. Table 3.1 provides the list of conservation-significant flora returned from the database searches along with the likelihood, pre- and post-survey, of the species being present. The *ecologia* report included as Appendix 1 provides more detail.

Table 3.1: Flora of conservation significance returned from the database searches.

Taxon	Status	Habitat	Flowering period	Likelihood of occurrence pre-survey	Likelihood of occurrence post-survey
Isopogon robustus	T	Skeletal grey sandy loam, laterite. Ridges.	October	Unlikely	Unlikely
Chamelaucium sp. Parker Range (B.H. Smith 1255)	P1	Unknown.	Unknown	Possible	Possible
Goodenia heatheriana	P1	Red crumbly clay, greenstone gravel and cobbles. Lower slopes, moderately exposed gently undulating plain, roadsides.	September to October	Possible	Unlikely
Hydrocotyle corynophora	P1	Damp depressions which seasonally dry into areas of red or red-brown cracking clays or clay loam.	October	Possible	Unlikely
Lepidosperma sp. Mt Caudan (N. Gibson & M. Lyons 2081)	P1	Unknown.	Unknown	Possible	Possible
Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)	P1	Unknown.	Unknown	Possible	Possible
Leucopogon validus	P1	Dry, brown, rocky sandy loam, brown-orange sandy clay, gravel, ironstone, sandstone. Low ranges, on and around exposed breakaways.	Unknown	Unlikely	Unlikely
Melaleuca grieveana	P1	Well-drained orange-brown loam, brown clay. Plains, gentle slopes, edge of crop paddocks.	July	Possible	Possible
Millotia newbeyi	P1	Red/brown loam, red clay. Undulating plains.	September	Possible	Possible
Rinzia medifila	P1	Unknown	Unknown	Possible	Possible
Acacia asepala	P2	Red-brown sandy loam. Undulating plains, along drainage lines.	August	Possible	Unlikely
Acacia concolorans	P2	Red/brown loam, clay. Low lateritic hills, flats.	July to August	Likely	Possible

Taxon	Status	Habitat	Flowering period	Likelihood of occurrence pre-survey	Likelihood of occurrence post-survey
Eutaxia lasiocalyx	P2	Red sandy loam, laterite and quartz gravel. Gentle lower slopes.	November	Possible	Possible
Lepidium merrallii	P2	Clay loam.	Unknown	Possible	Possible
Verticordia multiflora subsp. *solox*	P2	Yellow sand over gravel, sand over granite.	October to December or January	Likely	Possible
Acacia crenulata	P3	Clay, sandy clay, yellow sand. Rocky rises, granite outcrops, breakaways.	-	Unlikely	Unlikely
Acacia desertorum var. *nudipes*	P3	Yellow sand, lateritic gravel. Sandplains, flats.	August to October	Possible	Possible
Baeckea grandibracteata subsp. Parker Range (K. Newbey 9270)	P3	Clay, sandy clay, yellow sand. Rocky rises, granite outcrops, breakaways.	Unknown	Unlikely	Unlikely
Hakea pendens	P3	Stony loam. Ironstone ridges.	September	Likely	Unlikely
Lepidium genistoides	P3	Sandy loam.	September to October	Possible	Possible
Microseris walteri	P3	Dry open forest.	Unknown	Possible	Possible
Notisia intonsa	P3	Brown stony saline loams and gilgai plain; brown cracking clay	September to November	Possible	Unlikely
Rinzia torquata	P3	Yellow sand or lateritic habitats, sometimes with some clay, often in vegetation dominated by mallees, *Acacia, Allocasuarina* and *Melaleuca.*	July to October	Possible	Possible
Verticordia mitodes	P3	Yellow sand. Undulating plains.	October to January	Possible	Possible
Verticordia stenopetala	P3	Yellow sand, sometimes with gravel. Undulating plains.	October to January	Likely	Possible

Taxon	Status	Habitat	Flowering period	Likelihood of occurrence pre-survey	Likelihood of occurrence post-survey
Calamphoreus inflatus	P4	Clay loam with ironstone gravel. Flats, disturbed sites.	October to December or February to March	Likely	Unlikely
Eremophila caerulea subsp. merrallii	P4	Sand, clay or loam. Undulating plains.	October to December	Possible	Possible
Microcorys sp. Forrestania (V. English 2004)	P4	Yellow sandy clay or red-brown clay. Open woodland or cleared areas.	January to April	Possible	Possible
Stenanthemum bremerense	P4	Orange-brown sandy loam, orange-red gravelly loam, skeletal red loam, laterite, ironstone. Top or sides of outcrops and breakaways.	Unknown	Unlikely	Unlikely

3.6.3 Introduced Flora

The NatureMap database search identified eight introduced flora species within 20 km of the study area. One species, *Opuntia stricta*, is classified as a Weed of National Significance (WONS).

The Western Australian Organism List (WAOL) lists three species as 'Declared Pests' being: *Chondrilla juncea, Moraea miniata* and *Opuntia stricta*. The remaining species are listed as 'Permitted - s11' or are unlisted. Three species that have been recorded within 10 km of the study area are listed as having high ecological impact and rapid invasiveness, being: *Bromus rubens, Mesembryanthemum nodiflorum* and *Moraea miniata.* The *ecologia* report included as Appendix 1 provides more detail.

3.7 Significant Ecological Communities

The Protected Matters Search Tool database search results indicate the occurrence of the EPBC Act listed 'Eucalypt Woodlands of the Western Australian Wheatbelt' Critically Endangered Threatened Ecological Community (TEC) within and around the survey area (DoEE 2020). This is listed in Western Australia as a P3 Priority Ecological Community (PEC).

DBCA database search results also indicate the occurrence of 'Plant assemblages of the Parker Range System' state listed PEC (P3), which occurs approximately 8 km to the east of the study area.

No other TECs or PECs have been recorded within 10 km of the study area.

Table 3.2: Threatened and Priority Ecological Communities recorded within 10km of the survey area.

Name	Description
Eucalypt Woodlands of the Western Australian Wheatbelt WA listing: PEC (Priority 3) EPBC listing: Critically Endangered TEC	Eucalypt-dominated woodlands in the Western Australian Wheatbelt region as defined by the IBRA Avon Wheatbelt 1 and 2 and Western Mallee subregions with the specific exceptions of: woodlands and forests dominated by Jarrah *(E. marginata)* or Marri *(Corymbia calophylla)* where they occur without York Gum present; and non-woodland communities dominated by eucalypts, specifically those dominated by eucalypts with a mallee growth form. Community is defined primarily by its structure as a woodland. The presence in the canopy layer of eucalypt trees - most commonly salmon gum *(Eucalyptus salmonophloia),* York gum *(Eucalyptus loxophleba),* red morrel *(Eucalyptus longicornis)* or gimlet *(Eucalyptus salubris)* defines the Wheatbelt woodlands. Several of the other emergent eucalypt species which may be present as a defining species (e.g. Kondinin blackbutt *(E. kondinensis), E. myriadena,* salt river gum *(E. sargentii),* silver mallet *(E. ornata)* and mallet *(E. singularis)* are found only in the Western Australian Wheatbelt.
Plant assemblages of the Parker Range System WA listing: Priority 3	Hakea pendula Tall Shrubland is of particular significance. Eucalyptus sheathiana with *E. transcontinentalis* and/or *E. eremophila* woodland on sandy soils at the base of ridges and low rises; *E. longicornis* with *E. corrugata* and *E. salubris* or *E. myriadena* woodland on broad flats; *E. salmonophloia* and *E. salubris* woodland on broad flats; *Allocasuarina acutivalvis* and *A. corniculata* on deeper sandy soils of lateritic ridges; *E. capillosa* subsp. *polyclada* and/or *E. loxophleba* over *Hakea pendens* thicket on skeletal soils on ridges (laterites, breakaways and massive gossanous caps); and *Callitris glaucophylla* low open woodland on massive greenstone ridges.

3.8 Fauna

The NatureMap and Protected Matters Search Tool database searches returned ten fauna species of conservation significance as having previously been recorded, or considered to possibly occur within a 20 km radius of the Lot 451 survey area. Table 3.3 lists the species and the conservation code under state and federal listings. Definitions of the codes are included as Appendix 3.

A number of bird species listed under international agreements and/or as Migratory species were returned from the Protected Matters database search. These are not included in the table as there is no suitable habitat within or nearby the survey area.

Table 3.3: Conservation significant fauna returned from database searches.

Common Name	Species	WA Status	EPBC Act Status	Preferred habitat	Likelihood of occurrence	Database source
Mammals						
Western quoll, chuditch	*Dasyurus geoffroii*	T-VU S3	VU	Preferred habitat is woodland and mallee. Previously occurred throughout arid and semi-arid Australia but is now restricted to forests of south-west Western Australia.	Unlikely No prior records within the survey area.	PMST
Bilby, Dalgyte, Ninu	*Macrotis lagotis*	T-VU	VU	Known to inhabit open tussock grassland on uplands and hills; mulga woodland/shrubland growing on ridges and rises; and hummock grassland (spinifex) growing on sandplains and dunes, drainage systems, salt lake systems and other alluvial areas.	Unlikely No suitable habitat. Likely extinct from the region.	NatureMap
Black-flanked Rock-wallaby, Black-footed Rock-wallaby	*Petrogale lateralis subsp. lateralis*	T-EN	VU	Granite outcrops with caves and crevices, near permanent water sources.	Unlikely No suitable habitat within the survey area.	NatureMap
Red-tailed Phascogale, Kenngoor	*Phascogale calura*	S-CD	EN	Preferred habitat is dense, mature forests of Wandoo (*Eucalyptus wandoo*) and Sheoak (*Allocasuarina huegeliana*), which provide them with tree hollows.	Possible Suitable habitat may be present.	NatureMap
Birds						
Curlew Sandpiper	*Calidris ferruginea*	T-CR S1	CR & MI	Does not breed in Australia. Prefer mudflats in sheltered coastal areas, and ponds in salt works and sewage farms. Recorded inland around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand.	Unlikely No prior records within the survey area. PMST database states "Species or species habitat may occur in the area".	PMST
Malleefowl	*Leipoa ocellata*	T-VU S3	VU	Preferred habitat is scrubland and woodland dominated by mallee and *Acacia* species.	Possible Known habitat nearby.	NatureMap, PMST

Night Parrot	*Pezporus occidentalis*	EN	EN	Roosting and nesting sites are in clumps of dense vegetation, primarily old and large spinifex (*Triodia* spp) clumps, but sometimes other vegetation types.	Unlikely No suitable habitat.	PMST
Rainbow Bee-eater	*Merops ornatus*	-	Marine	Common and widespread species in WA, except the drier interior of the State and the far south-west. Occurs in lightly wooded sandy country, preferring areas near water. It nests in burrows excavated in sandy ground or banks, often at the margins of roads and tracks.	Possible Relatively common in the surrounding region.	PMST
Grey Wagtail	*Motacilla cinerea*	IA	MI			
Invertebrates						
Water flea (inland south west)	*Daphnia jollyi*	P1		Wetlands	Unlikely No suitable habitat	PMST
Tree-stem trapdoor spider	*Aganippe castellum*	P4	-	Flood-prone depressions and flats that support myrtaceous shrub communities.	Possible Prior records in the surrounding region.	NatureMap

4.0 FIELD SURVEY RESULTS

4.1 Flora

No EPBC Act listed 'Threatened Flora' taxa, BC Act listed 'Threatened Flora' taxa or DBCA-classified 'Priority Flora' taxa were recorded within the Study Area.

Twenty-nine conservation significant plant species were identified from TPFL and WAHERB databases within 20 km of the Study Area. Five species were considered to 'Likely' occur and nineteen species to 'Possibly' occur within the study area based on the proximity of previous records and the potential presence of suitable habitat. Potentially suitable habitat was found for eighteen of these species. While none of these taxa were recorded during this survey it is considered possible that they occur in the study area.

Habitat for the remaining eleven species was not identified in the survey area. Consequently these taxa are considered 'Unlikely' to occur. Table 3.1 provides the likelihood of occurrence post-survey for each of the species returned from the database search.

The introduced plant species *Vulpia myuros* was recorded in the study area. This species is widespread across the Wheatbelt and is not listed as a Weed of National Significance or as a declared pest.

Further detail is included in the *ecologia* report (Appendix 1).

4.2 Vegetation

Seven vegetation types were described and delineated for the study area. These included two *Allocasuarina* woodland types (AsCc, and AsMu), one shrubland type (ExAh), one *Melaleuca* and *Acacia* woodland type (MuAy), two Eucalypt woodland types (EcEr and EcEe) and one *Callitris* vegetation type (CcEc).

Each of the vegetation types and the condition is described in Table 4.1. Definitions of vegetation condition, as defined by the EPA Vegetation Scale (EPA 2016) are provided in Table 4.2. Representative photos of vegetation types can be found in the *ecologia* report (Appendix 1).

Vegetation types are shown on Figure 4.1. More detail is provided in the *ecologia* report included as Appendix 1.

4.3 Significant Vegetation

4.3.1 Threatened Ecological Communities

Vegetation potentially corresponding to the EPBC Act listed 'Eucalypt Woodlands of the Western Australian Wheatbelt' Critically Endangered TEC occurs within the Study Area. The State listed Priority 3 PEC of the same name is synonymous with the TEC. No other nationally listed TEC or State listed TEC or PEC was recorded within the study area, nor were any other vegetation types considered to be restricted or otherwise significant.

4.3.2 Eucalypt Woodlands of the Western Australian Wheatbelt TEC assessment

The Eucalypt Woodlands of the Western Australian Wheatbelt community was once the most common vegetation type occurring across the Wheatbelt of South West Western Australia, but has subsequently become fragmented and degraded due to extensive clearing for agricultural land use. The community is characterised by a complex mosaic of tree and mallet-form eucalypts over a floristically diverse native understorey. Woodlands dominated or co-dominated by mallee species, or those with very sparse tree or mallet canopy cover, are not considered to be analogous with the community. It is typically associated with flat or undulating areas, including drainage lines and saline areas, but not with granite outcrops or lateritic hills, although it may extend to the base of these landforms (Department of Environment and Energy 2015).

The vegetation types contained seven Eucalypt species: *Eucalyptus burracoppinensis*, *Eucalyptus calycogona*, *Eucalyptus capillosa*, *Eucalyptus eremophila*, *Eucalyptus leptopoda*, *Eucalyptus moderata* and *Eucalyptus rigidula*. Of these, only *Eucalyptus capillosa* is considered an indicator species for the TEC.

All of the vegetation types contain less than 70% exotic species, are considered either in "Very Good' or 'Excellent' condition and are all larger than minimum patch size requirements.

Vegetation types AsMu, CcEc and EcEe (refer to Table 4.1) each contain the minimum 10% canopy cover to be considered a mature woodland. EcEr does not.

Native understorey is present in vegetation types AsMu and EcEr but is largely absent in types CcEc and EcEe. Understorey below the woodland tree canopy in the TEC is highly variable in structure and composition. A bare to mostly bare understorey can be associated with some mallet woodlands (Department of Environment and Energy 2015) so this is not sufficient to exclude types CcEc and EcEe from the TEC assessment.

No granite outcrops, lateritic gravel hills or rocky rises were associated with the study area.

To be considered 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC, the indicator species *Eucalyptus capillosa* must be a dominant or co-dominant component of the vegetation. However this is not the case for any of the vegetation types identified in this survey, therefore none of the vegetation types meet all of the assessment criteria to be considered Eucalypt Woodlands of the Western Australian Wheatbelt TEC. Table 4.3 provides assessment against each of the TEC criteria.

Table 4.1: Vegetation descriptions and condition.

Vegetation type	Description	Condition (EPA 2016)	'Eucalypt woodlands' TEC potentially present	Area ha (%)
AsCc	*Allocasuarina spinosissima. +/- Callitris columellaris.* woodland with isolated to open woodland of *Eucalyptus rigidula and Eucalyptus burracoppinensis*, over *Melaleuca glaberrima, ?Thryptomene kochii, ?Micromyrtus sp.* sparse shrubland.	Excellent	No	26.4 (4%)
AsMu	*Allocasuarina spinosissima and Melaleuca uncinata* woodland with scattered *Eucalyptus capillosa +/- Eucalyptus eremophila* over *+/-Melaleuca glaberrima and ?Thryptomene kochii* shrubland.	Excellent	No	411.0 (63%)
CcEc	*Callitris columellaris, Eucalyptus capillosa* woodland with almost no understory.	Very Good	No	7.7 (1%)
EcEe	*Eucalyptus calycogona +/- Eucalyptus eremophila, Eucalyptus moderata, Eucalyptus capillosa woodland with almost no understory.*	Very Good	No	31.5 (4.9%)
EcEr	*Eucalyptus rigidula, Eucalyptus calycogona* open woodland to isolated mallees *+/- Santalum acuminatum,* over *?Thryptomene kochii +/- Microcybe multiflora subsp. multiflora, +/-Phebalium tuberculosum* shrubland.	Excellent	No	20.3 (3%)
ExAh	*Exocarpus aphyllus, Acacia hemiteles, Melaleuca glaberrima +/- Melaleuca cordata* shrubland.	Very Good to Excellent	No	24.0 (4%)
MuAy	*Melaleuca uncinata* and *Acacia yorkrakinensis* subsp. *acrita +/- Callitris columellaris woodland with isolated Eucalyptus eremophila*, *Eucalyptus calycogona +/- Eucalyptus leptopoda*, *over Melaleuca glaberrima*, *Melaleuca cordata* and *?Micromyrtus* sp. shrubland.	Excellent	No	127.0 (20%)

Table 4.2: Vegetation condition scale (Environmental Protection Authority 2016).

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

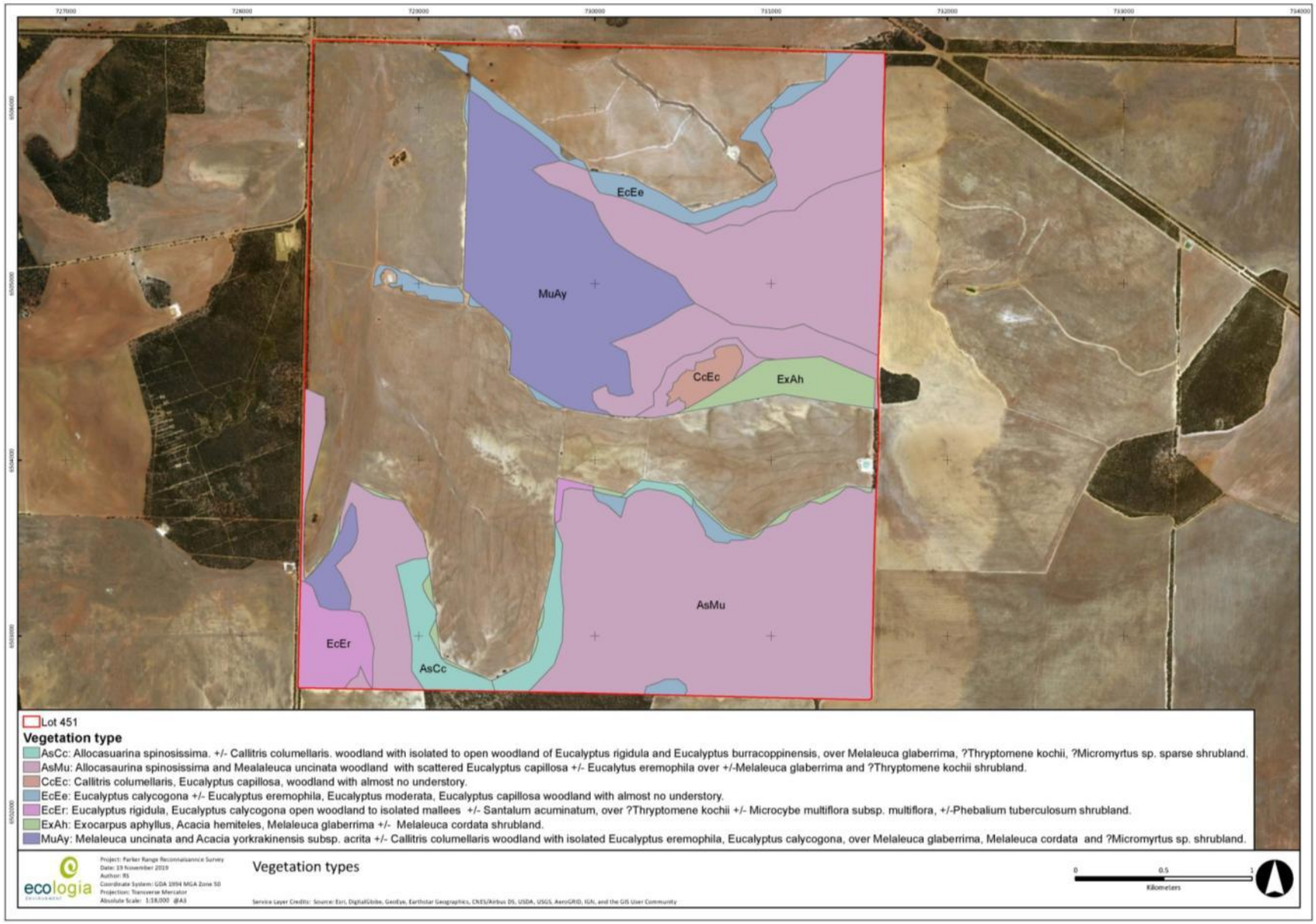

Figure 4.1: Vegetation types in the survey area.

Table 4.3: Eucalypt Woodland of the Western Australian Wheatbelt TEC assessment

Patch type	Sample site	Indicator species present	Canopy Cover (%)	Total patch area (ha)	Indicator Eucalypt species dominance	Approx. native understorey species richness	Native understory cover (%)	Weed cover (%)	Weed cover proportion of total (%)	Soil Colour	Soil Type	Landform	Outcropping presence and type	Vegetation condition (Keighery 1994)	Dominant overstorey species/vegetation type.	Dominant native understorey species	DoEE condition category
AsMu	PR03, PR04, PR08	*Eucalyptus capillosa*	>10	411	No	<10	1 to 20	<1	<1	Grey - red	Sandy loam	Undulating plain	None	Excellent	*Allocasuarina spinosissima, Melaleuca uncinata*	*Melaleuca glaberrima* and *?Thryptomene kochii*	NA
CcEc	P10, P11	*Eucalyptus capillosa*	>10	7.7	No	<5	<1	<1	<1	Grey - red	Sandy loam	Undulating plain	None	Very Good	*Callitris columellaris, Eucalyptus capillosa*	*?Thryptomene kochii*	NA
EcEe	PR01, PR02	*Eucalyptus capillosa*	>10	31.5	No	<5	<1	<1	<1	Grey - red	Sandy loam	Undulating plain	None	Very Good	*Eucalyptus capillosa, Melaleuca uncinata*	*Melaleuca cordata*	NA
EcEr	P20, P21	*Eucalyptus capillosa*	<10	10.3	No	>20	30	<1	<1	Grey - red	Sandy loam	Undulating plain	None	Excellent	*Eucalyptus rigidula, Eucalyptus calycogona*	*?Thryptomene kochii, Microcybe multiflora* subsp. *Multiflora*	NA

4.4 Fauna and Habitat

Fauna habitat was assessed in the study area to assist in determining the likelihood of presence of conservation significant species identified during the desktop review.

4.4.1 Malleefowl

The assessment included ground-truthing of potential nesting mounds constructed by malleefowl (*Leipoa ocellata*, VU), returned from a LIDAR survey of the area. The LIDAR survey had returned 21 potential mounds in and around the Lot 451 survey area. Coordinates of each were provided and each site in, or close to, the survey area was investigated. Five potential mounds located outside the survey area, and in active cleared pastoral areas, were not investigated. Based on investigation of similar sites within the Lot 451 survey area these were considered highly unlikely to be mounds.

In addition to the sites outside the survey area, nine of the potential mounds identified by the LIDAR survey were found not to be mounds. These were generally vegetation in a mounded form or disturbance resulting from pastoral activity. One of these sites appeared to be a recently active dog den.

Two mounds additional to the LIDAR sites were located during the foot traverse. One of these, "MFRecent01", is thought to have been active within the last 12-18 months. "MFExt01" was considered to be an extinct mound.

In total, eight inactive malleefowl mounds were located. Most are long unused (greater than 5 years). Three of the mounds retained a shallow crater-like shape with no vegetation present, suggesting activity within the last 12 – 18 months (National Malleefowl Recovery Team 2016).

Table 4.4 provides details of the outcome of the ground-truthing exercise. Figure 4.2 shows the location of the sites. Photographs of each of the sites investigated are included as Appendix 4.

Table 4.4: Results of ground-truthing of potential malleefowl mounds.

Reference	Coordinate (WGS84, Zone 50)	Status	Comment
MF01	729065 6506872	Not investigated	Unlikely to be a mound due to location.
MF02	729033 6506410	Not investigated	Unlikely to be a mound due to location.
MF03	730672 6506688	Not investigated	Unlikely to be a mound due to location.
MF04	729021 6505010	Not a mound	Vegetation and sand bank.
MF05	730812 6505457	Not a mound	Vegetation.
MF06	731670 6505659	Not a mound	Vegetation and contour bank in paddock.
MF07	730491 6504771	Malleefowl mound	Inactive. Possibly active in the last 12 – 18 months.
MF08	731335 6504919	Malleefowl mound	Inactive. Long unused.
MF09	728583 6503728	Not a mound	Vegetation, possible dog den.
MF10	728725 6503507	Malleefowl mound	Inactive. Long unused, possibly extinct
MF11	729096 6503084	Not a mound	Vegetation.
MF12	729063 6503224	Not a mound	Vegetation and large ant colony.

MF13	729085 6503209	Not a mound	Vegetation and large ant colony.
MF14	731415 6503547	Malleefowl mound	Inactive. Possibly active in the last 12 – 18 months.
MF15	729121 6502910	Not a mound	Vegetation.
MF16	729121 6502901	Not a mound	Vegetation.
MF17	729629 6502526	Malleefowl mound	Inactive. Long unused.
MF18	730855 6502849	Malleefowl mound	Inactive. Long unused.
MF19	730285 6502225	Not investigated	Unlikely to be a mound due to location.
MF20	728279 6506600	Not investigated	Unlikely to be a mound due to location.
MF21	728860 6503586	Malleefowl mound	Inactive. Long unused.
MFRecent01	731235 6505761	Malleefowl mound	Inactive. Possibly active in the last 12 – 18 months.
MFExt	731461 6504896	Malleefowl mound	Extinct

Suitable malleefowl habitat, comprising tall *Acacia*, *Melaleuca* and *Allocasuarina* shrubland, exists throughout much of the surveyed area. All LIDAR sites determined to be malleefowl mounds were located in vegetation type AsMu (*Allocasuarina spinosissima* and *Melaleuca uncinata* woodland with scattered Eucalypts), which occupies 411 ha (63%) of the vegetated area of Lot 451 (refer to Table 4.1 and Figure 4.1). Vegetation of this habitat was considered to be in Excellent condition (refer to Table 4.2) with very little disturbance, no evidence of grazing and no evidence of recent burning.

Vegetation type MuAy (*Melaleuca uncinata* and *Acacia yorkrakinensis* subsp. *acrita* +/- *Callitris columellaris* woodland) may also provide suitable nesting habitat for malleefowl, although none of the confirmed mounds were located within this vegetation type. This vegetation type was also considered to be in Excellent condition and occupies a further 127 ha (20%) of the vegetated area of Lot 451.

Further investigation of the probable vegetation types in remnant vegetation in the surrounding area indicates quite extensive habitat that is possibly suitable for malleefowl, based on pre-European vegetation mapping. Figure 4.3 shows the extent of vegetation that is considered potentially suitable as malleefowl habitat in the area immediately surrounding Lot 451. The area of potentially suitable habitat within a 10 km radius of Lot 451 is approximately 13,300 ha. While much of the original malleefowl habitat has been cleared for agriculture, there are corridors of remnant vegetation linking many of the larger vegetated areas (refer to Figure 4.3). Malleefowl are also known to traverse paddocks and other cleared areas while foraging. It is therefore considered likely that a malleefowl population could be supported by suitable habitat available in the remnant vegetation within and surrounding Lot 451.

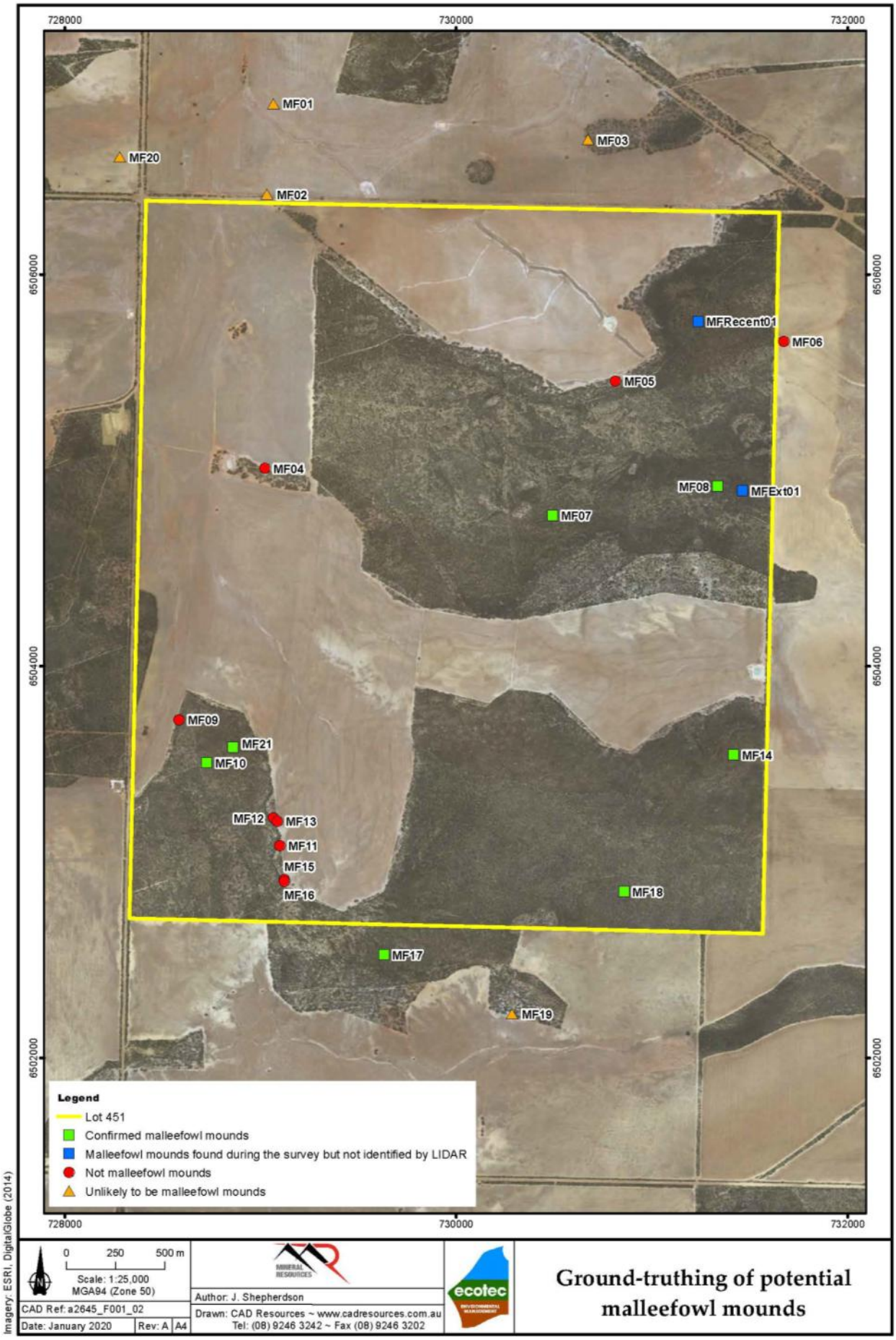

Figure 4.2: Results of ground-truthing of potential malleefowl mounds.

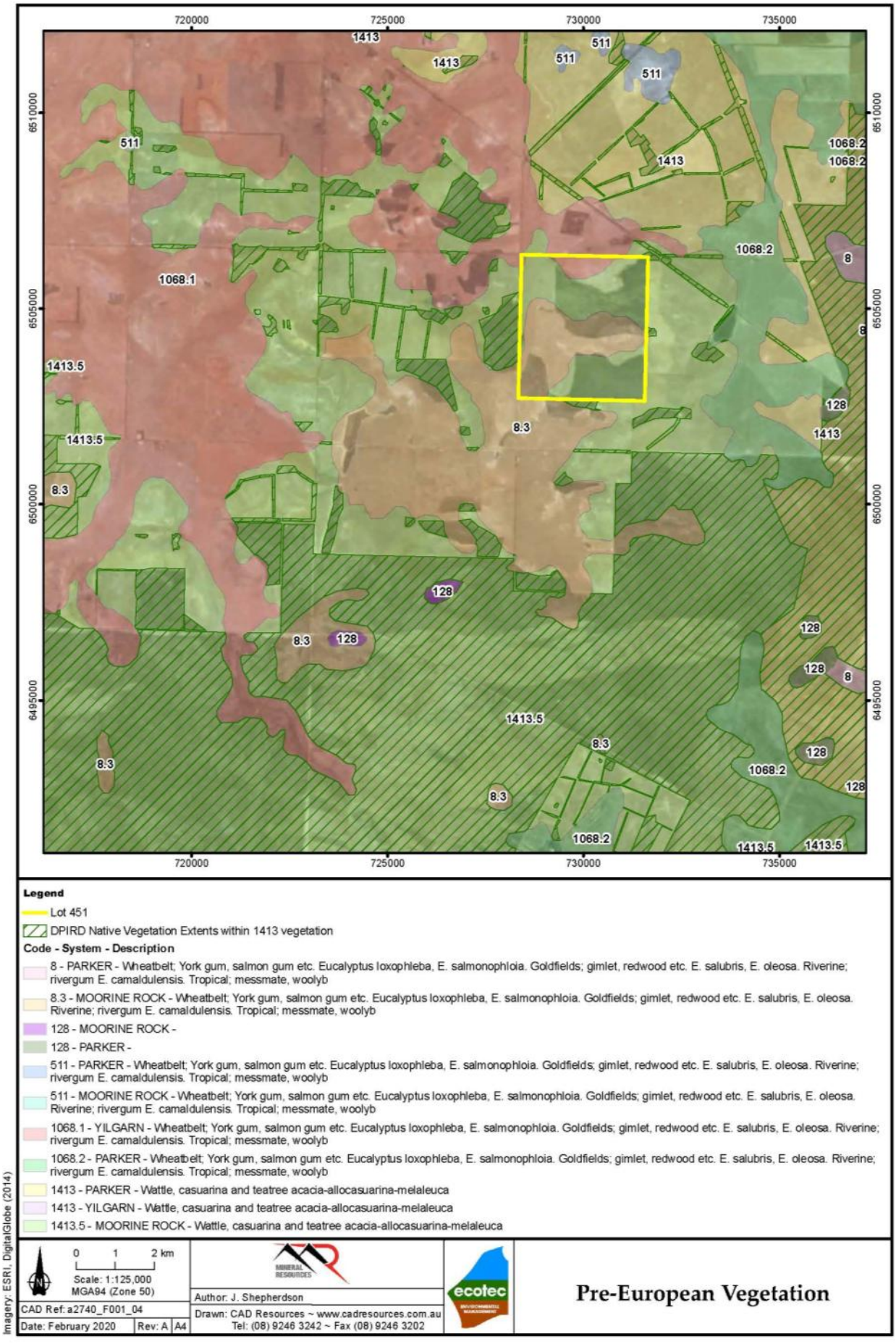

Figure 4.3: Potential malleefowl habitat (shaded green) surrounding Lot 451.

4.4.2 Tree-stem Trapdoor Spider

The tree-stem trapdoor spider (*Agnipe castellum, P4*) was returned in the desktop search as potentially inhabiting the survey area. The preferred habitat of the species for construction of burrows is flood-prone depressions and flats that support myrtaceous shrub communities. The tree-stem trapdoor spider constructs a burrow with a hinged "trapdoor" at the base of a tree or shrub and camouflages it with leaves and twigs, making them difficult to find.

A brief search of an area identified as potentially suitable for the species (Photograph 4.4) was undertaken during the field survey. Two abandoned burrows were located as well as one that appeared to be active (Photograph 4.2 and Photograph 4.3).

Figure 4.4 shows the area of habitat identified as being suitable for *A. castellum*, which partly coincides with an area of vegetation type CcEc, *Callitris columellaris*, *Eucalyptus capillosa* woodland with almost no understory (Figure 4.1). There is other potentially suitable habitat for *A. castellum* within Lot 451 and a large widespread population of the species is possible.

Photograph 4.1: Potentially suitable habitat for *A. castellum*.

Photograph 4.2: Potentially active *A. castellum* burrow with trapdoor closed.

Photograph 4.3: Potentially active *A. castellum* burrow with trapdoor open.

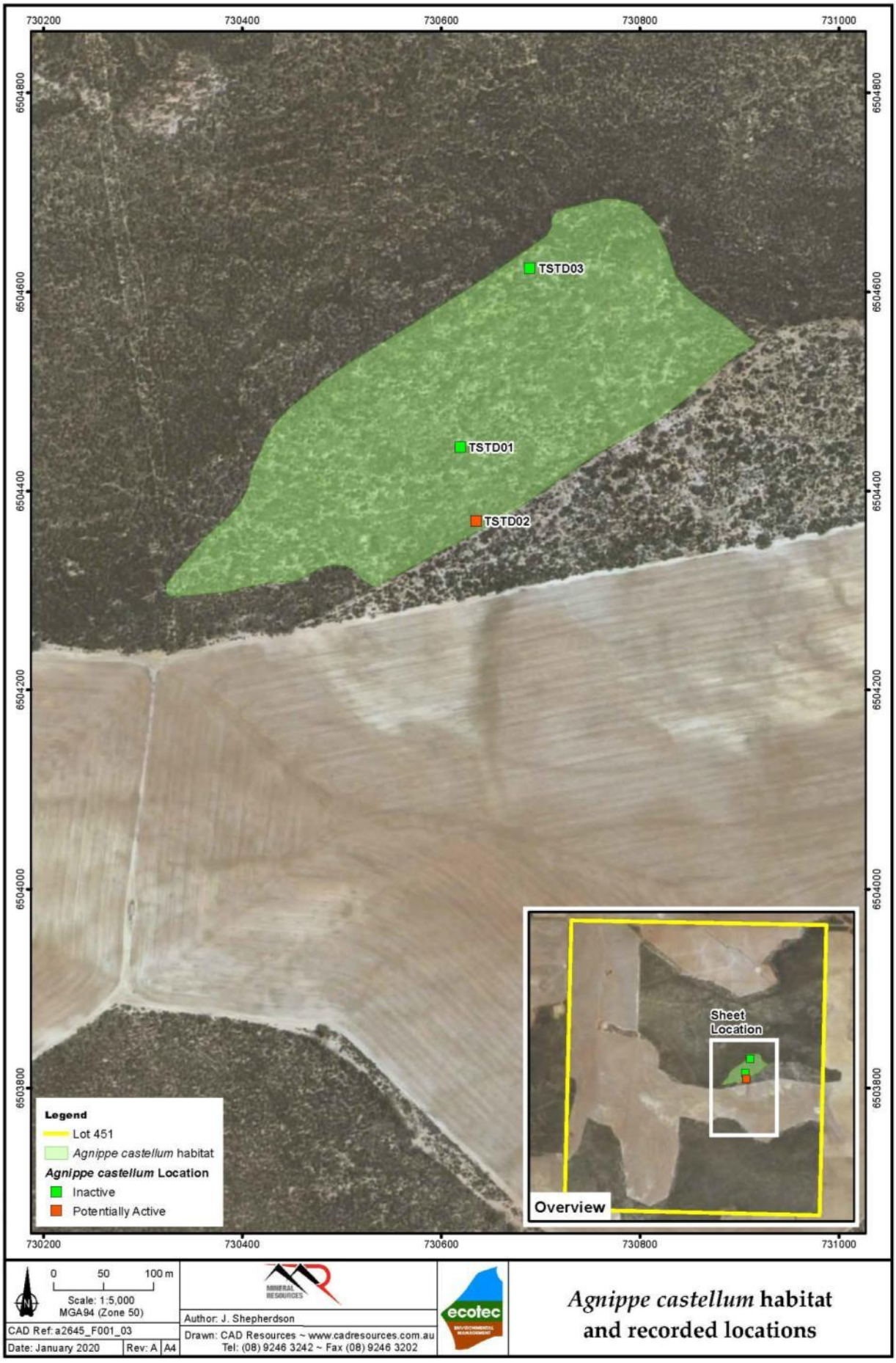

Figure 4.4: *A. castellum* habitat and recorded locations.

4.4.3 Other conservation-significant species

There was no evidence observed during the survey of any of the other conservation-significant fauna returned from the database searches (Table 3.3).

The survey area provides some suitable nesting habitat for the Western rosella (no longer listed as a conservation-significant species), being open Eucalypt forest and timbered areas, including cultivated land and orchards (Department of Environment and Conservation [DEC] 2009). The area of suitable nesting habitat is restricted to the EcEe vegetation type (Eucalypt woodland). There are larger areas of suitable nesting habitat in the surrounding area and, being highly mobile, it is possible the Western rosella may utilise suitable habitat within Lot 451 as part of a larger range. Common food items for the species include seed and nectar from a variety of native trees including *Eucalyptus* and *Casuarina*, as well as weed species (DEC 2009). As such, potentially suitable foraging habitat exists within and surrounding the Lot 451 survey area.

While not listed as a conservation-significant species, the survey area provides suitable nesting and foraging habitat for the white-browed babbler (*Pomatostomus superciliosus*), which was observed during the survey. The species is quite common in the Goldfields Region.

The rainbow bee-eater is considered likely to be seasonally present in the area. Suitable nesting habitat (sand banks forming drains, windrows and dam walls) is present around the perimeter of the vegetated areas and in the surrounding area.

Potentially suitable habitat exists for the red-tailed phascogale, being mature Eucalypt and *Allocasuarina* woodlands, however this is probably restricted to vegetation type EcEe, which occupies only 31.5 ha (4.9%) of the vegetated area of Lot 451.

There is no suitable habitat present for the black-flanked rock wallaby.

The bilby is believed extinct from the region and no suitable habitat exists.

There is insufficient suitable habitat present to support a chuditch population.

There is no suitable habitat present for the night parrot or any of the migratory/marine species returned in the database searches.

4.5 Introduced fauna

Evidence of dog activity was observed in several locations throughout the survey area. Scats and two potential pupping dens were observed. Both dens had sheep bones littered around the area (Photograph 4.4 and Photograph 4.5).

Foxes and cats, as well as rabbits are likely to be present in the area.

Photograph 4.4: A dog den located during the survey with sheep bones and scats present.

Photograph 4.5: A dog den at location MF09 with scats and sheep bones present.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 Flora

No EPBC Act listed 'Threatened Flora' taxa, BC Act listed 'Threatened Flora' taxa or DBCA-classified 'Priority Flora' taxa were recorded within the Study Area. Twenty-nine conservation significant plant species were identified from TPFL and WAHERB databases within 20 km of the Study Area. Five species were considered 'Likely' to occur and nineteen species to 'Possibly' occur within the study area based on the proximity of previous records and the potential presence of suitable habitat. Potentially suitable habitat was found for eighteen of these species. Although no conservation significant taxa were recorded, it is still considered possible that they occur in the study area. Habitat for the remaining eleven species was not identified in the survey area, consequently these taxa are considered 'Unlikely' to occur. Table 3.1 provides the conservation significant flora returned from the database searches and likelihood of occurrence in the survey area.

One introduced plant species, *Vulpia myuros*, was recorded in the study area. This species is widespread across the Wheatbelt and is not listed as a Weed of National Significance (Department of Environment and Energy 2019) or as a declared pest (Department of Agriculture and Food Western Australia 2016). Introduced flora species density was very low in all vegetation types (<1%).

If further work is required to determine the presence of conservation significant flora in the Lot 451 area, it is recommended that a survey be undertaken in later winter or early spring, preferably following substantial rainfall.

5.2 Vegetation

Seven vegetation types were described and delineated for the study area. Approximately 96% of the study area was considered open woodland or woodland, which was dominated by *Allocasuarina* woodland (67.5%) and *Melaleuca* and *Acacia* woodland (19.6%). Eucalypt woodland accounted for 8% of the study area.

Vegetation condition within *Allocasuarina* woodland, *Melaleuca* woodland, *Acacia* woodland and Eucalypt woodland EcEr was considered 'Excellent'. Native understorey was almost absent in vegetation types CcEc, EcEe and parts of ExAh. These areas occurred primarily adjacent to exclusion fencing that keeps out livestock in neighbouring agricultural land. It was not possible to tell the cause of this absence of understorey, consequently these areas were considered minorly disturbed and to be in 'Very Good' condition. However, understorey below the woodland tree canopy can be highly variable in structure and composition, a bare to mostly bare understorey can be associated with some mallet woodlands (Department of Environment and Energy 2015) which may be the case in the study area. Shrubland vegetation (ExAh) covering 3.7% of the study area contained highly variable groundcover and was also considered to be in 'Very Good' condition.

Four vegetation types identified from the study area supported *Eucalyptus capillosa*, an indicator species of 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC (Department of Environment and Energy 2015). In order to be considered 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC, vegetation must have at least 10% cover and indicator species must be dominant. Eucalyptus capillosa was not dominant in any of the vegetation types recorded in this survey. As a consequence, none of the vegetation types associated with the study area are considered to meet the criteria for classification as the 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC.

5.3 Conservation significant fauna

Eight inactive malleefowl mounds were located within the Lot 451 survey area, two of which had not been identified by the LIDAR survey. Two of the mounds are considered likely to have been active within the last 12 – 18 months. The remainder are long unused with several considered to be extinct or verging on being extinct. It is not surprising that no recent activity was observed at the time of the survey as the survey area displayed evidence of drought

impact at the time of the site assessment. Drought conditions have been experienced throughout the region over the last two years and have resulted in a decrease in malleefowl activity across the Goldfields and Wheatbelt (pers. comm. Eddy Cannella, Biostat Pty Ltd). The vegetation of the Lot 451 area was considered to be in Very Good to Excellent condition and it is considered highly likely that malleefowl will re-occupy the area when conditions are more suitable.

Given that two of the mounds located during the survey had not been identified by the LIDAR survey, it is possible that there are other mounds in the remnant vegetation of Lot 451. Further refinement and analysis of the LIDAR data based on the results of the ground truthing exercise may reveal additional targets to be investigated.

5.4 Habitat

Suitable habitat for malleefowl exists over much of Lot 451, accounting for more than 60% of the vegetated area. Potentially suitable habitat occupies an additional 20% of the vegetated area. Based on broad pre-European vegetation mapping, there are substantial areas of potentially suitable malleefowl nesting habitat to the south and east of the site, with more than 13,000 ha of potentially suitable habitat existing within a 10 km radius of Lot 451. Although the remnant vegetation in Lot 451 is somewhat isolated, being largely surrounded by cleared agricultural land, there are corridors of vegetation and relatively short distances of cleared land between the larger areas of remnant vegetation. Malleefowl are undoubtedly capable of crossing these open areas to access suitable habitat and are known to eat cultivated grain, so quite likely to forage seasonally in the pastoral areas.

If it is decided that Lot 451 is a suitable offset for the Parker Range Project, the following management actions will assist in maintaining and potentially improving suitable malleefowl habitat:

- Maintain and improve fencing around the vegetated area to exclude grazing stock
- Engage a suitable service provider to undertake an ongoing feral dog, fox and cat control program
- Undertake rehabilitation of the cleared pastoral area between the two existing areas of remnant vegetation, using suitable species, to create a vegetated corridor. This will improve connectivity and eventually increase the area of suitable habitat.

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Appendix 1

Reconnaissance Flora Survey and TEC Assessment - *ecologia*

FEBRUARY 2020

Providing sustainable environmental strategies,
management and monitoring solutions
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ENVIRONMENT

ECOTEC (WA) PTY LTD
MRL PARKER RANGE
RECONNAISSANCE FLORA SURVEY AND TEC ASEESSMENT

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Document Status						
Rev.	**Author(s)**	**Reviewer**	**Date**	**Approved for Issue**		
				Name	**Distributed To**	**Date**
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2	Rob Sellers	S Grein	17/02/2020	S Grein	J Shepherdson	17/02/2020

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EXECUTIVE SUMMARY

The Mineral Resources Limited (MRL) Parker Range Iron Ore Project is located approximately 52 km south of Southern Cross in the Yilgarn region of Western Australia. As a requirement of approval Condition 10 of Ministerial Statement 892 (MS892) MRL was required to establish the Parker Range Conservation Trust and acquire land suitable for rehabilitation to offset the residual impacts to conservation significant flora and fauna associated with the Parker Range Iron Ore Project. MRL has identified Lot 451 as a potential property to develop in order to meet offset requirements. Lot 451 is 1195 ha grazing property with fenced-off vegetation located approximately 37 km south of Southern Cross and 15 km east of the Parker Range Iron Ore Project. Ecotec (WA) Pty Ltd (Ecotec) was commissioned to confirm environmental values of the approximately 648 ha vegetated section of Lot 451. Ecotec on behalf of MRL commissioned Ecologia Environment (*ecologia*) to conduct a Reconnaissance Flora Survey and 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC assessment of the vegetated section of Lot 451 to confirm its suitability as an offset area.

To this end, the following were provided as part of this assessment:

- A desktop study to evaluate biological values of the study area and surrounds, including a review of existing environmental values, threatened and priority flora and community databases, and other relevant available literature;
- A flora, vegetation and conservation significant flora survey of the study area by way of a single-phase, Reconnaissance Flora and Vegetation Survey;
- An inventory and map of conservation significant species recorded within the study area, and the local and regional distribution of these species where data are available;
- Description and mapping of vegetation types within the study area;
- Assessment and mapping of the vegetation condition within the study area.

The flora and vegetation survey was conducted by one *ecologia* botanists on the 16th and 17th of December 2019. The survey was conducted primarily by sampling vascular plant species in a series of traverses, along which changes in vegetation type and disturbance were periodically noted.

No EPBC Act listed 'Threatened Flora' taxa, BC Act listed 'Threatened Flora' taxa or DBCA-classified 'Priority Flora' taxa were recorded within the study area.

One introduced plant species was recorded in the study area *Vulpia myuros.* This species is widespread across the wheatbelt and is not listed as a Weed of National Significance (Department of Environment and Energy 2019) or as a declared pest (Department of Agriculture and Food Western Australia 2016).

Seven vegetation types were described and delineated for the study area. Approximately 96% of the study area was considered open woodland or woodland, which was dominated by *Allocasuarina* woodland (67.5%) and *Melaleuca* and *Acacia* woodland (19.6%). Eucalypt woodland accounted for 8% of the study area. Vegetation condition was considered 'Excellent' in 90.2% of the study area, 'Very Good' to 'Excellent' in 3.7%, and 'Very Good' in 6.1%.

Four vegetation types recorded in the study area contained *Eucalyptus capillosa*, which an key indicator species of 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC (Department of Environment and Energy 2015). In order to be considered the Eucalypt Woodlands TEC, the community must have at least 10% crown cover of the tree canopy, must contain one or more tree species identified as key indicators, and contra-indicator species must not dominant or co-dominant in the canopy. Although *Eucalyptus capillosa* was present within these vegetation types (and co-dominant within EcEr), it tended to be co-dominant with mallee species (*Eucalyptus calycogona, Eucalytus leptopoda* and *Eucalyptus moderata*) that are contra-indicators of the Eucalypt Woodlands TEC, and therefore represent a different vegetation type to the TEC. As a consequence, none of the vegetation types associated with the study area are considered to meet the criteria for classification as the **'**Eucalypt Woodlands of the Western Australian Wheatbelt**'** TEC.

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ACRONYMS AND INITIALISMS

BAM Act	*Biosecurity and Agriculture Management Act* 2007
BC Act	*Biodiversity Conservation Act* 2016
BOM	Bureau of Meteorology
CALM	Department of Conservation and Land Management (now DBCA and DWER)
DAFWA	Department of Agriculture and Food Western Australia
DBCA	Department of Biodiversity, Conservation and Attractions (previously DPaW)
DEC	Department of Environment and Conservation (now DBCA)
DWER	Department of Water and Environmental Regulation
DoEE	Department of the Environment and Energy (previously DSEWPaC)
DPaW	Department of Parks and Wildlife (now DBCA)
DPIRD	Department of Primary Industries and Regional Development (previously DAFWA)
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DoEE)
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESCAVI	Executive Steering Committee for Australian Vegetation Information
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for Conservation of Nature
NVIS	National Vegetation Information System
PEC	Priority Ecological Community
TEC	Threatened Ecological Community
TPFL	Threatened and Priority Flora List database
TPFR	Threatened and Priority Flora Report form
WA	Western Australia
WAH	Western Australian Herbarium
WAHERB	Western Australian Herbarium Specimen Database
WAOL	Western Australian Organism List
WONS	Weeds of National Significance

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1 INTRODUCTION

1.1 PROJECT BACKGROUND

The Mineral Resources Limited (MRL) Parker Range Iron Ore Project is located approximately 52 km south of Southern Cross in the Yilgarn region of Western Australia. In accordance with Condition 10 of Ministerial Statement 892 (MS892) MRL is required to set up the Parker Range Conservation Trust and acquire land suitable for rehabilitation to offset the residual impacts to conservation significant flora and fauna associated with the Parker Range Iron Ore Project. MRL has identified Lot 451 as a potential property to develop in order to meet offset requirements. Lot 451 is a 1195 ha grazing property with fenced-off vegetation located approximately 37 km south of Southern Cross and 15 km east of the Parker Range Iron Ore Project. Ecotec (WA) Pty Ltd (Ecotec) was commissioned to confirm environmental values of the approximately 648 ha vegetated section of Lot 451. Ecotec in turn commissioned Ecologia Environment (*ecologia*) to conduct a Reconnaissance Flora Survey and 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC assessment of the vegetated section of Lot 451.

To this end, the following were provided as part of this assessment:

- A desktop study to evaluate biological values of the study area and surrounds, including a review of existing environmental values, threatened and priority flora and community databases, and other relevant available literature;
- A flora, vegetation and conservation significant flora survey of the study area by way of a single-phase, Reconnaissance Flora and Vegetation Survey;
- An inventory and map of conservation significant species recorded within the study area, and the local and regional distribution of these species where data are available;
- Description and mapping of vegetation types within the study area;
- Assessment and mapping of the vegetation condition within the study area.

1.2 LEGISLATIVE AND REGULATORY FRAMEWORK

The survey was designed and undertaken to comply with the following guidance documents:

- Environmental Factor Guideline: Flora and Vegetation (EPA 2016a);
- Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016b); and
- Approved Conservation Advice (including listing advice) for the Eucalypt Woodlands of the Western Australian Wheatbelt (Department of Environment and Energy 2015).

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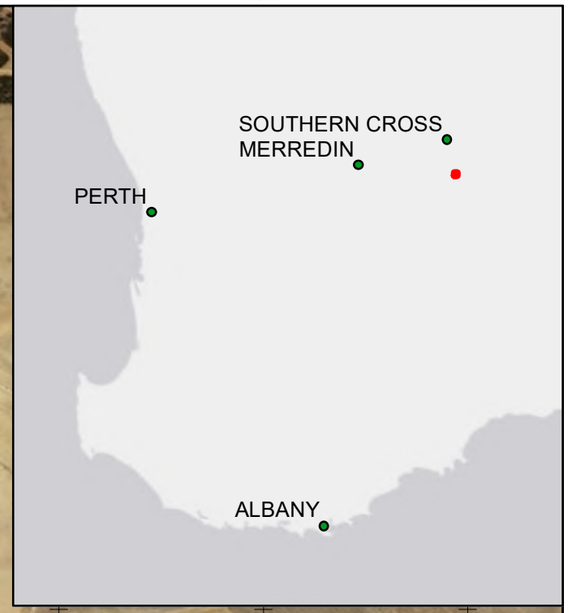

Lot 451

Project: Parker Range Reconnaisannce Survey
Date: 9 November 2019
Author: RS
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Absolute Scale: 1:15,000 @A3

Figure 1.1 Study Area

0 0.4 0.8
Kilometers

2 METHODOLOGY

2.1 DESKTOP STUDY

The methodology adopted for the desktop study was consistent with that recommended by Environmental Protection Authority (2016c). A review of background environmental information for the study area was undertaken, including climate (BoM), biogeography (IBRA 7) (Department of Sustainability Environment Water Population and Communities 2012), soils (Department of Primary Industries and Regional Development 2016), and pre-European vegetation (Shepherd *et al.* 2001).

Searches of the databases listed in Table 2.1 and a review of other relevant surveys were conducted to construct a list of conservation significant species and ecological communities previously recorded within or in the vicinity of the study area. The criteria listed in Table 2.2 were then applied to determine the likelihood of occurrence of significant species and communities occurring within the study area given the likely landforms and broad habitats present.

Table 2.1: Databases queried for the desktop study.

Database	Search details
EPBC Act Protected Matters database	Records of matters of national significance under the EPBC Act within a 10 kilometre (km) search buffer.
DBCA Threatened and Priority Flora Database (TPFL) and Western Australian Herbarium Specimen Database (WAHERB)	Conservation significant plant species within a 20 km search area.
DBCA NatureMap database	All plant species records within a 20 km search buffer

Table 2.2: Criteria used to assess the likelihood of occurrence of conservation significant species and communities.

Rating	Criterion
Recorded	The species/community has been recorded within the study area previously or during the current survey.
Likely	The species/community is likely to occur within the study area as suitable habitat is known to be present and there are existing records very close to the study area (within ca. 10 km).
Possible	The species/community may occur within the study area as there are existing records in the vicinity of the study area, and suitable habitat is likely to be present; OR The species/community may occur within the study area as there is insufficient information available to exclude the possibility of occurrence.
Unlikely	The species/community is unlikely to occur within the study area as suitable habitat is not present or is not likely to be present; OR Suitable habitat is present within the study area, but the taxon/community has not been recorded despite reasonable survey effort.
Does not occur	The community is an existing regionally mapped vegetation association (e.g. Shepherd et al. 2011) or land system which does not occur within the study area.

2.2 FLORA AND VEGETATION

2.2.1 Survey Timing and Methodology

The reconnaissance flora and vegetation survey and targeted conservation significant flora survey was conducted by one *ecologia* botanists on the 16th and 17th of December 2019. Survey methodologies were in accordance with the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority 2016c). The survey was conducted primarily by sampling vascular plant species in a series of traverses, along which changes in vegetation type and disturbance were periodically noted, which were supplemented by opportunistic records. Opportunistic floristic records collected during traverses are a time efficient approach to maximising the floristic inventory and increasing the probability of locating taxa of potential significance.

2.2.2 Sampling

Changes in geomorphological and floristic composition during traverses were noted as site locations. At each location the following were recorded: GPS coordinates, photograph of vegetation, dominant growth form, height, cover and up to three species for the three traditional strata (upper, mid and ground) compatible with NVIS Level V (Executive Steering Committee for Australian Vegetation Information 2003), landform and soil type, vegetation condition (Table 2.3) and description of disturbance, and additional information to assist vegetation classification, including slope, aspect, rock type and abundance, and fire history.

2.2.3 Conservation Significant Species

Threatened and Priority flora species identified during the desktop study were targeted during the field survey, based on previous known locations and habitat preferences. The targeted survey involved searches for species within potential suitable habitat during traverses walked between sites. Where conservation significant species were observed the following parameters were recorded: recorder and date; location (for individual or localised plants) or population boundary (for more extensive populations, time permitting); number of plants (count, for individual or localised plants) or estimated number of plants for more extensive populations; reproductive state; vegetation type; and landform.

2.2.4 Specimen Identification and Vouchering

Plant specimen identification was undertaken with reference to current taxonomic literature and herbarium reference specimens. Scientific names used in this report follow the species concepts currently adopted by the Western Australian Herbarium. Specimens that were believed to differ significantly from typical material were indicated with 'affinity' (aff.). Specimens that could not be definitively identified to genus or species level due to the absence of reproductive material required for positive identification were indicated with a question mark but were not considered to be otherwise anomalous.

2.2.5 Vegetation Characterisation

Vegetation descriptions were determined using structural vegetation classification of up to three dominant species from the three traditional strata (upper, mid and ground) compatible with NVIS Level V (Executive Steering Committee for Australian Vegetation Information 2003).

2.2.6 Vegetation Mapping

Data collected from sampling sites, in addition to other field observations, were consolidated to decribe and map vegetation units within the study area. Vegetation units were described and mapped based on the dominant species present in the three traditional strata (if present), consistent with NVIS Level V. Extrapolative vegetation mapping based on aerial imagery and ground-truth data was used to map the described vegetation units within study area. Mosaic units were mapped in cases where two

or more vegetation units occurred in a pattern too detailed to map separately at the mapping scale being applied.

Table 2.3: EPA Vegetation Condition Scale (Environmental Protection Authority 2016c)

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

2.2.7 Eucalypt Woodlands of the Western Australian Wheatbelt TEC Assessment

Based on the results of the desktop study, the EPBC Act-listed 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC, including the equivalent DBCA listed Priority 3 PEC, was identified as potentially occurring within the survey area. Four primary criteria are used to identify the vegetation potentially representing the TEC (Department of Environment and Energy 2015):

1. The distribution of the ecological community is limited to the following IBRA Regions and subregions:
    a. Avon Wheatbelt (AVW01 and AVW02 subregions)
    b. Mallee (MAL02 subregion only)
    c. Jarrah Forest (JAF01 and JAF02 adjacent to Avon Wheatbelt)
2. The structure of the ecological community is a woodland in which the minimum crown cover of the tree canopy in a mature woodland is 10% (crowns measured as if they are opaque).
3. One or more of the tree species identified as key indicators are dominant or co-dominant within a patch of the ecological community. If other (contra-indicator) species are present in the tree canopy, then these collectively do not occur as dominants in the tree canopy.
4. A native understorey is present but can be of variable composition.

In addition, woodland patches must also satisfy several criteria based on their condition, with the intention that highly degraded and degraded patches are excluded from any requirement for protection. For vegetation in Degraded to Good or better condition (Environmental Protection Authority 2016c), patches must have below a specific exotic species cover threshold, require at least five mature trees per 0.5 ha, and have a native understorey component width of at least 5 m (for roadside patches), or for non-roadside patches total patch size must be at least 2 ha or 5 ha depending on condition (Table 2.4).

The Eucalypt Woodlands TEC survey was conducted primarily by targeting patches of eucalypt woodland that were identified by the desktop assessment as potentially representing the Eucalypt

Woodlands TEC. Each patch was assessed in the field to identify any that may correspond to the TEC based on criteria outlined within the approved conservation advice for the community (Department of Environment and Energy 2015). Each patch of eucalypt woodland that was not excluded due to the presence of dominant contra-indicator species (e.g. *Allocasuarina* species), and where vegetation condition was better than 'Degraded only', was represented by either a 10 m x 10 m quadrat (at which all species within the quadrat were recorded, and overstorey species recorded within 20 m x 20 m area) or a sample site (at which only dominant species within the patch were recorded). Seven quadrats and 40 sample sites surveyed within the survey area. The following parameters were recorded at each site:

1. Patch number, location, and date;
2. Representative photograph of the patch;
3. A comprehensive species list (including weeds) and the stratum and estimated percent foliage cover and height of each (for quadrats only);
4. Vegetation condition according to the EPA scale (Environmental Protection Authority 2016c);
5. Tree canopy crown cover of TEC indicator species (%);
6. Species of canopy eucalypts;
7. Number of mature TEC indicator species per hectare;
8. Native understorey cover (%) and dominant native understorey species;
9. Weed cover (%) and dominant weed species;
10. Outcropping present (type and extent);
11. Soil type and colour, and landform;
12. Patch size/width within the survey area and outside of the survey area (ha);
13. Summary of patch and whether it meets the DoEE criteria to be the TEC.

Table 2.4: Minimum condition criteria for roadside patches of the TEC (adapted from DoEE 2015).

Exotic species cover	Mature trees	Roadside patch width	Minimum patch size (non-roadside)
Category A: Patches likely to correspond to a condition of Pristine / Excellent / Very good (Keighery 1994)			
Exotic plant species account for 0-30% of total vegetation cover in the understorey (i.e. below the tree canopy layer)	Mature trees may be present or absent	Minimum roadside patch width of 5 m or more (native understorey component)	2 ha or more in area
Category B: Patches likely to correspond to a condition of Good (Keighery 1994) and retains important habitat features			
Exotic plant species account for 30-50% of total vegetation cover in the understorey (i.e. below the tree canopy layer)	Mature trees are present with at least 5 trees per ha are present	Minimum roadside patch width of 5 m or more (native understorey component)	2 ha or more in area
Category C: Patches likely to correspond to a condition of Good (Keighery 1994)			
Exotic plant species account for 30-50% of total vegetation cover in the understorey (i.e. below the tree canopy layer)	Mature trees either absent or fewer than 5 trees per ha are present	Minimum roadside patch width of 5 m or more (native understorey component)	5 ha or more in area
Category D: Patches likely to correspond to a condition of Degraded to Good (Keighery, 1994) but retains important habitat features.			
Exotic plant species account for more than 50 to 70% of total vegetation cover in the understorey layers (i.e. below the tree canopy)	Mature trees are present with at least 5 trees per 0.5 ha	Minimum roadside patch width of 5 m or more (native understorey component)	5 ha or more in area

2.3 STUDY TEAM AND LICENCES

The flora, vegetation and fauna assessment was planned, coordinated, executed and reported by those summarised below in Table 2.5.

Table 2.5: Study team and licences.

Project Staff			
Name	**Qualification**	**Role**	Project role
Rob Sellers	BSc (Hons.)	Botanist	Desktop assessment, field survey, reporting
Licences - "Flora Taking (Biological Assessment) Licence"			
Robert Sellers		Licence No: FB62000198	Valid until: 10/12/2022

2.4 LIMITATIONS AND CONSTRAINTS

An assessment of survey-specific issues and limitations (Environmental Protection Authority 2016c) is detailed in Table 2.6 and **Error! Reference source not found.**.

Table 2.6: Flora and vegetation survey limitations.

Aspect	Constraint	Comment
Availability of contextual information at a regional and local scale	Nil	Broad scale vegetation, soil, and geology mapping data were available for the study area, in addition to Threatened and Priority flora database records, and conservation significant vegetation community records. This information was adequate to provide appropriate contextual information for the current survey.
Competency/experience of the team carrying out the survey, including experience in the bioregion surveyed	Nil	The level 2 Botanist undertaking the survey has conducted numerous botanical surveys in the South West and the Pilbara. The Principal Botanist undertaking the specimen identification for the survey has conducted numerous botanical surveys in the Avon Wheatbelt region.
Proportion of flora recorded and/or collected, any identification issues	Minor	Representative specimens of all taxa identified in the field were collected for confirmation. Seven of these could not be confidently identified to species level due to a lack of required reproductive material. However, the small number of unidentified samples are unlikely to have had any significant impact on the classification of vegetation communities, and none of these specimens were believed to correspond to any conservation significant species.
Was the appropriate area fully surveyed (effort and extent)	Nil	A targeted search was conducted for conservation significant flora during traverses. The level of survey was not sufficient to rule out the occurrence of any conservation significant flora.
Access restrictions within the survey area	Nil	All parts of the study area were accessible by walking from existing vehicle tracks.
Survey timing, rainfall, season of survey	Minor	The survey was conducted in December 2019, which is outside the optimal timing for flora and vegetation survey in the Avon Wheatbelt region.
Disturbance that may have affected the results of survey such as fire, flood or clearing	Nil	There were no natural or human interventions that constrained the survey of the study area.

3 DESKTOP STUDY

3.1 CLIMATE

The study area is located within the Yilgarn region of Western Australia, a region that experiences a dry Mediterranean climate with temperate, wet winters and warm dry summers. Most of the winter rainfall is derived from frontal systems originating in the south-west.

Rainfall data (Figure 3.1) from the nearest long-term (since 1984) Bureau of Meteorology (BOM) weather station were obtained from Mulgara (Station No. 12298) (Bureau of Meteorology 2019) which is found approximately 20.6 km west of the study area (Figure 1.1). Rainfall in Mulgara over the 12 months prior to the survey was 73% of mean annual rainfall (328.5 mm). Temperature data (Figure 3.1) were obtained from Southern Cross Aero BOM station (Station No. 12320) (Bureau of Meteorology 2019) which is located approximately 37.9 km north of the study area. Maximum daytime temperature is usually above 30 °C during the summer months and minimum temperatures frequently drop below 5°C degrees in winter.

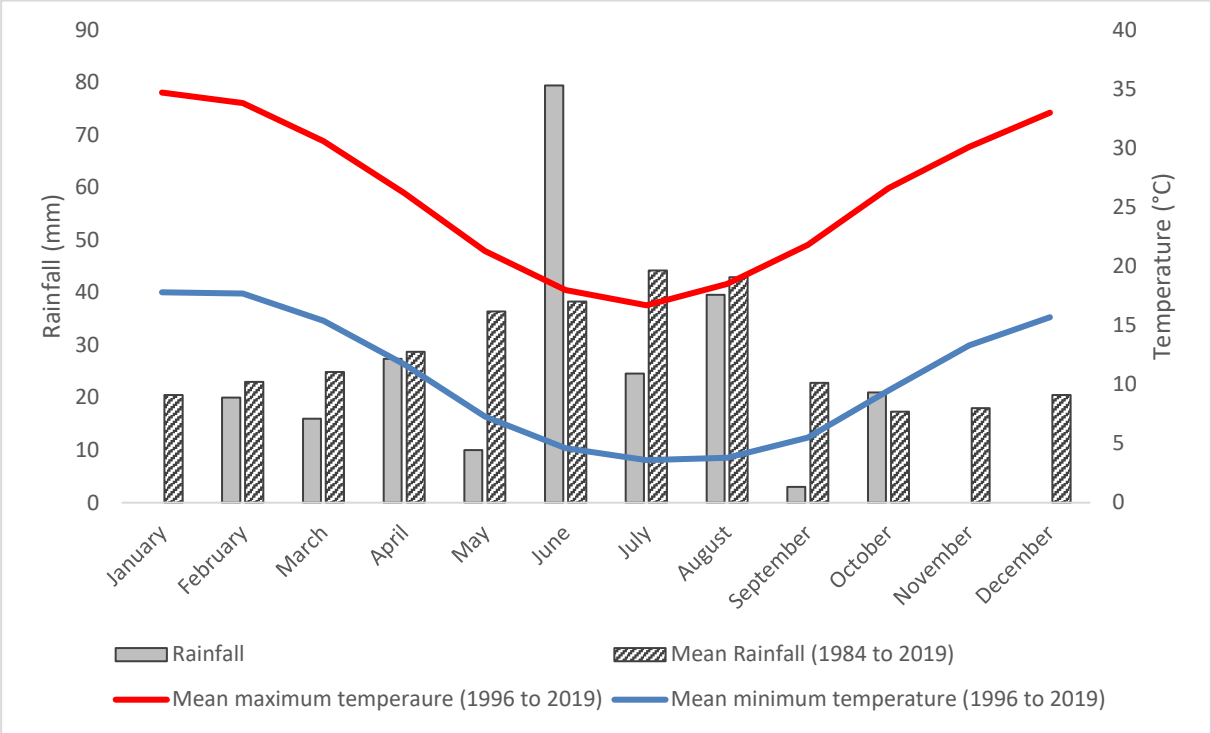

Figure 3.1: Climate data from Mulgara and Southern Cross Aero BOM weather stations (Station No. 12298 and 12320).

3.2 IBRA 7 BIOGEOGRAPHIC SUBREGIONS

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies the Australian continent into regions or bioregions on the basis of similar geology, landform, vegetation, fauna and climate characteristics (Department of Sustainability Environment Water Population and Communities 2012a). The study area is situated within the Avon Wheatbelt region according to IBRA 7 (Department of Sustainability Environment Water Population and Communities 2012), which is further divided into two subregions: Merredin (AVW01) and Katanning (AVW02). The study area is situated within the Merredin subregion (Figure 3.2). The Merredin subregion covers a total area of approximately 6,566,022 ha. The area has a dry and warm Mediterranean climate. Land use is dominated by a mixture of dryland agriculture and grazing. Undulating plain and disconnected drainage of salt lakes dissect a Tertiary plateau in Yilgarn Craton (Beecham 2001). Lateritic uplands are dominated by yellow sandplain and are vegetated with Proteacous scrub-heaths, Quaternary alluvials and eluvials contain mixed eucalypt, *Allocasuarina huegeliana* and Jam-York Gum woodlands.

3.3 GEOLOGY

In 2012, Raymond *et al.* (2012) compiled data by simplifying and edge-matching existing 1:250,000 scale geological maps. The resulting spatial dataset forms a seamless national coverage of outcrop and superficial geology. The geology of the study area associated with Cretaceous sedimentary rocks (Table 3.1, Figure 3.3). The study area is located in the Yilgarn Craton and its geology is dominated by Archean sedimentary rocks and granulite-facies metamorphics.

Table 3.1: Underlying geology associated with the study area (Raymond *et al.* 2012).

Symbol	Name	Lithology	Description	Area (ha)
As	Archean sedimentary rocks 76515	Sedimentary	Predominantly sedimentary rocks; includes sedimentary rocks of low metamorphic grade and diapiric breccias	122.81
An	Archean granulite-facies metamorphics 76511	High grade metamorphic rock	High-grade metamorphic rocks, generally with granulite facies assemblages; includes granitic gneisses	1072.55

3.4 LAND SYSTEMS AND SOILS

In 2016 the Department of Primary Industries and Regional Development consolidated soil-landscape mapping of Western Australia from two technical reports created by the Department of Agriculture and Food (Department of Agriculture Resource Management Technical Reports RMTR No. 280 (Purdie *et al.* 2016) and RMTR No. 313 (Tille 2006)). The resulting spatial dataset (Soil-landscape mapping covering Western Australia at the best available scale (Version 05.01) (Department of Primary Industries and Regional Development 2016) is a compilation of various surveys at different scales varying between 1:20,000 and 1:3,000,000. Mapping conforms to a nested hierarchy established to deal with the varying levels of information resulting from the variety of scales in mapping to provide soil-landscape data for all Western Australia. The study area is associated with eight soil-landscape systems (Table 3.2, Figure 3.4) and is comprised primarily of underlying laterite (39.9%), covered by loamy earths, duplexes and sandplains.

Table 3.2: Soil-landscape systems within the study area (Department of Primary Industries and Regional Development 2016).

ID	Mapping unit name	Description	Area (ha)	Percentage of study area
8170	Buladagie 1 Sandplain Subsystem	Gently undulating mainly yellow lateritic sandplain containing iron stone gravelly soils with associated brown yellow sandy and loamy earths, interspersed with alkaline red loamy hardsetting duplexes.	232.08	19.42
8578	Buladagie 2 Sandplain Subsystem	Gently undulating yellow lateritic sandplain interspersed with red alkaline duplexes.	4.51	0.38
8173	Buladagie 3 Undiferentiated Phase	Undifferentiated.	123.18	10.31
8171	Buladagie 3 with mafic or schist influence Phase	Areas of rocky heavy soils associating with mafic schist and phyllite geology.	191.37	16.01
8580	Garratt 1Qc Phase	Lower slopes and footslopes adjacent to salt lakes in the eaten Zone of Ancient Drainage.	97.72	8.17
8175	Greenmount 3 Subsystem	Rolling low hills in the eastern Zone of Ancient Drainage. Loamy earth (mostly calcareous) and clay.	173.62	14.52
8174	Greenmount 3l Phase	Rolling low hills in the eastern Zone of Ancient Drainage. Loamy lateritic earths.	240.02	20.08
1498	Greenmount, Perilya Subsystem	Tributary valley floors on greenstone, in the Southern Cross Zone. Calcareous loamy earths and shallow duplex.	132.87	11.12

3.5 CONSERVATION RESERVES AND NATIONALLY IMPORTANT WETLANDS

The Commonwealth Department of the Environment and Energy's (DoEE) Protected Matters Search Tool (Department of the Environment and Energy 2018) and the DBCA's managed lands and waters database were queried for Ramsar Wetlands, Nationally Important Wetlands, and DBCA managed lands and waters occurring near the study area.

The Merredin subregion (AVW02) has 1.91% of its area in conservation reserves. There are no Nationally Important Wetlands or Ramsar wetlands in the vicinity of the study area. No State and Territory Reserves are located within 10 km of the study area. The closest Nature reserve is Frog Rock located approximately 16 km to the west of the study area (Figure 3.5).

693000 702000 711000 720000 729000 738000 747000 756000 765000

6525000
6516000
6507000
6498000
6489000
6480000

Lot 451

IBRA 7 region

Avon Wheatbelt

Coolgardie

IBRA 7 subregion

Merredin

Southern Cross

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Project: Parker Range Reconnaisannce Survey
Date: 9 November 2019
Author: RS
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Absolute Scale: 1:200,000 @A3

Figure 3.2 : IBRA 7 regions and subregions (Department of Sustainability Environment Water Population and Communities 2012).

Service Layer Credits:

0 5 10
Kilometers

693000 702000 711000 720000 729000 738000 747000 756000 765000

6525000
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An
Czu
Ab
Ag
An
Czu
An
As
Ab
As
An
An
As
Af
As
An
Ag
Ab
As
An
Ab

Lot 451

Geologic unit

Ab: Mainly basaltic rocks; may include minor ultramafic volcanics
Af: Mainly felsic volcanics, including lavas and tuffs. Association may include volcaniclastic rocks.
Ag: Mainly felsic intrusive rocks. Range in composition from alkali feldspar granite to tonalite; includes associated rocks such as migmatite and minor gabbro and diorite.
An: High-grade metamorphic rocks, generally with granulite facies assemblages; includes granitic gneisses
As: Predominantly sedimentary rocks; includes sedimentary rocks of low metamorphic grade and diapiric breccias
Czu: Surficial or regolith units; poorly consolidated alluvial, colluvial, aeolian, lacustrine and coastal deposits; residual deposits (eg, laterite).

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Date: 9 November 2019
Author: RS
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Absolute Scale: 1:200,000 @A3

Figure 3.3 Underlying geology associated with the study area (Raymond et al. 2012).

Service Layer Credits:

0 5 10
Kilometers

726000 727000 728000 729000 730000 731000 732000 733000

6507000 6506000 6505000 6504000 6503000 6502000

8578
8173
8175
8170
8171
8570
1498
8133
8174
8580

Lot 451

Soil-landscape unit

- 1498: Greenmount, Perilya Subsystem
- 8133: Holleton 1 Sandplain Subsystem
- 8137: Holleton 3 Undiferentiated Phase
- 8170: Buladagie 1 Sandplain Subsystem
- 8171: Buladagie 3 with mafic or schist influence Phase
- 8173: Buladagie 3 Undiferentiated Phase
- 8174: Greenmount 3l Phase
- 8175: Greenmount 3 Subsystem
- 8570: Holleton 2 Sandplain Subsystem
- 8578: Buladagie 2 Sandplain Subsystem
- 8580: Garratt 1Qc Phase
- 8739: Holleton 3ge Phase

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Projection: Transverse Mercator
Absolute Scale: 1:20,000 @A3

Figure 3.4 :Soil-landscape units (Department of Primary Industries and Regional Development 2016).

Service Layer Credits:

0 0.5 1
Kilometers

690000 700000 710000 720000 730000 740000 750000 760000 770000

6530000 6520000 6510000 6500000 6490000 6480000

Yellowdine Nature Reserve

Wockallarry Nature Reserve

Frog Rock Nature Reserve

Jilbadji Nature Reserve

Mount Hampton Nature Reserve

Lot 451

DBCA Managed Lands

Nature Reserve

Project: Parker Range Reconnaisannce Survey
Date: 9 November 2019
Author: RS
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Absolute Scale: 1:200,000 @A3

Figure 3.5 Conservation Reserves and Nationally Important Wetlands.

0 5 10
Kilometers

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

3.6 FLORA AND VEGETATION

3.6.1 Floristic Diversity

A total of 319 vascular plant taxa (including species, infraspecific taxa, and phrase name taxa) were identified from the desktop assessment within the study area (NatureMap, Appendix B), representing 43 families and 125 genera. The most diverse families are the Myrtaceae (Myrtales) (83 taxa), Fabaceae (peas) (40 taxa), Orchidaceae (orchids) (23 taxa), Asteraceae (daisies) (23 taxa) and Proteaceae (22 taxa). The most diverse genera are *Eucalyptus* (38), *Acacia* (25), *Verticordia* (12), *Eremophila* (12), *Melaleuca* (12) and *Caladenia* (11).

3.6.2 Conservation Significant Species

The NatureMap, TPFL and WAHERB database searches identified 29 conservation significant plant taxa within the 20 km buffer search area, including one Threatened species, nine Priority 1 taxa, five Priority 2 taxa, ten Priority 3 taxa and four Priority 4 taxa (Table 3.3). The EPBC Act Protected Matters Report (Appendix C) identified three EPBC Act listed plant species as potentially occurring within the search area.

The likelihood for Threatened or Priority listed vascular plant species to occur within the study area was assessed (Table 3.3) using the criteria outlined in Table 2.2 (Section 2.1). To assist in this assessment, habitat preferences were sourced, where available, from relevant taxonomic literature, FloraBase records (Western Australian Herbarium 1998–2018), Threatened species profiles (SPRATs) (Threatened Species Scientific Committee 2016), or specimen data from the Australasian Virtual Herbarium (AVH) database (CHAH 2017). Herbarium catalogue numbers are provided if habitat information was derived from specimen data.

No Threatened or Priority listed plant species have previously been recorded within the study area (Figure 3.6). Based on the close proximity of previous records and the potential presence of suitable habitat, five taxa were considered likely to occur and 26 taxa were considered to nineteen occur within the study area (Table 3.3). Five taxa were considered unlikely to occur due to the probable absence of suitable habitat within the study area.

Table 3.3: Conservation significant plant species recorded within the desktop study area and likelihood of occurrence assessment.

Taxon	Status	Habitat	Flowering period	Likelihood of occurrence pre-survey	Likelihood of occurrence post-survey
Isopogon robustus	T	Skeletal grey sandy loam, laterite. Ridges.	October	Unlikely	Unlikely
Chamelaucium sp. Parker Range (B.H. Smith 1255)	P1	Unknown.	September to December	Possible	Possible
Goodenia heatheriana	P1	Red crumbly clay, greenstone gravel and cobbles. Lower slopes, moderately exposed gently undulating plain, roadsides.	September to October	Possible	Unlikely
Hydrocotyle corynophora	P1	Damp depressions which seasonally dry into areas of red or red-brown cracking clays or clay loam.	October	Possible	Unlikely
Lepidosperma sp. Mt Caudan (N. Gibson & M. Lyons 2081)	P1	Unknown.	Unknown	Possible	Possible
Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)	P1	Unknown.	Unknown	Possible	Possible
Leucopogon validus	P1	Dry, brown, rocky sandy loam, brown-orange sandy clay, gravel, ironstone, sandstone. Low ranges, on and around exposed breakaways.	Unknown	Unlikely	Unlikely
Melaleuca grieveana	P1	Well-drained orange-brown loam, brown clay. Plains, gentle slopes, edge of crop paddocks.	July	Possible	Possible
Millotia newbeyi	P1	Red/brown loam, red clay. Undulating plains.	September	Possible	Possible
Rinzia medifila	P1	Yellowish or reddish sandy soils, sometimes with laterite or greenstone, in *Eucalyptus* woodlands, often with *Melaleuca*.	September to October	Possible	Possible
Acacia asepala	P2	Red-brown sandy loam. Undulating plains, along drainage lines.	August	Possible	Unlikely
Acacia concolorans	P2	Red/brown loam, clay. Low lateritic hills, flats.	July to August	Likely	Possible
Eutaxia lasiocalyx	P2	Red sandy loam, laterite and quartz gravel. Gentle lower slopes.	November	Possible	Possible
Lepidium merrallii	P2	Clay loam.	Unknown	Possible	Possible
Verticordia multiflora subsp. *solox*	P2	Yellow sand over gravel, sand over granite.	October to December or January	Likely	Possible

Taxon	Status	Habitat	Flowering period	Likelihood of occurrence pre-survey	Likelihood of occurrence post-survey
Acacia crenulata	P3	Clay, sandy clay, yellow sand. Rocky rises, granite outcrops, breakaways.	-	Unlikely	Unlikely
Acacia desertorum var. *nudipes*	P3	Yellow sand, lateritic gravel. Sandplains, flats.	August to October	Possible	Possible
Baeckea grandibracteata subsp. Parker Range (K. Newbey 9270)	P3	Clay, sandy clay, yellow sand. Rocky rises, granite outcrops, breakaways.	Unknown	Unlikely	Unlikely
Hakea pendens	P3	Stony loam. Ironstone ridges.	September	Likely	Unlikely
Lepidium genistoides	P3	Sandy loam.	September to October	Possible	Possible
Microseris walteri	P3	Dry open forest.	Unknown	Possible	Possible
Notisia intonsa	P3	Brown stony saline loams and gilgai plain; brown cracking clay	September to November	Possible	Unlikely
Rinzia torquata	P3	Yellow sand or lateritic habitats, sometimes with some clay, often in vegetation dominated by mallees, *Acacia, Allocasuarina* and *Melaleuca.*	July to October	Possible	Possible
Verticordia mitodes	P3	Yellow sand. Undulating plains.	October to January	Possible	Possible
Verticordia stenopetala	P3	Yellow sand, sometimes with gravel. Undulating plains.	October to January	Likely	Possible
Calamphoreus inflatus	P4	Clay loam with ironstone gravel. Flats, disturbed sites.	October to December or February to March	Likely	Unlikely
Eremophila caerulea subsp. merrallii	P4	Sand, clay or loam. Undulating plains.	October to December	Possible	Possible
Microcorys sp. Forrestania (V. English 2004)	P4	Yellow sandy clay or red-brown clay. Open woodland or cleared areas.	January to April	Possible	Possible
Stenanthemum bremerense	P4	Orange-brown sandy loam, orange-red gravelly loam, skeletal red loam, laterite, ironstone. Top or sides of outcrops and breakaways.	Unknown	Unlikely	Unlikely

3.6.3 Introduced Species

A NatureMap database search identified 8 introduced species within 20 km of the study area (Table 3.4). One species is classified as WONS (*Opuntia stricta*). The WAOL lists three species as a 'Declared Pests': *Chondrilla juncea, Moraea miniata* and *Opuntia stricta.* The remaining species are listed as 'Permitted - s11' or are unlisted.

In 2008, the Swan Catchment Council and the Department of Environmental Conservation (DEC) created a Swan Coastal Plain region assessment of environmental weeds in order to inform weed management, this methodology has since been applied throughout WA (Bettink K. and Keighery G. 2008). Three species that have been recorded within 10 km of the study area are listed as having high ecological impact and rapid invasiveness: *Bromus rubens; Mesembryanthemum nodiflorum;* and *Moraea miniata.*

Table 3.4: Introduced plant species recorded within 20 km of the study area (NatureMap).

Taxa	Common name	WONS	WAOL rating	Ecological impact	Invasiveness
Aira cupaniana	Silvery hairgrass		Permitted - s11	Not rated	Not rated
Bromus rubens	Red brome		Permitted - s11	H	R
Chondrilla juncea	Skeleton weed		Declared Pest - s22(2)	Not rated	Not rated
Mesembryanthemum nodiflorum	Slender iceplant		Permitted - s11	H	R
Moraea miniata	Two-leaf cape tulip		Declared Pest - s22(2)	H	R
Opuntia stricta	Common prickly pear	Yes	Declared Pest - s22(2)	U	S
Pentameris airoides	False hairgrass		Permitted - s11	U	U
Vulpia myuros	Rat's tail fescue		Permitted - s11	U	R

690000 700000 710000 720000 730000 740000 750000

6520000

6510000

6500000

6490000

Lot 451
20 km buffer

Threatened

- *Isopogon robustus*

Priority 1

- *Chamelaucium* sp. Parker Range (B.H. Smith 1255)
- *Goodenia heatheriana*
- *Hydrocotyle corynophora*
- Lepidosperma sp. Mt Caudan (N. Gibson & M. Lyons 2081)
- Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)
- *Leucopogon validus*
- *Melaleuca grieveana*
- *Millotia newbeyi*
- *Rinzia medifila*

Priority 2

- *Acacia asepala*
- *Acacia concolorans*
- *Eutaxia lasiocalyx*
- *Lepidium merrallii*
- *Verticordia multiflora* subsp. *solox*

Priority 3

- *Acacia crenulata*
- *Acacia desertorum* var. *nudipes*
- *Baeckea grandibracteata* subsp. Parker Range (K. Newbey 9270)
- *Hakea pendens*
- *Lepidium genistoides*
- *Microseris walteri*
- *Notisia intonsa*
- *Rinzia torquata*
- *Verticordia mitodes*
- *Verticordia stenopetala*

Priority 4

- *Calamphoreus inflatus*
- *Eremophila caerulea* subsp. *merrallii*
- *Microcorys* sp. Forrestania (V. English 2004)
- *Stenanthemum bremerense*

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Date: 9 November 2019
Author: RS
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Absolute Scale: 1:175,000 @A3

Figure 3.6 DBCA conservation significant flora records within 20 km.

0 4.75 9.5
Kilometers

3.6.4 Pre-European Vegetation

Shepherd *et al.* (2001) mapped the extent of pre-European vegetation of Western Australia with updates reflecting NVIS standards. Three vegetation units are associated with the study area: 1068, Medium woodland; salmon gum, morrel, gimlet & *Eucalyptus sheathiana*; 1413, Shrublands*; Acacia, Casuarina* & *Melaleuca* thicket; and 8, Medium woodland; salmon gum & gimlet (Table 3.5, Figure 3.7). The pre-European and current extent of vegetation associations are available from the Statewide Vegetation Statistics dataset (Government of Western Australia 2018). Vegetation associations below 30% of their pre-European extent within a bioregion are classed as 'Critical Assets', according to according to the National Objectives and Targets for Biodiversity Conservation 2001-2005 (Department of Environment and Heritage 2001), as this is the threshold below which species loss appears to accelerate exponentially (Environmental Protection Authority 2000). The current extent of the vegetation associations 1068 and 1413 above the 30% threshold in the Merredin subregion (Table 3.5). The current extent of vegetation association 8 is well below the 30% in the Merredin subregion.

Table 3.5: Pre-European vegetation associations associated with the study area.

Beard Vegetation type	Vegetation association description	Pre-European extent in AVW01 (ha)	Percentage remaining in AVW01	Current percentage protected for conservation (AVW01)	Extent within study area (ha)	Percentage of post-European extent within study area
1068	Medium woodland; salmon gum, morrel, gimlet & *Eucalyptus sheathiana*	74,875	49.75	3.48	74.02	0.20
1413	Shrublands*; Acacia, Casuarina* & *Melaleuca* thicket	546,676	31.85	2.25	680.85	0.39
8	Medium woodland; salmon gum & gimlet	353,872	14.11	1.11	440.49	0.88

720000 722000 724000 726000 728000 730000 732000 734000 736000 738000

6510000 6508000 6506000 6504000 6502000 6500000 6498000

511

1068

128

8

1413

552

Lot 451

Vegetation unit

1068 - Medium woodland; salmon gum, morrel, gimlet & Eucalyptus sheathiana
128 - Bare areas; rock outcrops
1413 - Shrublands; acacia, casuarina & melaleuca thicket
511 - Medium woodland; salmon gum & morrel
552 - Shrublands; Casuarina acutivalvus & calothamnus (also melalueca) thicket on greenstone hills
8 - Medium woodland; salmon gum & gimlet

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Project: Parker Range Reconnaisannce Survey
Date: 9 November 2019
Author: RS
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Absolute Scale: 1:50,000 @A3

Figure 3.7 Pre-European vegetation associations (Shepherd et al. 2001).

Service Layer Credits:

0 1.25 2.5
Kilometers

3.7 SIGNIFICANT ECOLOGICAL COMMUNITIES

Protected Matters Search Tool and DBCA database search results that indicate the occurrence of the state listed 'Eucalypt Woodlands of the Western Australian Wheatbelt' PEC (P3) within the survey area and around it (Department of Energy and Environment 2020). This indicates the potential occurrence of the EPBC Act listed (Critically Endangered) 'Eucalypt Woodlands of the Western Australian Wheatbelt' threatened ecological community which includes a narrower range of *Eucalypt* canopy species than the state listed PEC and also has minimum patch size thresholds.

DBCA database search results also indicate the occurrence of 'Plant assemblages of the Parker Range System' state listed PEC occurs extensively approximately 8 km to the east of the study area.

No other TECs or PECs have been recorded within 10 km of the study area.

Table 3.6: Threatened and Priority Ecological communities recorded within 10 km of survey area.

Name	Description
Eucalypt Woodlands of the Western Australian Wheatbelt PEC (Priority 3)	Eucalypt-dominated woodlands in the Western Australian Wheatbelt region as defined by the IBRA Avon Wheatbelt 1 and 2 and Western Mallee subregions with the specific exceptions of: woodlands and forests dominated by Jarrah *(E. marginata)* or Marri *(Corymbia calophylla)* where they occur without York Gum present; and non-woodland communities dominated by eucalypts, specifically those dominated by eucalypts with a mallee growth form. Community is defined primarily by its structure as a woodland. The presence in the canopy layer of eucalypt trees - most commonly salmon gum *(Eucalyptus salmonophloia),* York gum *(Eucalyptus loxophleba),* red morrel *(Eucalyptus longicornis)* or gimlet *(Eucalyptus salubris)* defines the Wheatbelt woodlands. Several of the other emergent eucalypt species which may be present as a defining species (e.g. Kondinin blackbutt *(E. kondinensis), E. myriadena,* salt river gum *(E. sargentii),* silver mallet *(E. ornata)* and mallet *(E. singularis)* are found only in the Western Australian Wheatbelt.
Plant assemblages of the Parker Range System	*Hakea pendula* Tall Shrubland is of particular significance. *Eucalyptus sheathiana* with *E. transcontinentalis* and/or *E. eremophila* woodland on sandy soils at the base of ridges and low rises; *E. longicornis* with *E. corrugata* and *E. salubris* or *E. myriadena* woodland on broad flats; *E. salmonophloia* and *E. salubris* woodland on broad flats; *Allocasuarina acutivalvis* and *A. corniculata* on deeper sandy soils of lateritic ridges; *E. capillosa* subsp. *polyclada* and/or *E. loxophleba* over *Hakea pendens* thicket on skeletal soils on ridges (laterites, breakaways and massive gossanous caps); and *Callitris glaucophylla* low open woodland on massive greenstone ridges.

720000 730000 740000 750000

6510000

6500000

Lot 451

Threatened and Priority Ecological Communities

Eucalypt woodlands of the Western Australian Wheatbelt

Plant assemblages of the Parker Range System

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Project: Parker Range Reconnaisannce Survey
Date: 9 November 2019
Author: RS
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Absolute Scale: 1:100,000 @A3

Figure 3.8 Threatened and Priority Ecological Communities in the vicinity of the study area.

0 2.5 5
Kilometers

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

4 FIELD SURVEY RESULTS

4.1 CONSERVATION SIGNIFICANT FLORA

No EPBC Act listed 'Threatened Flora' taxa, BC Act listed 'Threatened Flora' taxa or DBCA-classified 'Priority Flora' taxa were recorded during the current survey within the study area.

4.2 INTRODUCED FLORA

One introduced plant species was recorded during the survey (Table 4.1). *Vulpia myuros* is not listed as WONS (Department of Agriculture and Food Western Australia 2016) or listed as a 'Declared Pest' on the WAOL (Department of Agriculture and Food Western Australia 2016). Its Ecological impact and invasiveness ratings (see Appendix A for definitions) (Department of Parks and Wildlife 2013) (Table 4.1) is 'Unknown' and 'Rapid'.

Table 4.1: Summary of introduced species recorded within the study area.

Taxa	Common name	WONS	WAOL rating	Ecological impact	Invasiveness
Vulpia myuros	Rat's tail fescue		Permitted - s11	U	R

4.3 VEGETATION TYPES AND CONDITION

Seven vegetation types were described and delineated for the study area (Table 4.2, Figure 4.1). Representative photos of vegetation types can be found in Appendix F. These included two *Allocasuarina* woodland types (AsCc, and AsMu), one shrubland type (ExAh), one *Melaleuca* and *Acacia* woodland type (MuAy), two Eucalypt woodland types (EcEr and EcEe), and one *Callitris* vegetation type (CcEc). Vegetation condition is mapped in Figure 4.2.

Allocasuarina woodland type AsCc (*Allocasuarina spinosissima*. +/- *Callitris columellaris.* woodland with isolated to open woodland of *Eucalyptus rigidula* and *Eucalyptus burracoppinensis,* over *Melaleuca glaberrima*, *?Thryptomene kochii*, *?Micromyrtus* sp. sparse shrubland) comprised 4.07% (23.40 ha) of the study area. These were in 'Excellent' condition with no introduced species present. This type occurred in areas of undulating sandplain composed of grey – red sandy loam.

Allocasuarina woodland type AsMu (*Allocasaurina spinosissima* and *Mealaleuca uncinata* woodland with scattered *Eucalyptus capillosa* +/- *Eucalytus eremophila* over +/- *Melaleuca glaberrima* and *?Thryptomene kochii* shrubland) comprised 63.45% (411.02 ha) of the study area). These were in "Excellent" condition with no introduced species present. This type occurred in areas of undulating sandplain composed of grey – red sandy loam.

Shrubland type ExAh (*Exocarpus aphyllus, Acacia hemiteles, Melaleuca glaberrima* +/- *Melaleuca cordata* shrubland) comprised 3.70% (23.97 ha) of the study area. These were in 'Very Good' to 'Excellent' condition. This type occurred proximal to boundary fencing occurred in areas of undulating sandplain composed of grey – red sandy loam.

Melaleuca and Acacia woodland type (MuAy) (*Melaleuca uncinata* and *Acacia yorkrakinensis* subsp. *acrita* +/- *Callitris columellaris* woodland with isolated *Eucalyptus eremophila, Eucalyptus calycogona*, over *Melaleuca glaberrima, Melaleuca cordata* and *?Micromyrtus* sp. shrubland) comprised 19.60% (126.97 ha) of the study area. These were in 'Very Good' to 'Excellent' condition. This type occurred in areas of undulating sandplain composed of grey – red sandy loam.

Eucalypt woodland type EcEr (*Eucalyptus rigidula, Eucalyptus calycogona* open woodland to isolated mallees +/- *Santalum acuminatum*, over *?Thryptomene kochii* +/- *Microcybe multiflora* subsp. *multiflora*, +/- *Phebalium tuberculosum* shrubland) comprised 3.14% (20.34 ha) of the study area.

These were in 'Excellent' condition. This type occurred in areas of undulating sandplain composed of grey – red sandy loam.

Eucalypt woodland type EcEe (*Eucalyptus calycogona*, +/- *Eucalyptus eremophila*, *Eucalyptus moderata*, *Eucalyptus capillosa* woodland with almost no understory) comprised 4.86% (31.52 ha) of the study area. These were in 'Very Good' condition with very minor weed presence (*Vulpia myuros*) and very little other understorey or shrub layer. This type occurred in areas of undulating sandplain composed of grey – red sandy loam.

Callitris vegetation type CcEc (*Callitris columellaris, Eucalyptus capillosa*, woodland with almost no understory) comprised 1.19% (7.72 ha) of the study area. These were in 'Very Good' condition. This type occurred in areas of undulating sandplain composed of surface laterite and grey – red sandy loam.

Table 4.2: Summary of vegetation within the study area.

Vegetation type	Description	Condition	'Eucalypt woodlands' TEC potentially present	Area ha (%)
AsCc	*Allocasuarina spinosissima. +/- Callitris columellaris.* woodland with isolated to open woodland of *Eucalyptus rigidula and Eucalyptus burracoppinensis*, over *Melaleuca glaberrima, ?Thryptomene kochii, ?Micromyrtus sp.* sparse shrubland.	Excellent	No	26.4 (4%)
AsMu	*Allocasuarina spinosissima and Melaleuca uncinata* woodland with scattered *Eucalyptus capillosa +/- Eucalyptus eremophila* over *+/-Melaleuca glaberrima and ?Thryptomene kochii* shrubland.	Excellent	No	411.0 (63%)
CcEc	*Callitris columellaris, Eucalyptus capillosa* woodland with almost no understory.	Very Good	No	7.7 (1%)
EcEe	*Eucalyptus calycogona*, *+/- Eucalyptus eremophila, Eucalyptus moderata, Eucalyptus capillosa* woodland with almost no understory.	Very Good	No	31.5 (4.9%)
EcEr	*Eucalyptus rigidula, Eucalyptus calycogona* open woodland to isolated mallees *+/- Santalum acuminatum,* over *?Thryptomene kochii +/- Microcybe multiflora* subsp. *multiflora, +/-Phebalium tuberculosum* shrubland.	Excellent	No	20.3 (3%)
ExAh	*Exocarpus aphyllus, Acacia hemiteles, Melaleuca glaberrima +/- Melaleuca cordata* shrubland.	Very Good to Excellent	No	24.0 (4%)
MuAy	*Melaleuca uncinata* and *Acacia yorkrakinensis* subsp. *acrita +/- Callitris columellaris woodland with isolated Eucalyptus eremophila*, *Eucalyptus calycogona +/- Eucalyptus leptopoda*, *over Melaleuca glaberrima*, *Melaleuca cordata* and *?Micromyrtus* sp. shrubland.	Excellent	No	127.0 (20%)

727000 728000 729000 730000 731000 732000 733000

6506000 6505000 6504000 6503000 6502000

P44 P43 P42 P41 P40 P35 P32 PR05 PR06 PR07 P 2 P 1 P10 P 9 P12 PR08 PR02 PR01 PR03 PR04 P29 P30 P27 P26 P25 P16 P14 PR10 P17 P13 PR09 P18 P19 P20 P22 P23 PR11 P21 P24 P24

MuAy EcEe CcEc ExAh AsMu AsCc EcEr

Lot 451

Vegetation sample sites

Vegetation type

AsCc: Allocasuarina spinosissima. +/- Callitris columellaris. woodland with isolated to open woodland of Eucalyptus rigidula and Eucalyptus burracoppinensis, over Melaleuca glaberrima, ?Thryptomene kochii, ?Micromyrtus sp. sparse shrubland.

AsMu: Allocasaurina spinosissima and Mealaleuca uncinata woodland with scattered Eucalyptus capillosa +/- Eucalytus eremophila over +/-Melaleuca glaberrima and ?Thryptomene kochii shrubland.

CcEc: Callitris columellaris, Eucalyptus capillosa, woodland with almost no understory.

EcEe: Eucalyptus calycogona +/- Eucalyptus eremophila, Eucalyptus moderata, Eucalyptus capillosa woodland with almost no understory.

EcEr: Eucalyptus rigidula, Eucalyptus calycogona open woodland to isolated mallees +/- Santalum acuminatum, over ?Thryptomene kochii +/- Microcybe multiflora subsp. multiflora, +/-Phebalium tuberculosum shrubland.

ExAh: Exocarpus aphyllus, Acacia hemiteles, Melaleuca glaberrima +/- Melaleuca cordata shrubland.

MuAy: Melaleuca uncinata and Acacia yorkrakinensis subsp. acrita +/- Callitris columellaris woodland with isolated Eucalyptus eremophila, Eucalyptus calycogona, over Melaleuca glaberrima, Melaleuca cordata and ?Micromyrtus sp. shrubland.

ecologia ENVIRONMENT

Project: Parker Range Reconnaisannce Survey
Date: 19 November 2019
Author: RS
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Absolute Scale: 1:18,000 @A3

Figure 4.1 Vegetation types

0 0.5 1
Kilometers

4.4 VEGETATION CONDITION

Vegetation condition is summarized in Table 4.3 and Figure 4.2.

Table 4.3: Summary of vegetation condition within the study area.

Vegetation condition	Vegetation type	Disturbance	Area (ha)
Excellent	AsCc	Introduced plant taxa less than 1%.	26.4
	AsMu		411
	EcEr		20.3
	MuAy		127
Very Good to Excellent	ExAh	Introduced plant taxa less than 1% and varied ground cover.	24
Very Good	CcEc	Introduced plant taxa less than 1% and very little ground cover or shrub layer.	7.7
	EcEe		31.5

727000
728000
729000
730000
731000
732000
733000
6506000
6505000
6504000
6503000

Lot 451

Vegetation condition

- Excellent
- Very Good to Excellent
- Very Good

ecologia ENVIRONMENT

Project: Parker Range Reconnaisannce Survey
Date: 19 November 2019
Author: RS
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Absolute Scale: 1:16,000 @A3

Figure 4.2 Vegetation condition

0 0.425 0.85
Kilometers

4.5 SIGNIFICANT VEGETATION

4.5.1 Threatened Ecological Communities

Vegetation potentially corresponding to the 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC occurs within the study area. The State listed 'Eucalypt Woodlands of the Western Australian Wheatbelt' Priority 3 PEC is synonymous with the TEC. No other nationally listed TEC or State listed TEC or PEC were recorded within the study area, nor were any other vegetation types considered to be restricted or otherwise significant.

4.5.2 Eucalypt Woodlands of the Western Australian Wheatbelt TEC assessment

Assessment against minimum criteria for the TEC are summarised in Table 4.4.

Location: Vegetation types in the study area are located within the Avon Wheatbelt (AVW01).

Indicator species: One eucalypt species (*Eucalyptus capillosa*) was recorded within the study areas and is key indicator of the Eucalypt Woodlands TEC when dominant or codominant within the community (Department of Environment and Energy 2015). *E. capillosa* was recorded within vegetation types AsMu, CcEc, EcEe and EcEr.

Canopy cover: Vegetation types AsMu, CcEc and EcEe each contain the minimum 10% canopy cover to be considered a mature woodland, however EcEr does not (Department of Environment and Energy 2015).

Canopy dominance: Vegetation types contained multiple eucalypt species that were co-dominant in the canopy layer: *Eucalyptus burracoppinensis, Eucalyptus calycogona, Eucalyptus capillosa, Eucalyptus eremophila, Eucalyptus leptopoda, Eucalyptus moderata* and *Eucalyptus rigidula.* All of these species, excluding *E. capillosa,* are considered contra-indicators of the TEC if dominant or co-dominant within the community canopy layer.

Introduced species cover and vegetation condition: The above vegetation types contain less than 70% exotic species, are considered either in 'Very Good' or 'Excellent' condition and are all larger than minimum patch size requirements (Department of Environment and Energy 2015).

Native understorey: Native understorey is present in vegetation types AsMu and EcEr but is largely absent in types CcEc and EcEe. Understorey below the woodland tree canopy in the TEC is highly variable in structure and composition. A bare to mostly bare understorey can be associated with some mallet woodlands (Department of Environment and Energy 2015) so this is not sufficient to exclude types Cc and EcEe from the TEC assessment.

Granite outcrop presence: No granite outcrops, lateritic gravel hills or rocky rises were associated with the study area which might affect vegetation classification.

To be considered 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC indicator *Eucalyptus* species must be dominant or co-dominant component of the vegetation; this is not the case in vegetation types AsMu, CcEc, and EcEr. Within EcEr, *Eucalyptus capillosa* is co-dominant with *Melaleuca uncinata* and mallee species (*Eucalyptus calycogona* and *Eucalyptus moderata*) at vegetation sample site PR01 (Figure 4.1, Appendix D), and is not present at vegetation sample site PR02 within the same vegetation type where *Eucalyptus leptopoda* is codominant. The codominance of these mallee species is a contraindicator of the 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC (Department of Environment and Energy 2015). It has therefore been determined that no vegetation on Lot 451 represents 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC.

Table 4.4: Eucalypt Woodland of the Western Australian Wheatbelt TEC assessment.

Vegetation type	Sample site	Indicator species present	Total canopy cover (%)	Total patch area (ha)	Indicator eucalypt species dominance	Approx. native understorey species richness	Native understory cover (%)	Weed cover (%)	Weed cover proportion of total (%)	Soil Colour	Soil Type	Landform	Outcropping presence and type	Vegetation condition (Keighery 1994)	Dominant overstorey species/vegetation type.	Dominant native understorey species	DoEE condition category
AsMu	PR03, PR04, PR08	*Eucalyptus capillosa*	>10	411	No	<10	1 to 20	<1	<1	Grey - red	Sandy loam	Undulating plain	None	Excellent	*Allocasuarina spinosissima, Melaleuca uncinata*	*Melaleuca glaberrima* and *?Thryptomene kochii*	NA
CcEc	P10, P11	*Eucalyptus capillosa*	>10	7.7	No	<5	<1	<1	<1	Grey - red	Sandy loam	Undulating plain	None	Very Good	*Callitris columellaris, Eucalyptus capillosa*	*?Thryptomene kochii*	NA
EcEe	PR01, PR02	*Eucalyptus capillosa*	>10	31.5	Yes	<5	<1	<1	<1	Grey - red	Sandy loam	Undulating plain	None	Very Good	*Eucalyptus capillosa, Eucalyptus calycogona, Eucalyptus leptopoda, Eucalyptus moderata, Melaleuca uncinata*	*Melaleuca cordata*	NA: contra-indicator species co-dominant in canopy layer.
EcEr	P20, P21	*Eucalyptus capillosa*	<10	10.3	No	>20	30	<1	<1	Grey - red	Sandy loam	Undulating plain	None	Excellent	*Eucalyptus rigidula, Eucalyptus calycogona*	*?Thryptomene kochii, Microcybe multiflora* subsp. *Multiflora*	NA

5 DISCUSSION

5.1 FLORA

No EPBC Act listed 'Threatened Flora' taxa, BC Act listed 'Threatened Flora' taxa or DBCA-classified 'Priority Flora' taxa were recorded within the Study Area.

Twenty-nine conservation significant plant species were identified from TPFL and WAHERB databases within 20 km of the Study Area. Five species were considered to 'Likely' occur and nineteen species to 'Possibly' occur within the study area based on the proximity of previous records and the potential presence of suitable. Potentially suitable habitat was found for eighteen of these species, although no conservation significant taxa were recorded it is still considered 'Possible' that they occur in the study area. Habitat for the remaining eleven species was not identified in the survey area, consequently these taxa are considered 'Unlikely' to occur.

One introduced plant species was recorded in the study area *Vulpia myuros.* This species is widespread across the wheatbelt and is not listed as a Weed of National Significance (Department of Environment and Energy 2019) or as a declared pest (Department of Agriculture and Food Western Australia 2016).

5.2 VEGETATION

Seven vegetation types were described and delineated for the study area. These included two *Allocasuarina* woodland types (AsCc, and AsMu), one shrubland type (ExAh), one *Melaleuca and Acacia* woodland type (MuAy), two Eucalypt woodland types (EcEr and EcEe) and one *Callitris* vegetation type (CcEc). Approximately 96% of the study area was considered open woodland or woodland, which was dominated by *Allocasuarina* woodland (67.5%) and *Melaleuca* and *Acacia* woodland (19.6%). Eucalypt woodland accounted for 8% of the study area. Introduced species density was very low in all vegetation types (<1%). Vegetation condition within *Allocasuarina* woodland, *Melaleuca* woodland and *Acacia* woodland and Eucalypt woodland EcEr was considered 'Excellent'. Native understorey was almost absent in vegetation types CcEc, EcEe and parts of ExAh. These areas occurred primarily adjacent to exclusion fencing that keeps out livestock in neighbouring agricultural land. It was not possible to tell the cause of this absence of understorey, consequently these areas were considered minorly disturbed and to be in 'Very Good' condition. However, understorey below the woodland tree canopy can be highly variable in structure and composition, a bare to mostly bare understorey can be associated with some mallet woodlands (Department of Environment and Energy 2015) which may be the case in the study area. Shrubland vegetation (ExAh) covering 3.7% of the study area contained highly variable groundcover and was also considered to be in 'Very Good' condition.

5.3 EUCALYPT WOODLANDS OF THE WESTERN AUSTRALIAN WHEATBELT TEC

The Eucalypt Woodlands of the Western Australian Wheatbelt community was once the most common vegetation type occurring across the Wheatbelt of South West Western Australia, but has subsequently become fragmented and degraded due to extensive clearing for agricultural land use (Department of Environment and Energy 2015). The community is characterised by a complex mosaic of tree and mallet-form eucalypts over a floristically diverse native understorey. Woodlands dominated or co-dominated by mallee species, or those with very sparse tree or mallet canopy cover, are not considered to be analogous with the community. It is typically associated with flat or undulating areas, including drainage lines and saline areas, but not with granite outcrops or lateritic hills, although it may extend to the base of these landforms (Department of Environment and Energy 2015).

Four vegetation types recorded in the study area contained *Eucalyptus capillosa*, which is a key indicator species of 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC (Department of Environment and Energy 2015). In order to be considered the Eucalypt Woodlands TEC, the community must have at least 10% crown cover of the tree canopy, must contain one or more tree species

identified as key indicators, and contra-indicator species must not dominant or co-dominant in the canopy. Although *Eucalyptus capillosa* was present within these vegetation types (and co-dominant within EcEr), it tended to be co-dominant with mallee species (*Eucalyptus calycogona, Eucalyptus leptopoda* and *Eucalyptus moderata*) that are contra-indicators of the Eucalypt Woodlands TEC, and therefore represent a different vegetation type to the TEC. As a consequence, none of the vegetation types associated with the study area are considered to meet the criteria for classification as the 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC.

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7 APPENDICES

APPENDIX A DEFINITIONS

DEFINITIONS

SIGNIFICANT FLORA

According to the *EPA Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a), plant taxa (or records) may be considered significant for a number of reasons including, but not restricted to, the following:

- Being listed as a 'Threatened Species' under the *Biodiversity Conservation* (BC) *Act* 2016 (WA) or the EPBC Act (Cwlth);
- Being classified by the Department of Biodiversity, Conservation and Attractions (DBCA) as a 'Priority Flora' species;
- Locally endemic species or those associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- New species or those having anomalous features that indicate a potential new species;
- Being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- Unusual species, including restricted subspecies, varieties or naturally occurring hybrids; and
- Being representative of taxonomic groups that no longer occur widely in the broader landscape (relictual species/populations).

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Cwlth)

At a Commonwealth level, Threatened Flora species are protected under the EPBC Act, which lists species in accordance with the criteria of the International Union for Conservation of Nature (IUCN) (International Union for Conservation of Nature 2014), that is, 'Critically Endangered', 'Endangered', 'Vulnerable', 'Conservation Dependant', 'Extinct', or 'Extinct in the Wild' (refer to Appendix A for category definitions).

Biodiversity Conservation Act 2016 (WA)

At a State level, Threatened Flora species are protected under the BC Act. These are taxa which have been adequately surveyed and are deemed to be either rare, in danger of extinction, or otherwise in need of special protection in the wild and are gazetted as Threatened (Declared Rare) Flora. Threatened Flora are further categorised by the Department of Biodiversity, Conservation and Attractions (DBCA) according to their level of threat using the IUCN red list criteria ((International Union for Conservation of Nature 2014) (Appendix A).

Priority Flora (DBCA)

The DBCA maintains a list of Priority Flora species, which are considered poorly known, uncommon or under threat but for which there is insufficient justification to be listed as Threatened, based on known distribution and population sizes. Priority Flora species are assigned to one of four categories, described in Appendix A. DBCA-listed Priority Flora species do not have any statutory protection.

SIGNIFICANT VEGETATION

According to *EPA Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a), vegetation may be considered significant for a number of reasons including, but not restricted to, the following:

- Being identified as a 'Threatened Ecological Community (TECs)' under the BC Act and/or the EPBC Act;
- Being classified as a 'Priority Ecological Communities (PECs)' by DBCA;
- Having a restricted distribution;
- The degree of historical impact from threatening processes;
- Playing a role as a refuge;

- Providing an important function required to maintain ecological integrity of a significant ecosystem.

The WA Minister for Environment has endorsed 69 ecological communities as threatened in the following categories:

- 20 critically endangered
- 17 endangered
- 28 vulnerable
- 4 presumed total destroyed

Twenty-five of these are listed under the EPBC Act. Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the priority ecological community list under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as threatened ecological communities. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for near threatened, or that have been recently removed from the threatened list, are placed in priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in priority 5.

INTRODUCED FLORA

Weeds of National Significance (WONS)

At a national level, there are 32 weed species listed as Weeds of National Significance (WONS). The Commonwealth National Weeds Strategy: *A Strategic Approach to Weed Problems of National Significance* (DSEWPaC 2012) describes broad goals and objectives to manage these species.

Declared Pests

The purpose of the *Biosecurity and Agriculture Management Act 2007* (BAM Act) is to prevent serious animal and plant pests and diseases from entering WA and becoming established, and to minimise the spread and impact of those that are already present. The BAM Act (and associated regulations) replaces the *Agriculture and Related Resources Protection Act 1976* (and associated regulations).

The BAM regulations were enacted on 1 May 2013, placing organisms into one of five legal status categories: Declared Pest - Prohibited, Declared Pest, Permitted, Permitted – Requires Permit, and Unlisted (Appendix A). The Western Australian Organism List (WAOL) (Department of Agriculture and Food Western Australia 2016) lists organisms in each of these categories. Unlisted organisms must not be imported (unless in accordance with an import permit and regulations). The BAM Act further categorises Declared Pests in one of three control categories: C1 Exclusion, C2 Eradication, and C3 Management (Appendix A).

Environmental Weeds

At a regional level, DBCA rates weed species against four criteria based on the Weed Prioritisation Process (Department of Parks and Wildlife 2013): invasiveness, ecological impact, potential and current distribution, and feasibility of control. Currently, only species with a rating for both the ecological impact and invasiveness criteria are listed (see Appendix A).

SIGNIFICANT FAUNA

According to *EPA Factor Guideline: Terrestrial Fauna* (Environmental Protection Authority 2016b), terrestrial fauna may be considered significant for a number of reasons including, but not restricted to:

- Being identified as a Threatened or Priority species (Appendix A);
- Species with restricted distribution;
- Degree of historical impact from threatening processes; and
- Providing an important function required to maintain the ecological integrity of a significant ecosystem.

Additionally, as described in EPA Guidance (Environmental Protection Authority 2016d) terrestrial fauna may be considered significant for the following reasons:

- Species is protected by international agreement or treaty (i.e. migratory fauna);
- Species is a short-range endemic;
- Species has declining populations or distribution;
- Species is at the extreme of its range, or is part of an outlying population; and
- Species is undescribed.

Fauna habitats may be significant if they provide habitat important to the life history of a significant species, i.e. breeding, feeding and roosting or aggregation areas, or where they are unique or isolated habitats, for example wetlands, in the landscape or region (Environmental Protection Authority 2016b).

***Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)**

At the Commonwealth level, Threatened Fauna are protected under Section 178 of the EPBC Act, which may list species as: extinct, extinct in the wild, critically endangered, endangered, vulnerable, and conservation dependent. In addition, under sections 209 and 248 of the Act, some migratory and marine species are protected under international agreements. EPBC Act conservation code definitions can be found in Appendix A.

***Biodiversity Conservation Act 2016* (WA)**

At a State level, fauna species are protected under the BC Act. Threatened, Extinct and Specially Protected fauna are species 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. BC Act conservation code definitions can be found in Appendix A.

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. 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 BC Act.

Specially protected fauna under section 13(1) of the BC Act are species that meet 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.

Threatened Flora and Fauna Categories (EPBC Act)

Code	Definition
EX	**Extinct** Taxa which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
EW	**Extinct in the Wild** Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CR	**Critically Endangered** Taxa which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
EN	**Endangered** Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
VU	**Vulnerable** Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which at a particular time if, at that time, the species is the focus of a specific conservation programme, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Threatened Flora and Fauna Categories (BC Act)

Category	Code	Definition	Schedule
Critically Endangered	CR	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.	**Schedule 1**
Endangered	EN	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.	**Schedule 2**
Vulnerable	VU	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.	**Schedule 3**
Extinct species	EX	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.	**Schedule 4**
Extinct in the wild species	EW	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.
Migratory	MI	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.	**Schedule 5**
Species of special conservation interest (conservation dependent fauna)	CD	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.	**Schedule 6**
Other specially protected species	OS	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.	**Schedule 7**

Definition of codes for Priority Flora and Fauna (BC Act)

Code	Definition
P1: Priority One	**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.
P2: Priority Two	**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.
P3: Priority Three	**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.
P4: Priority Four	**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.

Control categories for Declared Pests (Weeds)

Declared plant category	Description
C1 - Exclusion	Pests assigned to this category are not established in WA and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2 - Eradication	Pests assigned to this category are present in WA in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3 - Management	Pests assigned to this category are established in WA but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Categorisation of Environmental Weeds

Field	Description	Code
Ecological Impact	Impact of species within the Region, from low impact (causes minimal disruption to ecological processes or loss of biodiversity) to high (causes acute disruption of ecological processes, dominates and/or significantly alters vegetation structure, composition and function of ecosystems). Examples of impact attributes to consider: - changed fire regime - changed nutrient conditions - changed hydrological patterns - changed soil erosion patterns - changed geomorphological processes - changed biomass distribution - changed light distribution - loss of biodiversity - substantially reduces regeneration opportunities of native plants - allelopathic effects	Low (L) Medium (M) High (H) Unknown (U)
Invasiveness	Rate of spread of a weed in native vegetation, encompassing factors of establishment, reproduction and long distance dispersal (>100m). Examples of establishment factors include: - ability to outcompete (light, moisture, nutrients, rapid root growth) - sexual or asexual establishment - need for disturbance to establish Examples of reproduction factors include: - time to seeding - seed production - vegetative reproduction Examples of long distance dispersal mechanisms include: - wind - water - flying/ground animals - deliberate/accidental human spread - vehicles - produce contaminant	Slow (S) Moderate (M) Rapid (R) Unknown (U)

BAM Act Definitions (Declared Pests)

Legal status	Definition
Declared Pest, Prohibited - s12	Prohibited organisms are declared pests by virtue of section 22(1), and may only be imported and kept subject to permits. Permit conditions applicable to some species may only be appropriate or available to research organisations or similarly secure institutions.
Declared Pest - s22(2)	Declared pests must satisfy any applicable import requirements when imported, and may be subject to an import permit if they are potential carriers of high-risk organisms. They may also be subject to control and keeping requirements once within Western Australia.
Permitted - s11	Permitted organisms must satisfy any applicable import requirements when imported. They may be subject to an import permit if they are potential carriers of high-risk organisms.
Permitted, Requires Permit - r73	Regulation 73 permitted organisms may only be imported subject to an import permit. These organisms may be subject to restriction under legislation other than the Biosecurity and Agriculture Management Act 2007. Permit conditions applicable to some species may only be appropriate or available to research organisations or similarly secure institutions.
Unlisted - s14	If you are considering importing an unlisted organism/s you will need to submit the name/s for assessment, as unlisted organisms are automatically prohibited entry into WA.
Control categories	Definition
C1 Exclusion	Organisms which should be excluded from part or all of Western Australia.
C2 Eradication	Organisms which should be eradicated from part or all of Western Australia.
C3 Management	Organisms that should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers or distribution of the organism or prevent or contain the spread of the organism.
Unassigned	Unassigned: Declared pests that are recognised as having a harmful impact under certain circumstances, where their subsequent control requirements are determined by a Plan or other legislative arrangements under the Act.

Definition of codes for Threatened Ecological Communities

Code	Definition
PD: Presumed Totally Destroyed	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies (A or B): A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or B) All occurrences recorded within the last 50 years have since been destroyed.
CR: Critically Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C): A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii): i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years); ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated. B) Current distribution is limited, and one or more of the following apply (i, ii or iii): i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years); ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes; iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes. C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).
EN: Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C): A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii): i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years); ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated. B) Current distribution is limited, and one or more of the following apply (i, ii or iii): i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years); ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes; iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes. C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).
VU: Vulnerable	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range. An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium (within approximately 50 years) to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C): A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated. B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations. C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long-term future because of existing or impending threatening processes.

Definition of codes for Priority Ecological Communities

Code	Definition
P1: Priority One	Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
P2: Priority Two	Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
P3: Priority Three	(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or; (iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
P4: Priority Four	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. (i) Rare. Ecological communities known from few occurrences 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 communities are usually represented on conservation lands. (ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category. (iii) Ecological communities that have been removed from the list of threatened communities during the past five years.
P5: Priority Five	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

APPENDIX B VASCULAR FLORA RECORDS (NATUREMAP)

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 09/12/2019

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Vouchered Status Vouchered
Species Group Vascular Plants
Method 'By Circle'
Centre 119° 25' 30" E,31° 34' 20" S
Buffer 20km

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	14052	*Acacia asepala*		P2	
2.	15467	*Acacia assimilis subsp. assimilis*			
3.	3236	*Acacia beauverdiana (Pukkati)*			
4.	3251	*Acacia camptoclada*			
5.	3264	*Acacia colletioides (Wait-a-while)*			
6.	14618	*Acacia concolorans*		P2	
7.	16117	*Acacia consanguinea*			
8.	14623	*Acacia crenulata*		P3	
9.	16169	*Acacia deficiens*			
10.	14069	*Acacia desertorum var. nudipes*		P3	
11.	3366	*Acacia hemiteles*			
12.	15285	*Acacia heteroneura var. jutsonii*			
13.	12258	*Acacia inceana subsp. conformis*			
14.	3389	*Acacia intricata*			
15.	3393	*Acacia jennerae*			
16.	3440	*Acacia merrallii*			
17.	3458	*Acacia nigripilosa*			
18.	15479	*Acacia nigripilosa subsp. nigripilosa*			
19.	3494	*Acacia poliochroa*			
20.	16141	*Acacia pravifolia*			
21.	3512	*Acacia rendlei*			
22.	3524	*Acacia rossei*			
23.	23525	*Acacia steedmanii subsp. steedmanii*			
24.	3599	*Acacia warramaba*			
25.	15292	*Acacia yorkrakinensis subsp. acrita*			
26.	31602	*Acrotriche lancifolia*			
27.	1770	*Adenanthos argyreus (Little Woollybush)*			
28.	185	*Aira cupaniana (Silvery Hairgrass)*	Y		
29.	13904	*Allocasuarina acutivalvis subsp. acutivalvis*			
30.	1721	*Allocasuarina campestris*			
31.	1722	*Allocasuarina corniculata*			
32.	12655	*Allocasuarina spinosissima*			
33.	12025	*Amphipogon caricinus var. caricinus*			
34.	40903	*Androcalva aphrix*			
35.	7836	*Angianthus tomentosus (Camel-grass)*			
36.	7846	*Asteridea athrixioides*			
37.	2481	*Atriplex vesicaria (Bladder Saltbush)*			
38.	17241	*Austrostipa hemipogon*			
39.	17246	*Austrostipa nitida*			
40.	17249	*Austrostipa puberula*			
41.	17251	*Austrostipa scabra*			
42.	17255	*Austrostipa trichophylla*			
43.	5344	*Baeckea elderiana*			
44.	31153	*Baeckea grandibracteata subsp. Parker Range (K. Newbey 9270)*		P3	
45.	5389	*Beaufortia orbifolia (Ravensthorpe Bottlebrush)*			
46.	46826	*Beaufortia puberula (Hairy-leaved Beaufortia)*			
47.	4591	*Bertya dimerostigma*			
48.	34261	*Beyeria minor*			
49.	34276	*Beyeria sulcata var. brevipes*			
50.	4419	*Boronia fabianoides*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
51.	16628	*Boronia fabianoides subsp. rosea*			
52.	11201	*Boronia ternata var. ternata*			
53.	1267	*Borya constricta*			
54.	19437	*Brachysola coerulea*			
55.	253	*Bromus rubens (Red Brome)*	Y		
56.	15344	*Caladenia dimidia*			
57.	18023	*Caladenia horistes*			
58.	46535	*Caladenia incensum (Glistening spider orchid)*			
59.	15370	*Caladenia microchila*			
60.	15374	*Caladenia pachychila*			
61.	19280	*Caladenia paradoxa*			
62.	1614	*Caladenia roei (Ant Orchid)*			
63.	1617	*Caladenia sigmoidea*			
64.	18594	*Caladenia sp. Muddarning Hill (S.D. Hopper 4013)*			
65.	18019	*Caladenia vulgata*			
66.	19872	*Caladenia x tryphera*			
67.	15050	*Calamphoreus inflatus*		P4	
68.	2853	*Calandrinia eremaea (Twining Purslane)*			
69.	2862	*Calandrinia porifera*			
70.	92	*Callitris canescens*			
71.	8466	*Callitris columellaris (White Cypress Pine)*			
72.	97	*Callitris roei (Roe's Cypress Pine)*			
73.	13654	*Calytrix breviseta subsp. stipulosa*			
74.	5483	*Calytrix tetragona (Common Fringe-myrtle)*			
75.	2953	*Cassytha melantha (Large Dodder-laurel)*			
76.	2955	*Cassytha nodiflora*			
77.	1215	*Chamaexeros fimbriata*			
78.	35640	*Chamelaucium pauciflorum subsp. Perenjori (B.J. Conn 2181)*			
79.	15130	*Chamelaucium pauciflorum subsp. pauciflorum*			
80.	38341	*Chamelaucium sp. Parker Range (B.H. Smith 1255)*		P1	
81.	7925	*Chondrilla juncea (Skeleton Weed)*	Y		
82.	4566	*Comesperma volubile (Love Creeper)*			
83.	40923	*Commersonia craurophylla (Brittle Leaved Rulingia)*			
84.	8824	*Conospermum croniniae*			
85.	7419	*Coopernookia strophiolata*			
86.	7946	*Cotula cotuloides (Smooth Cotula)*			
87.	15400	*Cyanicula amplexans*			
88.	6747	*Cyanostegia angustifolia (Tinsel-flower)*			
89.	6751	*Cyanostegia microphylla (Tinsel Flower)*			
90.	7458	*Dampiera obliqua*			
91.	37041	*Dampiera sp. Forrestania (F. Lullfitz L 4034)*			
92.	7477	*Dampiera stenostachya (Narrow-spiked Dampiera)*			
93.	6218	*Daucus glochidiatus (Australian Carrot)*			
94.	16576	*Daviesia argillacea*			
95.	3802	*Daviesia croniniana*			
96.	16585	*Daviesia nudiflora subsp. nudiflora*			
97.	16587	*Daviesia rubiginosa*			
98.	6771	*Dicrastylis parvifolia*			
99.	10858	*Diuris picta*			
100.	4756	*Dodonaea caespitosa*			
101.	4769	*Dodonaea lobulata (Bead Hopbush)*			
102.	12034	*Dodonaea microzyga var. acrolobata*			
103.	3088	*Drosera andersoniana (Sturdy Sundew)*			
104.	13224	*Drosera browniana*			
105.	4459	*Drummondita hassellii*			
106.	14104	*Eremaea pauciflora var. pauciflora*			
107.	13641	*Eremophila caerulea subsp. merrallii*		P4	
108.	17156	*Eremophila clavata*			
109.	14895	*Eremophila decipiens subsp. decipiens*			
110.	7200	*Eremophila drummondii*			
111.	7219	*Eremophila granitica (Thin-leaved Poverty Bush)*			
112.	15112	*Eremophila interstans subsp. interstans*			
113.	7226	*Eremophila ionantha (Violet-flowered Eremophila)*			
114.	7240	*Eremophila metallicorum*			
115.	18570	*Eremophila oppositifolia subsp. angustifolia*			
116.	7264	*Eremophila saligna (Willowy Eremophila)*			
117.	7267	*Eremophila scoparia (Broom Bush ()*			
118.	17162	*Eremophila subfloccosa subsp. lanata*			
119.	20718	*Ericksonella saccharata*			
120.	2514	*Eriochiton sclerolaenoides (Woolly Bindii)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
121.	5579	*Eucalyptus calycogona (Gooseberry Mallee)*			
122.	19508	*Eucalyptus calycogona subsp. calycogona*			
123.	46476	*Eucalyptus calycogona subsp. miraculum*			
124.	12904	*Eucalyptus capillosa*			
125.	14300	*Eucalyptus celastroides subsp. celastroides (Mirret)*			
126.	5607	*Eucalyptus corrugata (Rough-fruited Mallee)*			
127.	5612	*Eucalyptus cylindrocarpa (Woodline Mallee)*			
128.	13515	*Eucalyptus exigua*		P3	
129.	12377	*Eucalyptus extensa*			
130.	5648	*Eucalyptus flocktoniae (Merrit, Merid)*			
131.	5665	*Eucalyptus griffithsii (Griffith's Grey Gum)*			
132.	5673	*Eucalyptus horistes*			
133.	15743	*Eucalyptus incerata (Mount Day Mallee)*			
134.	20404	*Eucalyptus kochii subsp. yellowdinensis*			
135.	13059	*Eucalyptus leptopoda subsp. leptopoda*			
136.	12901	*Eucalyptus livida (Mallee Wandoo)*			
137.	5701	*Eucalyptus longicornis (Red Morrel, Moril)*			
138.	20802	*Eucalyptus longissima*			
139.	5711	*Eucalyptus melanoxylon (Black Morrel)*			
140.	19323	*Eucalyptus moderata*			
141.	5717	*Eucalyptus myriadena*			
142.	13513	*Eucalyptus myriadena subsp. myriadena*			
143.	13524	*Eucalyptus olivina*			
144.	5742	*Eucalyptus petraea (Granite Rock Box)*			
145.	19666	*Eucalyptus phenax subsp. phenax*			
146.	5747	*Eucalyptus platycorys (Boorabbin Mallee)*			
147.	13520	*Eucalyptus polita*			
148.	19064	*Eucalyptus prolixa*			
149.	5761	*Eucalyptus rigidula (Stiff-leaved Mallee)*			
150.	12693	*Eucalyptus salicola (Salt Gum)*			
151.	5767	*Eucalyptus salubris (Gimlet)*			
152.	5772	*Eucalyptus sheathiana (Ribbon-barked Gum)*			
153.	41527	*Eucalyptus sp. Dunbar Road (D. Nicolle & M. French DN 5466)*			
154.	13027	*Eucalyptus tenera*			
155.	5793	*Eucalyptus transcontinentalis (Redwood, Pungul)*			
156.	18293	*Eucalyptus urna*			
157.	34775	*Eucalyptus vittata*			
158.	5802	*Eucalyptus yilgarnensis (Yorrell)*			
159.	17027	*Euryomyrtus leptospermoides*			
160.	16722	*Euryomyrtus maidenii*			
161.	20741	*Eutaxia lasiocalyx*		P2	
162.	10977	*Exocarpos aphyllus (Leafless Ballart)*			
163.	5204	*Frankenia interioris*			
164.	3900	*Gastrolobium floribundum (Wodjil Poison)*			
165.	10981	*Gastrolobium parviflorum*			
166.	3943	*Glycyrrhiza acanthocarpa (Native Liquorice)*			
167.	7991	*Gnephosis drummondii*			
168.	8003	*Gnephosis tridens*			
169.	10777	*Gompholobium gompholobioides*			
170.	10969	*Gompholobium hendersonii*			
171.	3959	*Gompholobium viscidulum*			
172.	7495	*Goodenia berardiana*			
173.	7504	*Goodenia dyeri*			
174.	19349	*Goodenia heatheriana*		P1	
175.	7527	*Goodenia mimuloides*			
176.	7531	*Goodenia occidentalis*			
177.	7534	*Goodenia pinifolia (Pine-leaved Goodenia)*			
178.	7535	*Goodenia pinnatifida (Cutleaf Goodenia)*			
179.	1949	*Grevillea acuaria*			
180.	8830	*Grevillea ceratocarpa*			
181.	15769	*Grevillea eremophila*			
182.	2018	*Grevillea huegelii*			
183.	8834	*Grevillea incrassata*			
184.	15981	*Grevillea obliquistigma subsp. obliquistigma*			
185.	2055	*Grevillea oncogyne*			
186.	2142	*Hakea commutata*			
187.	2163	*Hakea francisiana (Emu Tree)*			
188.	12231	*Hakea newbeyana*			
189.	12232	*Hakea pendens*		P3	
190.	2195	*Hakea platysperma (Cricket Ball Hakea)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
191.	2211	*Hakea subsulcata*			
192.	2217	*Hakea verrucosa*			
193.	6684	*Halgania andromedifolia*			
194.	6180	*Haloragis trigonocarpa*			
195.	6862	*Hemigenia pedunculata*			
196.	5122	*Hibbertia eatoniae*			
197.	5124	*Hibbertia exasperata*			
198.	5813	*Homalocalyx pulcherrimus*			
199.	5221	*Hybanthus floribundus*			
200.	6228	*Hydrocotyle corynophora*		P1	
201.	48652	*Hysterobaeckea petraea*			
202.	9	*Isoetes caroli*			
203.	8087	*Isoetopsis graminifolia (Cushion Grass)*			
204.	25898	*Isopogon robustus*		T	Y
205.	16812	*Isopogon scabriusculus subsp. pubifloris*			
206.	13284	*Lawrencella rosea*			
207.	1306	*Laxmannia paleacea*			
208.	3028	*Lepidium genistoides*		P3	
209.	3031	*Lepidium merrallii*		P2	
210.	41649	*Lepidosperma rigidulum*			
211.	41647	*Lepidosperma sanguinolentum*			
212.		*Lepidosperma sp.*			
213.	30475	*Lepidosperma sp. Mt Caudan (N. Gibson & M. Lyons 2081)*		P1	Y
214.	30438	*Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)*		P1	
215.	4056	*Leptosema daviesioides*			
216.	20870	*Leucopogon sp. Avon (J. Buegge D34)*			
217.	41770	*Leucopogon sp. Boorabbin (K.R. Newbey 8374)*			
218.	41768	*Leucopogon sp. Forrestania (G.F. Craig 2386)*			
219.	19517	*Leucopogon sp. outer wheatbelt (M. Hislop 30)*			
220.	31798	*Leucopogon validus*		P1	Y
221.	2533	*Maireana amoena*			
222.	15063	*Melaleuca acuminata subsp. acuminata*			
223.	5908	*Melaleuca eleuterostachya*			
224.	19450	*Melaleuca grieveana*		P1	
225.	19486	*Melaleuca hamata*			
226.	5925	*Melaleuca lateriflora (Gorada)*			
227.	5929	*Melaleuca leiocarpa*			
228.	5947	*Melaleuca pauperiflora (Boree)*			
229.	15663	*Melaleuca pauperiflora subsp. fastigiata*			
230.	5958	*Melaleuca radula (Graceful Honeymyrtle)*			
231.	5967	*Melaleuca sparsiflora*			
232.	5979	*Melaleuca teuthidoides*			
233.	20289	*Melaleuca vinnula*			
234.	2814	*Mesembryanthemum nodiflorum (Slender Iceplant)*	Y		
235.	18316	*Microcorys sp. Forrestania (V. English 2004)*		P4	
236.	18045	*Microcybe multiflora subsp. baccharoides*			
237.	18046	*Microcybe multiflora subsp. multiflora*			
238.	9187	*Micromyrtus erichsenii*			
239.	6000	*Micromyrtus racemosa*			
240.	46735	*Microseris walteri*		P3	
241.	14382	*Microtis eremaea*			
242.	14338	*Millotia newbeyi*		P1	
243.	12631	*Millotia perpusilla*			
244.	19180	*Moraea miniata (Two-leaf Cape Tulip)*	Y		
245.	48227	*Notisia intonsa*		P3	
246.	8139	*Olearia magniflora*			
247.	8140	*Olearia muelleri (Goldfields Daisy)*			
248.	8145	*Olearia pimeleoides (Pimelea Daisybush, Burrobunga)*			
249.	44401	*Olearia sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628)*			
250.	5227	*Opuntia stricta (Common Prickly Pear)*	Y		
251.	40423	*Pentameris airoides (False Hairgrass)*	Y		
252.	15630	*Persoonia inconspicua*			
253.	2270	*Persoonia quinquenervis*			
254.	4500	*Phebalium filifolium (Slender Phebalium)*			
255.	16556	*Phebalium megaphyllum*			
256.	4504	*Phebalium tuberculosum*			
257.	6812	*Pityrodia lepidota*			
258.	8181	*Podolepis tepperi*			
259.	16688	*Prasophyllum gracile*			
260.	1682	*Prasophyllum sargentii*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
261.	6917	*Prostanthera incurvata*			
262.	1689	*Pterostylis mutica (Midget Greenhood)*			
263.	10778	*Pterostylis picta*			
264.	12216	*Pterostylis roensis*			
265.	1696	*Pterostylis sargentii (Frog Greenhood)*			
266.	18657	*Pterostylis sp. inland (A.C. Beauglehole 11880)*			
267.	13305	*Rhodanthe heterantha*			
268.	13249	*Rhodanthe oppositifolia subsp. oppositifolia*			
269.	13253	*Rhodanthe rubella*			
270.	48265	*Rinzia fimbriolata (Wheatbelt Rinzia)*		P1	
271.	48264	*Rinzia medifila (Parker Range Rinzia)*		P1	
272.	48266	*Rinzia torquata (Necklace Rinzia)*		P3	
273.	40425	*Rytidosperma caespitosum*			
274.	40427	*Rytidosperma setaceum*			
275.	2356	*Santalum acuminatum (Quandong, Warnga)*			
276.	7644	*Scaevola spinescens (Currant Bush, Maroon)*			
277.	993	*Schoenus hexandrus*			
278.	1002	*Schoenus nanus (Tiny Bog Rush)*			
279.	2609	*Sclerolaena diacantha (Grey Copperburr)*			
280.	2626	*Sclerolaena parviflora (Small-flower Saltbush)*			
281.	12276	*Senna artemisioides subsp. filifolia*			
282.	17558	*Senna artemisioides subsp. x artemisioides*			
283.	46824	*Seringia velutina (Velvet firebush)*			
284.	8226	*Siloxerus pygmaeus*			
285.	7025	*Solanum oldfieldii*			
286.	2917	*Stellaria filiformis (Thread Spurry)*			
287.	31712	*Stenanthemum bremerense*		P4	
288.	7785	*Stylidium repens (Matted Triggerplant)*			
289.	16761	*Synaphea interioris*			
290.	15534	*Synaphea spinulosa subsp. major*			
291.	31492	*Tecticornia disarticulata*			
292.	46513	*Tecticornia doliiformis*			
293.	33319	*Tecticornia indica subsp. bidens*			
294.	4248	*Templetonia aculeata*			
295.	42065	*Tetrapora tenuiramea*			
296.	20732	*Thelymitra petrophila*			
297.	6058	*Thryptomene kochii*			
298.	1343	*Thysanotus patersonii*			
299.	4737	*Tripterococcus brunonis (Winged Stackhousia)*			
300.	16986	*Trymalium myrtillus subsp. myrtillus*			
301.	12388	*Verticordia acerosa var. preissii*			
302.	6073	*Verticordia chrysantha*			
303.	12422	*Verticordia eriocephala (Common Cauliflower)*			
304.	6087	*Verticordia helmsii*			
305.	12432	*Verticordia inclusa*			
306.	12442	*Verticordia mitodes*		P3	
307.	12445	*Verticordia multiflora subsp. solox*		P2	
308.	6109	*Verticordia picta (Painted Featherflower)*			
309.	12451	*Verticordia plumosa var. incrassata*			
310.	6113	*Verticordia pritzelii (Pritzel's Featherflower)*			
311.	6114	*Verticordia rennieana*			
312.	6121	*Verticordia stenopetala*		P3	
313.	724	*Vulpia myuros (Rat's Tail Fescue)*	Y		
314.	8275	*Waitzia acuminata (Orange Immortelle)*			
315.	46093	*Waitzia fitzgibbonii*			
316.	6938	*Westringia cephalantha*			
317.	9247	*Westringia rigida (Stiff Westringia)*			
318.	1396	*Wurmbea graniticola*			

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

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely 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 datasource, only records from that datasource are used to determine if a species is restricted to the query area.

APPENDIX C EPBC PROTECTED MATTERS SEARCH TOOL

Australian Government
Department of the Environment and Energy

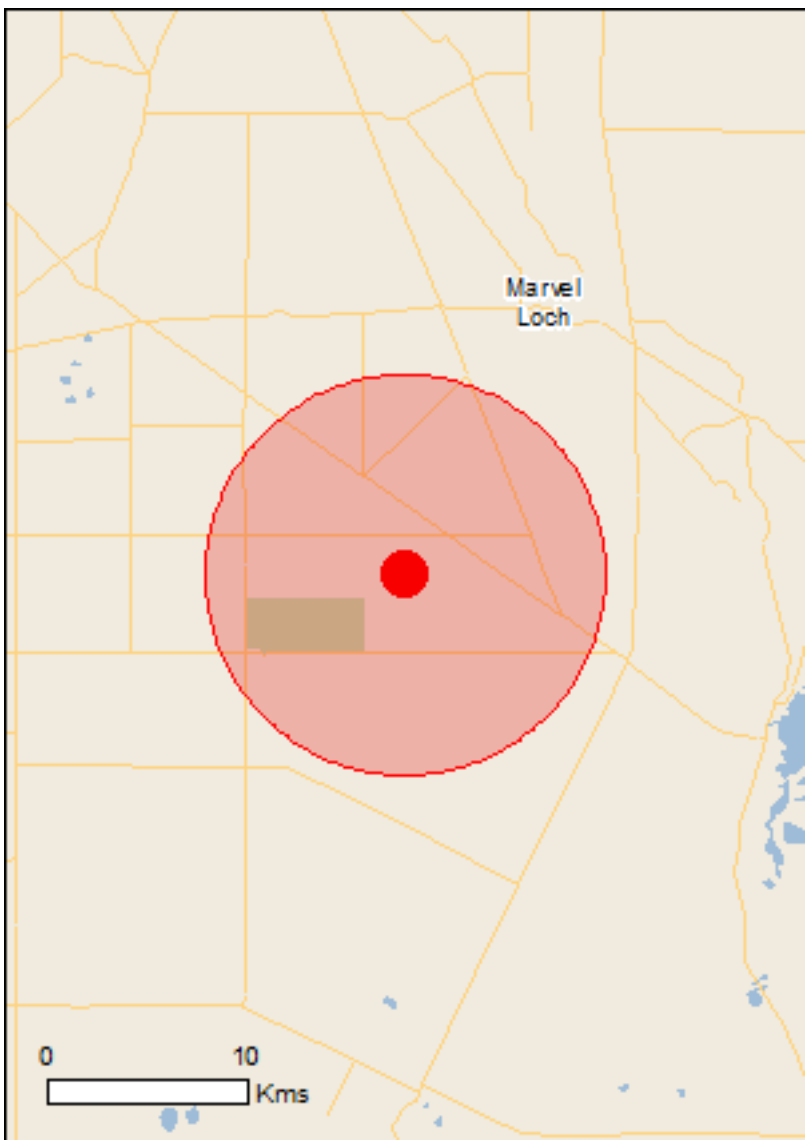
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

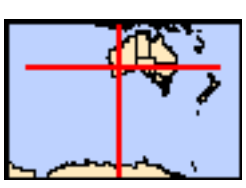
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 30/01/20 17:09:23



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	7
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	10
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	13
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Plants		
Acacia lobulata Chiddarcooping Wattle [55567]	Endangered	Species or species habitat may occur within area
Dasymalla axillaris Native Foxglove [38829]	Critically Endangered	Species or species habitat may occur within area
Isopogon robustus Robust Coneflower [82646]	Critically Endangered	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Plants		
Carrichtera annua Ward's Weed [9511]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.57037 119.42443

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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APPENDIX D FLORA SURVEY SITE DATA

Site	Date	Northing	Easting	Vegetation type	Soil Colour	Soil Type	Rock type	Time since fire	Condition
P 1	16/12/2020	6504420.052	729654.5862	MuAy	Grey - red	Sandy - loam	None	>5 years	Excellent
P 2	16/12/2020	6504535.949	729978.911	MuAy	Grey - red	Sandy - loam	None	>5 years	Excellent
P 9	16/12/2020	6504334.9	730438.1641	CcEc	Grey - red	Sandy - loam	None	>5 years	Very Good
P10	16/12/2020	6504629.039	730701.3265	CcEc	Grey - red	Sandy - loam	None	>5 years	Very Good
P12	16/12/2020	6504329.772	730720.6966	ExAh	Grey - red	Sandy - loam	None	>5 years	Very Good to Excellent
P13	17/12/2020	6503477.289	728649.8005	AsMu	Grey - red	Sandy - loam	None	>5 years	Excellent
P14	17/12/2020	6503498.714	728708.1965	AsMu	Grey - red	Sandy - loam	None	>5 years	Excellent
P15	17/12/2020	6503503.176	728773.4659	AsMu	Grey - red	Sandy - loam	None	>5 years	Excellent
P16	17/12/2020	6503547.111	728905.7412	AsMu	Grey - red	Sandy - loam	None	>5 years	Excellent
P17	17/12/2020	6503526.799	728970.8531	AsMu	Grey - red	Sandy - loam	None	>5 years	Excellent
P18	17/12/2020	6503319.635	729054.2887	ExAh	Grey - red	Sandy - loam	None	>5 years	Very Good to Excellent
P19	17/12/2020	6503213.019	728766.8524	AsMu	Grey - red	Sandy - loam	None	>5 years	Excellent
P20	17/12/2020	6503081.885	728409.5399	EcEr	Grey - red	Sandy - loam	None	>5 years	Excellent
P21	17/12/2020	6502899.626	728505.4453	EcEr	Grey - red	Sandy - loam	None	>5 years	Excellent
P22	17/12/2020	6503064.657	728830.9112	AsMu	Grey - red	Sandy - loam	None	>5 years	Excellent
P23	17/12/2020	6503078.144	729095.418	ExAh	Grey - red	Sandy - loam	None	>5 years	Very Good to Excellent
P24	17/12/2020	6502724.713	729463.2341	AsCc	Grey - red	Sandy - loam	None	>5 years	Excellent
P24	17/12/2020	6502988.671	729673.219	ExAh	Grey - red	Sandy - loam	None	>5 years	Very Good to Excellent
P25	17/12/2020	6503505.046	730086.7658	AsMu	Grey - red	Sandy - loam	None	>5 years	Excellent
P26	17/12/2020	6503688.025	730139.4457	EcEe	Grey - red	Sandy - loam	None	>5 years	Very Good
P27	17/12/2020	6503779.349	730128.3315	EcEe	Grey - red	Sandy - loam	None	>5 years	Very Good
P29	17/12/2020	6503849.033	730228.7542	AsCc	Grey - red	Sandy - loam	None	>5 years	Excellent
P30	17/12/2020	6503845.477	730472.5837	AsCc	Grey - red	Sandy - loam	None	>5 years	Excellent
P31	17/12/2020	6504910.007	729297.3681	EcEe	Grey - red	Sandy - loam	None	>5 years	Very Good
P32	17/12/2020	6504948.606	729304.9874	MuAy	Grey - red	Sandy - loam	None	>5 years	Excellent
P35	17/12/2020	6505055.77	729346.1327	MuAy	Grey - red	Sandy - loam	None	>5 years	Excellent
P40	17/12/2020	6505323.832	729285.1394	MuAy	Grey - red	Sandy - loam	None	>5 years	Excellent
P41	17/12/2020	6505557.307	729280.3455	MuAy	Grey - red	Sandy - loam	None	>5 years	Excellent

Site	Date	Northing	Easting	Vegetation type	Soil Colour	Soil Type	Rock type	Time since fire	Condition
P42	17/12/2020	6505633.236	729286.4406	MuAy	Grey - red	Sandy - loam	None	>5 years	Excellent
P43	17/12/2020	6505872.233	729298.7452	MuAy	Grey - red	Sandy - loam	None	>5 years	Excellent
P44	17/12/2020	6506010.88	729303.3414	MuAy	Grey - red	Sandy - loam	None	>5 years	Excellent
PR01	16/12/2020	6505520.644	730154.9084	EcEe	Grey - red	Sandy - loam	None	>5 years	Very Good
PR02	16/12/2020	6505511.921	730158.3217	EcEe	Grey - red	Sandy - loam	None	>5 years	Very Good
PR03	16/12/2020	6505467.484	730136.0631	AsMu	Grey - red	Sandy - loam	None	>5 years	Excellent
PR04	16/12/2020	6505379.21	730124.5129	AsMu	Grey - red	Sandy - loam	None	>5 years	Excellent
PR05	16/12/2020	6504915.727	729779.1446	MuAy	Grey - red	Sandy - loam	None	>5 years	Excellent
PR06	16/12/2020	6504702.29	729743.9294	MuAy	Grey - red	Sandy - loam	None	>5 years	Excellent
PR07	16/12/2020	6504633.251	729710.6848	MuAy	Grey - red	Sandy - loam	None	>5 years	Excellent
PR08	16/12/2020	6504273.749	730404.4027	AsMu	Grey - red	Sandy - loam	None	>5 years	Excellent
PR09	17/12/2020	6503423.77	728508.4144	MuAy	Grey - red	Sandy - loam	None	>5 years	Excellent
PR10	17/12/2020	6503528.891	728787.1817	AsMu	Grey - red	Sandy - loam	None	>5 years	Excellent
PR11	17/12/2020	6503077.675	728904.9535	AsMu	Grey - red	Sandy - loam	None	>5 years	Excellent

APPENDIX E TRACK LOG

727000 728000 729000 730000 731000 732000

6506000

6505000

6504000

6503000

Lot 451

Parker Range tracks

ecologia ENVIRONMENT

Project: Parker Range Reconnaisannce Survey
Date: 19 November 2019
Author: RS
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Absolute Scale: 1:15,000 @A3

Track log

0 0.4 0.8

Kilometers

APPENDIX F REPERESENTATIVE VEGETATION PHOTOS

Allocasuarina woodland

Vegetation type: AsCc

Vegetation type: AsMu

Callitris woodland

Vegetation type: CcEc

Eucalypt woodland

Vegetation type: EcEe

Vegetation type EcEr

Shrubland

Vegetation type: ExAh

Melaleuca and *Acacia* woodland

Vegeatation type MuAy

Appendix 2
Desktop Survey Results

Australian Government
Department of the Environment and Energy

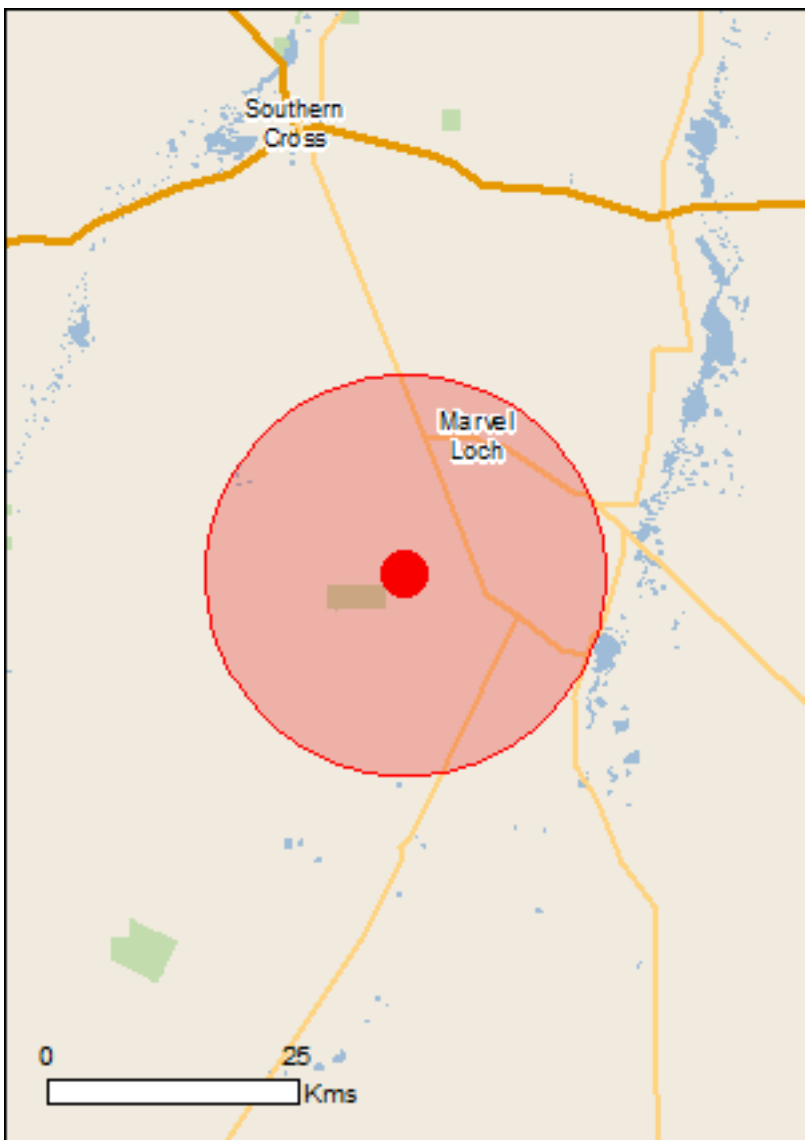
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

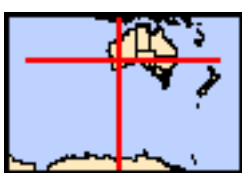
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 11/12/19 13:14:11



Coordinates
Buffer: 20.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	11
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	14
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Plants		
Acacia lobulata Chiddarcooping Wattle [55567]	Endangered	Species or species habitat may occur within area
Banksia sphaerocarpa var. dolichostyla Ironcaps Banksia, Ironcap Banksia [10518]	Vulnerable	Species or species habitat may occur within area
Dasymalla axillaris Native Foxglove [38829]	Critically Endangered	Species or species habitat may occur within area
Eremophila viscida Varnish Bush [2394]	Endangered	Species or species habitat may occur within area
Isopogon robustus Robust Coneflower [82646]	Critically Endangered	Species or species habitat known to occur within area
Roycea pycnophylloides Saltmat [21161]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
[Symonanthus bancroftii](#) Bancrofts Symonanthus [12837]	Endangered	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat may occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat may occur within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardea alba](#) Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
[Ardea ibis](#) Cattle Egret [59542]		Species or species habitat may occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Thinornis rubricollis		
Hooded Plover [59510]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Wockallarry	WA

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia		
Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia senegalensis		
Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris		
Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus		
Goat [2]		Species or species habitat likely to occur within area
Equus asinus		
Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus		
Horse [5]		Species or species habitat likely to occur within area
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus		
House Mouse [120]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Carrichtera annua Ward's Weed [9511]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.57219 119.42268

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Jeremy Shepherdson on 11/12/2019

Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	119° 25' 12" E,31° 34' 12" S
Buffer	20km
Group By	Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	590	2214
Other specially protected fauna	1	1
Priority 1	13	49
Priority 2	6	47
Priority 3	13	92
Priority 4	5	13
Rare or likely to become extinct	4	41
TOTAL	**632**	**2457**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Rare or likely to become extinct					
1.	25898	*Isopogon robustus*		T	Y
2.	24557	*Leipoa ocellata (Malleefowl)*		T	
3.	24168	*Macrotis lagotis (Bilby, Dalgyte, Ninu)*		T	
4.	24142	*Petrogale lateralis subsp. lateralis (Black-flanked Rock-wallaby, Black-footed Rock-wallaby)*		T	
Other specially protected fauna					
5.	24098	*Phascogale calura (Red-tailed Phascogale, Kenngoor)*		S	
Priority 1					
6.	38341	*Chamelaucium sp. Parker Range (B.H. Smith 1255)*		P1	
7.	33942	*Daphnia jollyi (water flea (inland south west))*		P1	
8.	19349	*Goodenia heatheriana*		P1	
9.	2064	*Grevillea phillipsiana*		P1	
10.	6860	*Hemigenia obovata*		P1	
11.	6228	*Hydrocotyle corynophora*		P1	
12.	30475	*Lepidosperma sp. Mt Caudan (N. Gibson & M. Lyons 2081)*		P1	Y
13.	30438	*Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)*		P1	
14.	31798	*Leucopogon validus*		P1	Y
15.	19450	*Melaleuca grieveana*		P1	
16.	14338	*Millotia newbeyi*		P1	
17.	48265	*Rinzia fimbriolata (Wheatbelt Rinzia)*		P1	
18.	48264	*Rinzia medifila (Parker Range Rinzia)*		P1	
Priority 2					
19.	14052	*Acacia asepala*		P2	
20.	14618	*Acacia concolorans*		P2	
21.	20741	*Eutaxia lasiocalyx*		P2	
22.	3031	*Lepidium merrallii*		P2	
23.	20645	*Lissanthe scabra*		P2	
24.	12445	*Verticordia multiflora subsp. solox*		P2	
Priority 3					
25.	14623	*Acacia crenulata*		P3	
26.	14069	*Acacia desertorum var. nudipes*		P3	
27.	31153	*Baeckea grandibracteata subsp. Parker Range (K. Newbey 9270)*		P3	
28.	13515	*Eucalyptus exigua*		P3	
29.	12232	*Hakea pendens*		P3	
30.	19690	*Hibbertia lepidocalyx subsp. tuberculata*		P3	
31.	8	*Isoetes brevicula*		P3	
32.	3028	*Lepidium genistoides*		P3	
33.	46735	*Microseris walteri*		P3	
34.	48227	*Notisia intonsa*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
				P3	
35.	48266	*Rinzia torquata (Necklace Rinzia)*		P3	
36.	12442	*Verticordia mitodes*		P3	
37.	6121	*Verticordia stenopetala*		P3	

Priority 4

38.	33902	*Aganippe castellum (Tree-stem Trapdoor Spider)*		P4	
39.	15050	*Calamphoreus inflatus*		P4	
40.	13641	*Eremophila caerulea subsp. merrallii*		P4	
41.	18316	*Microcorys sp. Forrestania (V. English 2004)*		P4	
42.	31712	*Stenanthemum bremerense*		P4	

Non-conservation taxon

43.	3200	*Acacia acuminata (Jam, Mangard)*			
44.	15467	*Acacia assimilis subsp. assimilis*			
45.	3236	*Acacia beauverdiana (Pukkati)*			
46.	3251	*Acacia camptoclada*			
47.	3264	*Acacia colletioides (Wait-a-while)*			
48.	16117	*Acacia consanguinea*			
49.	16169	*Acacia deficiens*			
50.	3292	*Acacia densiflora*			
51.	3318	*Acacia enervia*			
52.	16168	*Acacia enervia subsp. enervia*			
53.	3324	*Acacia erinacea*			
54.	3366	*Acacia hemiteles*			
55.	15285	*Acacia heteroneura var. jutsonii*			
56.	12258	*Acacia inceana subsp. conformis*			
57.	3389	*Acacia intricata*			
58.	3393	*Acacia jennerae*			
59.	3440	*Acacia merrallii*			
60.	3455	*Acacia neurophylla*			
61.	3458	*Acacia nigripilosa*			
62.	15479	*Acacia nigripilosa subsp. nigripilosa*			
63.	3463	*Acacia nyssophylla*			
64.	3478	*Acacia pachypoda*			
65.	3494	*Acacia poliochroa*			
66.	16141	*Acacia pravifolia*			
67.	3512	*Acacia rendlei*			
68.	3524	*Acacia rossei*			
69.	23525	*Acacia steedmanii subsp. steedmanii*			
70.	3599	*Acacia warramaba*			
71.	15292	*Acacia yorkrakinensis subsp. acrita*			
72.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
73.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
74.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
75.	24265	*Acanthiza uropygialis (Chestnut-rumped Thornbill)*			
76.	31602	*Acrotriche lancifolia*			
77.	7817	*Actinobole uliginosum (Flannel Cudweed)*			
78.	1770	*Adenanthos argyreus (Little Woollybush)*			
79.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
80.		*Agraptocorixa parvipunctata*			
81.	184	*Aira caryophyllea (Silvery Hairgrass)*	Y		
82.	185	*Aira cupaniana (Silvery Hairgrass)*	Y		
83.	1720	*Allocasuarina acutivalvis*			
84.	13904	*Allocasuarina acutivalvis subsp. acutivalvis*			
85.	1721	*Allocasuarina campestris*			
86.	1722	*Allocasuarina corniculata*			
87.	12655	*Allocasuarina spinosissima*			
88.		*Allodessus bistrigatus*			
89.		*Alona rectangula novaezealandiae*			
90.		*Alona rigidicaudis*			
91.		*Alona sp. nov. b (Venemores)*			
92.	6565	*Alyxia buxifolia (Dysentery Bush)*			
93.	12025	*Amphipogon caricinus var. caricinus*			
94.	2380	*Amyema miquelii (Stalked Mistletoe)*			
95.		*Aname mainae*			
96.		*Anax papuensis*			
97.	40903	*Androcalva aphrix*			
98.	7836	*Angianthus tomentosus (Camel-grass)*			
99.		*Anisops sp.*			
100.	24561	*Anthochaera carunculata (Red Wattlebird)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
101.	24285	*Aquila audax (Wedge-tailed Eagle)*			
102.	7838	*Arctotheca calendula (Cape Weed, African Marigold)*	Y		
103.	207	*Aristida contorta (Bunched Kerosene Grass)*			
104.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
105.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
106.	24356	*Artamus personatus (Masked Woodswallow)*			
107.	1265	*Arthropodium curvipes*			
108.	25236	*Aspidites ramsayi (Woma)*			
109.	7846	*Asteridea athrixioides*			
110.	6336	*Astroloma serratifolium (Kondrung)*			
111.		*Atelomastix bamfordi*			
112.	2481	*Atriplex vesicaria (Bladder Saltbush)*			
113.		*Austrolestes aridus*			
114.	17237	*Austrostipa elegantissima*			
115.	17241	*Austrostipa hemipogon*			
116.	17246	*Austrostipa nitida*			
117.	17249	*Austrostipa puberula*			
118.	17251	*Austrostipa scabra*			
119.	17255	*Austrostipa trichophylla*			
120.		*Backobourkia heroine*			
121.	5344	*Baeckea elderiana*			
122.		*Barnardius zonarius*			
123.	5389	*Beaufortia orbifolia (Ravensthorpe Bottlebrush)*			
124.	46826	*Beaufortia puberula (Hairy-leaved Beaufortia)*			
125.		*Bennelongia gnamma (ex. sp. 563)*			
126.		*Berosus sp.*			
127.	4591	*Bertya dimerostigma*			
128.	4592	*Beyeria brevifolia*			
129.	34261	*Beyeria minor*			
130.	34276	*Beyeria sulcata var. brevipes*			
131.		*Bezzia sp. (not 1 or 2)*			
132.		*Bezzia sp. 1 (SAP)*			
133.	7856	*Blennospora drummondii*			
134.		*Boeckella opaqua*			
135.	4419	*Boronia fabianoides*			
136.	16628	*Boronia fabianoides subsp. rosea*			
137.	11201	*Boronia ternata var. ternata*			
138.	1267	*Borya constricta*			
139.	7882	*Brachyscome perpusilla*			
140.	19437	*Brachysola coerulea*			
141.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
142.	253	*Bromus rubens (Red Brome)*	Y		
143.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
144.	15344	*Caladenia dimidia*			
145.	18023	*Caladenia horistes*			
146.	46535	*Caladenia incensum (Glistening spider orchid)*			
147.	15370	*Caladenia microchila*			
148.	15374	*Caladenia pachychila*			
149.	19280	*Caladenia paradoxa*			
150.	1614	*Caladenia roei (Ant Orchid)*			
151.	1617	*Caladenia sigmoidea*			
152.	18594	*Caladenia sp. Muddarning Hill (S.D. Hopper 4013)*			
153.	18019	*Caladenia vulgata*			
154.	19872	*Caladenia x tryphera*			
155.	2853	*Calandrinia eremaea (Twining Purslane)*			
156.	2862	*Calandrinia porifera*			
157.	92	*Callitris canescens*			
158.	8466	*Callitris columellaris (White Cypress Pine)*			
159.	96	*Callitris preissii (Rottnest Island Pine, Maro)*			
160.	97	*Callitris roei (Roe's Cypress Pine)*			
161.	5408	*Calothamnus gilesii*			
162.	35716	*Calothamnus quadrifidus subsp. petraeus*			
163.	7903	*Calotis hispidula (Bindy Eye)*			
164.	13654	*Calytrix breviseta subsp. stipulosa*			
165.	5483	*Calytrix tetragona (Common Fringe-myrtle)*			
166.	2953	*Cassytha melantha (Large Dodder-laurel)*			
167.	2955	*Cassytha nodiflora*			
168.	1121	*Centrolepis aristata (Pointed Centrolepis)*			
169.	1126	*Centrolepis eremica*			
170.	1133	*Centrolepis pilosa*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
171.	24086	*Cercartetus concinnus (Western Pygmy-possum, Mundarda)*			
172.		*Ceriodaphnia quadrangula s.l.*			
173.	1215	*Chamaexeros fimbriata*			
174.	35640	*Chamelaucium pauciflorum subsp. Perenjori (B.J. Conn 2181)*			
175.	15130	*Chamelaucium pauciflorum subsp. pauciflorum*			
176.	31	*Cheilanthes austrotenuifolia*			
177.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
178.	47909	*Cheramoeca leucosterna (White-backed Swallow)*			
179.		*Chironomus aff. alternans (V24) (CB)*			
180.		*Chironomus tepperi*			
181.	7925	*Chondrilla juncea (Skeleton Weed)*	Y		
182.	24980	*Christinus marmoratus (Marbled Gecko)*			
183.		*Cladopelma curtivalva*			
184.		*Cloeon sp.*			
185.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
186.	4566	*Comesperma volubile (Love Creeper)*			
187.	40923	*Commersonia craurophylla (Brittle Leaved Rulingia)*			
188.		*Compterosmittia? sp. A (SAP)*			
189.	8824	*Conospermum croniniae*			
190.	7419	*Coopernookia strophiolata*			
191.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
192.	24416	*Corvus bennetti (Little Crow)*			
193.	25592	*Corvus coronoides (Australian Raven)*			
194.	7946	*Cotula cotuloides (Smooth Cotula)*			
195.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
196.	25595	*Cracticus tibicen (Australian Magpie)*			
197.	25596	*Cracticus torquatus (Grey Butcherbird)*			
198.	3137	*Crassula colorata (Dense Stonecrop)*			
199.	3139	*Crassula exserta*			
200.	3142	*Crassula natans*	Y		
201.	24918	*Crenadactylus ocellatus subsp. ocellatus (Clawless Gecko)*			
202.	4811	*Cryptandra spyridioides*			
203.	16195	*Cryptandra wilsonii*			
204.	25020	*Cryptoblepharus plagiocephalus*			
205.		*Cryptochironomus griseidorsum*			
206.	24871	*Ctenophorus cristatus (Bicycle Dragon)*			
207.	24879	*Ctenophorus maculatus subsp. griseus (Spotted Military Dragon)*			
208.	24886	*Ctenophorus reticulatus (Western Netted Dragon)*			
209.	25052	*Ctenotus leonhardii*			
210.	25080	*Ctenotus uber subsp. uber (Spotted Ctenotus)*			
211.	15400	*Cyanicula amplexans*			
212.	6747	*Cyanostegia angustifolia (Tinsel-flower)*			
213.	6751	*Cyanostegia microphylla (Tinsel Flower)*			
214.		*Cypretta baylyi*			
215.	7458	*Dampiera obliqua*			
216.	37041	*Dampiera sp. Forrestania (F. Lullfitz L 4034)*			
217.	7477	*Dampiera stenostachya (Narrow-spiked Dampiera)*			
218.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
219.	6218	*Daucus glochidiatus (Australian Carrot)*			
220.	16576	*Daviesia argillacea*			
221.	3802	*Daviesia croniniana*			
222.	3813	*Daviesia grahamii*			
223.	16585	*Daviesia nudiflora subsp. nudiflora*			
224.	16587	*Daviesia rubiginosa*			
225.	25766	*Delma fraseri (Fraser's Legless Lizard)*			
226.	1259	*Dianella revoluta (Blueberry Lily)*			
227.	11636	*Dianella revoluta var. divaricata*			
228.	6771	*Dicrastylis parvifolia*			
229.		*Dicrotendipes 'CA1' wheatbelt (was lindae) (SAP)*			
230.		*Diplacodes bipunctata*			
231.	25469	*Diplodactylus granariensis*			
232.	24940	*Diplodactylus pulcher*			
233.	10858	*Diuris picta*			
234.	4756	*Dodonaea caespitosa*			
235.	4769	*Dodonaea lobulata (Bead Hopbush)*			
236.	12034	*Dodonaea microzyga var. acrolobata*			
237.	4780	*Dodonaea stenozyga*			
238.	3088	*Drosera andersoniana (Sturdy Sundew)*			
239.	13224	*Drosera browniana*			
240.	3092	*Drosera bulbosa (Red-leaved Sundew)*			

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241.	3098	*Drosera glanduligera (Pimpernel Sundew)*			
242.	3106	*Drosera macrantha (Bridal Rainbow)*			
243.	3131	*Drosera stolonifera (Leafy Sundew)*			
244.	4459	*Drummondita hassellii*			
245.	24650	*Drymodes brunneopygia (Southern Scrub-robin)*			
246.		*Dunhevedia crassa*			
247.	25092	*Egernia depressa (Southern Pygmy Spiny-tailed Skink)*			
248.	25104	*Egernia richardi*			
249.		*Elanus axillaris*			
250.	2510	*Enchylaena lanata*			
251.		*Eolophus roseicapillus*			
252.	24651	*Eopsaltria australis subsp. griseogularis (Western Yellow Robin)*			
253.	378	*Eragrostis dielsii (Mallee Lovegrass)*			
254.	14104	*Eremaea pauciflora var. pauciflora*			
255.	17156	*Eremophila clavata*			
256.	14895	*Eremophila decipiens subsp. decipiens*			
257.	7200	*Eremophila drummondii*			
258.	7219	*Eremophila granitica (Thin-leaved Poverty Bush)*			
259.	15112	*Eremophila interstans subsp. interstans*			
260.	7226	*Eremophila ionantha (Violet-flowered Eremophila)*			
261.	7240	*Eremophila metallicorum*			
262.	7247	*Eremophila oppositifolia (Weeooka)*			
263.	18570	*Eremophila oppositifolia subsp. angustifolia*			
264.	7264	*Eremophila saligna (Willowy Eremophila)*			
265.	7267	*Eremophila scoparia (Broom Bush ()*			
266.	17162	*Eremophila subfloccosa subsp. lanata*			
267.	20718	*Ericksonella saccharata*			
268.	2514	*Eriochiton sclerolaenoides (Woolly Bindii)*			
269.	4335	*Erodium cygnorum (Blue Heronsbill)*			
270.	14377	*Erymophyllum ramosum subsp. ramosum*			
271.	5572	*Eucalyptus burracoppinensis (Burracoppin Mallee)*			
272.	5579	*Eucalyptus calycogona (Gooseberry Mallee)*			
273.	19508	*Eucalyptus calycogona subsp. calycogona*			
274.	46476	*Eucalyptus calycogona subsp. miraculum*			
275.	12904	*Eucalyptus capillosa*			
276.	14300	*Eucalyptus celastroides subsp. celastroides (Mirret)*			
277.	5607	*Eucalyptus corrugata (Rough-fruited Mallee)*			
278.	5612	*Eucalyptus cylindrocarpa (Woodline Mallee)*			
279.	5637	*Eucalyptus eremophila (Tall Sand Mallee)*			
280.	12377	*Eucalyptus extensa*			
281.	5648	*Eucalyptus flocktoniae (Merrit, Merid)*			
282.	18521	*Eucalyptus flocktoniae subsp. flocktoniae*			
283.	5665	*Eucalyptus griffithsii (Griffith's Grey Gum)*			
284.	5673	*Eucalyptus horistes*			
285.	15743	*Eucalyptus incerata (Mount Day Mallee)*			
286.	20404	*Eucalyptus kochii subsp. yellowdinensis*			
287.	13059	*Eucalyptus leptopoda subsp. leptopoda*			
288.	12901	*Eucalyptus livida (Mallee Wandoo)*			
289.	5701	*Eucalyptus longicornis (Red Morrel, Moril)*			
290.	20802	*Eucalyptus longissima*			
291.	13037	*Eucalyptus loxophleba subsp. lissophloia*			
292.	5711	*Eucalyptus melanoxylon (Black Morrel)*			
293.	19323	*Eucalyptus moderata*			
294.	5717	*Eucalyptus myriadena*			
295.	13513	*Eucalyptus myriadena subsp. myriadena*			
296.	20091	*Eucalyptus oleosa subsp. oleosa*			
297.	13524	*Eucalyptus olivina*			
298.	5742	*Eucalyptus petraea (Granite Rock Box)*			
299.	16201	*Eucalyptus phenax*			
300.	19666	*Eucalyptus phenax subsp. phenax*			
301.	5747	*Eucalyptus platycorys (Boorabbin Mallee)*			
302.	13520	*Eucalyptus polita*			
303.	19064	*Eucalyptus prolixa*			
304.	5761	*Eucalyptus rigidula (Stiff-leaved Mallee)*			
305.	12693	*Eucalyptus salicola (Salt Gum)*			
306.	5766	*Eucalyptus salmonophloia (Salmon Gum, Wurak)*			
307.	5767	*Eucalyptus salubris (Gimlet)*			
308.	5772	*Eucalyptus sheathiana (Ribbon-barked Gum)*			
309.	41527	*Eucalyptus sp. Dunbar Road (D. Nicolle & M. French DN 5466)*			
310.	13027	*Eucalyptus tenera*			

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311.	5793	*Eucalyptus transcontinentalis (Redwood, Pungul)*			
312.	18293	*Eucalyptus urna*			
313.	34775	*Eucalyptus vittata*			
314.	5802	*Eucalyptus yilgarnensis (Yorrell)*			
315.	24368	*Eurostopodus argus (Spotted Nightjar)*			
316.	17027	*Euryomyrtus leptospermoides*			
317.	16722	*Euryomyrtus maidenii*			
318.	10977	*Exocarpos aphyllus (Leafless Ballart)*			
319.	25621	*Falco berigora (Brown Falcon)*			
320.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
321.	5204	*Frankenia interioris*			
322.	3900	*Gastrolobium floribundum (Wodjil Poison)*			
323.	10981	*Gastrolobium parviflorum*			
324.	24959	*Gehyra variegata*			
325.	25530	*Gerygone fusca (Western Gerygone)*			
326.	7061	*Glossostigma drummondii (Mudmat)*			
327.	47962	*Glyciphila melanops (Tawny-crowned Honeyeater)*			
328.	3943	*Glycyrrhiza acanthocarpa (Native Liquorice)*			
329.	7991	*Gnephosis drummondii*			
330.	8002	*Gnephosis tenuissima*			
331.	8003	*Gnephosis tridens*			
332.	10777	*Gompholobium gompholobioides*			
333.	10969	*Gompholobium hendersonii*			
334.	3959	*Gompholobium viscidulum*			
335.	7495	*Goodenia berardiana*			
336.	7504	*Goodenia dyeri*			
337.	7527	*Goodenia mimuloides*			
338.	7531	*Goodenia occidentalis*			
339.	7534	*Goodenia pinifolia (Pine-leaved Goodenia)*			
340.	7535	*Goodenia pinnatifida (Cutleaf Goodenia)*			
341.	24443	*Grallina cyanoleuca (Magpie-lark)*			
342.	1949	*Grevillea acuaria*			
343.	8830	*Grevillea ceratocarpa*			
344.	15769	*Grevillea eremophila*			
345.	2018	*Grevillea huegelii*			
346.	8834	*Grevillea incrassata*			
347.	2051	*Grevillea obliquistigma*			
348.	15981	*Grevillea obliquistigma subsp. obliquistigma*			
349.	2055	*Grevillea oncogyne*			
350.	2057	*Grevillea paradoxa (Bottlebrush Grevillea)*			
351.	2142	*Hakea commutata*			
352.	2163	*Hakea francisiana (Emu Tree)*			
353.	12231	*Hakea newbeyana*			
354.	2195	*Hakea platysperma (Cricket Ball Hakea)*			
355.	2211	*Hakea subsulcata*			
356.	2217	*Hakea verrucosa*			
357.	6684	*Halgania andromedifolia*			
358.	6180	*Haloragis trigonocarpa*			
359.	25408	*Heleioporus albopunctatus (Western Spotted Frog)*			
360.		*Hemicordulia tau*			
361.	6862	*Hemigenia pedunculata*			
362.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
363.	5122	*Hibbertia eatoniae*			
364.	5124	*Hibbertia exasperata*			
365.	5160	*Hibbertia pungens*			
366.	5165	*Hibbertia rostellata*			
367.	24491	*Hirundo neoxena (Welcome Swallow)*			
368.	5813	*Homalocalyx pulcherrimus*			
369.	12742	*Hyalosperma demissum*			
370.	15447	*Hyalosperma glutinosum subsp. glutinosum*			
371.	5221	*Hybanthus floribundus*			
372.	11546	*Hydrocotyle pilifera var. glabrata*			
373.	24277	*Hylacola cauta (Shy Groundwren, Shy Heathwren)*			
374.	34001	*Hylacola cauta subsp. whitlocki (Shy Groundwren)*			
375.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
376.	48652	*Hysterobaeckea petraea*			
377.		*Ilyodromus sp 573 (SAP)*			
378.		*Ilyodromus sp. 566 (aff. amplicolis) (south-west, SAP)*			
379.		*Ischnura aurora aurora*			
380.		*Ischnura heterosticta heterosticta*			

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381.	9	*Isoetes caroli*			
382.	8087	*Isoetopsis graminifolia (Cushion Grass)*			
383.	917	*Isolepis marginata (Coarse Club-rush)*			
384.		*Isometroides vescus*			
385.	16812	*Isopogon scabriusculus subsp. pubifloris*			
386.	1178	*Juncus bufonius (Toad Rush)*	Y		
387.		*Kiefferulus martini*			
388.	19955	*Lachnagrostis plebeia*			
389.	13284	*Lawrencella rosea*			
390.	1306	*Laxmannia paleacea*			
391.		*Lecane latissima*			
392.	41649	*Lepidosperma rigidulum*			
393.	41647	*Lepidosperma sanguinolentum*			
394.		*Lepidosperma sp.*			
395.	4056	*Leptosema daviesioides*			
396.		*Lerista kingi*			
397.	20870	*Leucopogon sp. Avon (J. Buegge D34)*			
398.	41770	*Leucopogon sp. Boorabbin (K.R. Newbey 8374)*			
399.	41768	*Leucopogon sp. Forrestania (G.F. Craig 2386)*			
400.	19517	*Leucopogon sp. outer wheatbelt (M. Hislop 30)*			
401.	7671	*Levenhookia leptantha (Trumpet Stylewort)*			
402.	25005	*Lialis burtonis*			
403.	25659	*Lichenostomus leucotis (White-eared Honeyeater)*			
404.	24576	*Lichenostomus leucotis subsp. novaenorciae (White-eared Honeyeater)*			
405.	25661	*Lichmera indistincta (Brown Honeyeater)*			
406.	41413	*Liopholis multiscutata (Bull Skink)*			
407.	31877	*Lobelia cleistogamoides*			
408.	478	*Lolium rigidum (Wimmera Ryegrass)*	Y		
409.	1226	*Lomandra effusa (Scented Matrush)*			
410.		*Lophoictinia isura*			
411.	6967	*Lycium australe (Australian Boxthorn)*			
412.	24135	*Macropus robustus subsp. erubescens (Euro, Biggada)*			
413.		*Macrothrix hardingi*			
414.	2533	*Maireana amoena*			
415.	2544	*Maireana georgei (Satiny Bluebush)*			
416.	2550	*Maireana marginata*			
417.	2554	*Maireana pentagona (Hairy Bluebush)*			
418.	2561	*Maireana radiata*			
419.	2568	*Maireana trichoptera (Downy Bluebush)*			
420.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
421.	24551	*Malurus pulcherrimus (Blue-breasted Fairy-wren)*			
422.	25654	*Malurus splendens (Splendid Fairy-wren)*			
423.	24583	*Manorina flavigula (Yellow-throated Miner)*			
424.		*Masasteron piankai*			
425.	4077	*Medicago minima (Small Burr Medic)*	Y		
426.	5869	*Melaleuca acuminata*			
427.	15063	*Melaleuca acuminata subsp. acuminata*			
428.	5887	*Melaleuca cardiophylla (Tangling Melaleuca)*			
429.	5896	*Melaleuca cordata*			
430.	5908	*Melaleuca eleuterostachya*			
431.	19486	*Melaleuca hamata*			
432.	19081	*Melaleuca johnsonii*			
433.	5925	*Melaleuca lateriflora (Gorada)*			
434.	5927	*Melaleuca laxiflora*			
435.	5929	*Melaleuca leiocarpa*			
436.	5947	*Melaleuca pauperiflora (Boree)*			
437.	15663	*Melaleuca pauperiflora subsp. fastigiata*			
438.	5958	*Melaleuca radula (Graceful Honeymyrtle)*			
439.	5966	*Melaleuca sheathiana (Boree, Buri)*			
440.	5967	*Melaleuca sparsiflora*			
441.	5969	*Melaleuca spicigera*			
442.	5979	*Melaleuca teuthidoides*			
443.	20289	*Melaleuca vinnula*			
444.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
445.	24736	*Melopsittacus undulatus (Budgerigar)*			
446.	25184	*Menetia greyii*			
447.	24598	*Merops ornatus (Rainbow Bee-eater)*			
448.	2813	*Mesembryanthemum crystallinum (Iceplant)*	Y		
449.	2814	*Mesembryanthemum nodiflorum (Slender Iceplant)*	Y		
450.	18045	*Microcybe multiflora subsp. baccharoides*			

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451.	18046	*Microcybe multiflora subsp. multiflora*			
452.		*Microcyclops varicans*			
453.	24654	*Microeca fascinans subsp. assimilis (Jacky Winter)*			
454.	9187	*Micromyrtus erichsenii*			
455.	6000	*Micromyrtus racemosa*			
456.	14382	*Microtis eremaea*			
457.		*Microvelia (Austromicrovelia) peramoena*			
458.	12631	*Millotia perpusilla*			
459.	8106	*Millotia tenuifolia (Soft Millotia)*			
460.	24904	*Moloch horridus (Thorny Devil)*			
461.	19180	*Moraea miniata (Two-leaf Cape Tulip)*	Y		
462.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*			
463.	25190	*Morethia butleri*			
464.	24223	*Mus musculus (House Mouse)*	Y		
465.	7295	*Myoporum tetrandrum (Boobialla)*			
466.		*Nematoda sp.*			
467.	25421	*Neobatrachus albipes (White-footed Trilling Frog)*			
468.	25425	*Neobatrachus kunapalari (Kunapalari Frog)*			
469.	24738	*Neophema elegans (Elegant Parrot)*			
470.	24229	*Notomys mitchellii (Mitchell's Hopping-mouse)*			
471.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
472.	8139	*Olearia magniflora*			
473.	8140	*Olearia muelleri (Goldfields Daisy)*			
474.	8145	*Olearia pimeleoides (Pimelea Daisybush, Burrobunga)*			
475.	44401	*Olearia sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628)*			
476.	6723	*Omphalolappula concava (Burr Stickseed)*			
477.	12782	*Ophioglossum gramineum*			
478.	5227	*Opuntia stricta (Common Prickly Pear)*	Y		
479.	24618	*Oreoica gutturalis (Crested Bellbird)*			
480.	34011	*Oreoica gutturalis subsp. gutturalis (Crested Bellbird (southern))*			
481.		*Orthetrum caledonicum*			
482.		*Orthocladiinae sp. F (SAP)*			
483.	24619	*Pachycephala inornata (Gilbert's Whistler)*			
484.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
485.	25253	*Parasuta gouldii*			
486.	25682	*Pardalotus striatus (Striated Pardalote)*			
487.	7089	*Parentucellia latifolia (Common Bartsia)*	Y		
488.	40423	*Pentameris airoides (False Hairgrass)*	Y		
489.	15630	*Persoonia inconspicua*			
490.	2270	*Persoonia quinquenervis*			
491.	48061	*Petrochelidon nigricans (Tree Martin)*			
492.	24659	*Petroica goodenovii (Red-capped Robin)*			
493.	24409	*Phaps chalcoptera (Common Bronzewing)*			
494.	4500	*Phebalium filifolium (Slender Phebalium)*			
495.	16556	*Phebalium megaphyllum*			
496.	4504	*Phebalium tuberculosum*			
497.	3058	*Phlegmatospermum drummondii (Drummond's Phlegmatospermum)*			
498.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
499.	16824	*Phyllangium sulcatum*			
500.	6812	*Pityrodia lepidota*			
501.		*Planicirclus alticarinatus*			
502.	7299	*Plantago debilis*			
503.	25720	*Platycercus icterotis (Western Rosella)*			
504.	14999	*Platysace trachymenioides*			
505.	8173	*Podolepis capillaris (Wiry Podolepis)*			
506.	8177	*Podolepis lessonii*			
507.	8181	*Podolepis tepperi*			
508.	8184	*Podotheca gnaphalioides (Golden Long-heads)*			
509.	25510	*Pogona minor (Dwarf Bearded Dragon)*			
510.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
511.		*Polypedilum watsoni*			
512.	25722	*Polytelis anthopeplus (Regent Parrot)*			
513.	24683	*Pomatostomus superciliosus (White-browed Babbler)*			
514.	34013	*Pomatostomus superciliosus subsp. ashbyi (White-browed Babbler (western wheatbelt))*			
515.		*Porosia cf. bigibossa (SAP)*			Y
516.	16688	*Prasophyllum gracile*			
517.	1682	*Prasophyllum sargentii*			
518.		*Procladius paludicola*			
519.	6917	*Prostanthera incurvata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
520.	25261	*Pseudechis australis (Mulga Snake)*			
521.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
522.	25263	*Pseudonaja modesta (Ringed Brown Snake)*			
523.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
524.	1686	*Pterostylis barbata (Bird Orchid)*			
525.	1689	*Pterostylis mutica (Midget Greenhood)*			
526.	10778	*Pterostylis picta*			
527.	12216	*Pterostylis roensis*			
528.	1696	*Pterostylis sargentii (Frog Greenhood)*			
529.		*Pterostylis sp.*			
530.	18657	*Pterostylis sp. inland (A.C. Beauglehole 11880)*			
531.	2718	*Ptilotus drummondii (Narrowleaf Mulla Mulla)*			
532.	2727	*Ptilotus gaudichaudii*			
533.	2732	*Ptilotus holosericeus*			
534.	32417	*Ptychostomum angustifolium*			
535.	42344	*Purnella albifrons (White-fronted Honeyeater)*			
536.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
537.	24278	*Pyrrholaemus brunneus (Redthroat)*			
538.	8195	*Quinetia urvillei*			
539.		*Rak sp. nov. b (Venemores) (SAP)*			
540.	2581	*Rhagodia drummondii*			
541.	48096	*Rhipidura albiscapa (Grey Fantail)*			
542.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
543.	13305	*Rhodanthe heterantha*			
544.	13294	*Rhodanthe laevis*			
545.	13249	*Rhodanthe oppositifolia subsp. oppositifolia*			
546.	13253	*Rhodanthe rubella*			
547.	11151	*Rostraria pumila*	Y		
548.		*Rotaria sp. a (SPS)*			
549.	40425	*Rytidosperma caespitosum*			
550.	40427	*Rytidosperma setaceum*			
551.	2356	*Santalum acuminatum (Quandong, Warnga)*			
552.	7644	*Scaevola spinescens (Currant Bush, Maroon)*			
553.	8200	*Schoenia cassiniana (Schoenia)*			
554.	993	*Schoenus hexandrus*			
555.	1002	*Schoenus nanus (Tiny Bog Rush)*			
556.	1006	*Schoenus odontocarpus*			
557.		*Scirtidae sp.*			
558.	2609	*Sclerolaena diacantha (Grey Copperburr)*			
559.	8877	*Sclerolaena gardneri*			
560.	2626	*Sclerolaena parviflora (Small-flower Saltbush)*			
561.	8207	*Senecio glossanthus (Slender Groundsel)*			
562.	12276	*Senna artemisioides subsp. filifolia*			
563.	17558	*Senna artemisioides subsp. x artemisioides*			
564.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
565.	46824	*Seringia velutina (Velvet firebush)*			
566.	14583	*Siloxerus multiflorus*			
567.	8226	*Siloxerus pygmaeus*			
568.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
569.	3073	*Sisymbrium runcinatum*	Y		
570.	30948	*Smicrornis brevirostris (Weebill)*			
571.	24109	*Sminthopsis dolichura (Little long-tailed Dunnart)*			
572.	24112	*Sminthopsis granulipes (White-tailed Dunnart)*			
573.	7013	*Solanum hoplopetalum (Thorny Solanum)*			
574.	7025	*Solanum oldfieldii*			
575.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
576.	2917	*Stellaria filiformis (Thread Spurry)*			
577.	3076	*Stenopetalum filifolium*			
578.		*Sternopriscus sp.*			
579.	25597	*Strepera versicolor (Grey Currawong)*			
580.	7785	*Stylidium repens (Matted Triggerplant)*			
581.	25269	*Suta fasciata (Rosen's Snake)*			
582.	16761	*Synaphea interioris*			
583.	15534	*Synaphea spinulosa subsp. major*			
584.		*Tanytarsus nr bispinosus (SAP)*			
585.		*Tardigrada sp.*			
586.	31492	*Tecticornia disarticulata*			
587.	46513	*Tecticornia doliiformis*			
588.	33236	*Tecticornia halocnemoides (Shrubby Samphire)*			
589.	33319	*Tecticornia indica subsp. bidens*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
590.	4248	*Templetonia aculeata*			
591.	4257	*Templetonia smithiana*			
592.	4258	*Templetonia sulcata (Centipede Bush)*			
593.	42065	*Tetrapora tenuiramea*			
594.	1034	*Tetraria capillaris (Hair Sedge)*			
595.		*Teyl luculentus*			
596.	20732	*Thelymitra petrophila*			
597.	6058	*Thryptomene kochii*			
598.	1338	*Thysanotus manglesianus (Fringed Lily)*			
599.	1343	*Thysanotus patersonii*			
600.	25207	*Tiliqua rugosa subsp. rugosa*			
601.	6268	*Trachymene cyanopetala*			
602.	6279	*Trachymene ornata (Spongefruit)*			
603.		*Trichocyclus balladong*			
604.		*Triplectides australis*			
605.	4737	*Tripterococcus brunonis (Winged Stackhousia)*			
606.	4843	*Trymalium myrtillus*			
607.	16986	*Trymalium myrtillus subsp. myrtillus*			
608.		*Turbellaria sp.*			
609.	24983	*Underwoodisaurus milii (Barking Gecko)*			
610.	8255	*Ursinia anthemoides (Ursinia)*	Y		
611.	24386	*Vanellus tricolor (Banded Lapwing)*			
612.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
613.	12388	*Verticordia acerosa var. preissii*			
614.	6073	*Verticordia chrysantha*			
615.	12422	*Verticordia eriocephala (Common Cauliflower)*			
616.	6087	*Verticordia helmsii*			
617.	12432	*Verticordia inclusa*			
618.	6109	*Verticordia picta (Painted Featherflower)*			
619.	12451	*Verticordia plumosa var. incrassata*			
620.	6113	*Verticordia pritzelii (Pritzel's Featherflower)*			
621.	6114	*Verticordia rennieana*			
622.	722	*Vulpia bromoides (Squirrel Tail Fescue)*	Y		
623.	724	*Vulpia myuros (Rat's Tail Fescue)*	Y		
624.		*Vulpia sp.*			
625.	7389	*Wahlenbergia preissii*			
626.	8275	*Waitzia acuminata (Orange Immortelle)*			
627.	46093	*Waitzia fitzgibbonii*			
628.	6938	*Westringia cephalantha*			
629.	9247	*Westringia rigida (Stiff Westringia)*			
630.	6659	*Wilsonia humilis (Silky Wilsonia)*			
631.	1396	*Wurmbea graniticola*			
632.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

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

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely 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 datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Appendix 3
Conservation Codes and Definitions

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

CONSERVATION CODES

For Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] 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.

[1] The definition of flora includes algae, fungi and lichens
[2]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).

Appendix 4

Photographs of potential malleefowl mounds identified by LIDAR survey

Site reference	MF04
Status	Not a malleefowl mound.
Comments	Vegetation and pastoral disturbance.
Photo	

Site reference	MF05
Status	Not a malleefowl mound.
Comments	Vegetation
Photo	

Site reference	MF06
Status	Not a malleefowl mound.
Comments	Contour bank and vegetation.
Photo	

Site reference	MF07
Status	Inactive mound.
Comments	Possibly active in the last 12-18 months.
Photo	

Site reference	MF08
Status	Inactive.
Comments	Long unused.
Photo	

Site reference	MF09
Status	Not a malleefowl mound.
Comments	Possibly a dog den.
Photo	

Site reference	MF010
Status	Inactive
Comments	Long unused, probably extinct.
Photo	

Site reference	MF11
Status	Not a malleefowl mound.
Comments	Vegetation.
Photo	

Site reference	MF12
Status	Not a malleefowl mound.
Comments	Vegetation and large ant colony.
Photo	

Site reference	MF13
Status	Not a malleefowl mound.
Comments	Vegetation and large ant colony.
Photo	

Site reference	MF14
Status	Inactive.
Comments	Long unused.
Photo	

Site reference	MF15
Status	Not a malleefowl mound.
Comments	Vegetation and large ant colony.
Photo	

Site reference	MF16
Status	Not a malleefowl mound.
Comments	Vegetation.
Photo	

Site reference	MF17
Status	Inactive.
Comments	Long unused.
Photo	

Site reference	MF18
Status	Inactive. Long unused.
Comments	
Photo	

Site reference	MF21
Status	Inactive.
Comments	Long unused.
Photo	

Site reference	MFRecent01
Status	Inactive. Possibly active in the last 12 – 18 months.
Comments	Not identified by the LIDAR survey.
Photo	

Site reference	MFExt01
Status	Extinct
Comments	Not identified by the LIDAR survey.
Photo	

Appendix 5
Track Log of Area Assessed

727000 728000 729000 730000 731000 732000

6506000

6505000

6504000

6503000

Lot 451
Parker Range_tracks_combined

ecologia ENVIRONMENT

Project: Parker Range Reconnaisannce Survey
Date: 19 November 2019
Author: RS
Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Absolute Scale: 1:15,000 @A3

Track log

0 0.4 0.8
Kilometers