Mineral Resources Limited

1 Sleat Road

Applecross WA 6153

20 April 2020

Dear Mr Neil Smith

Senior Environmental Advisor

RE: Memo report of population estimates and potential impacts to the priority species *Westringia acifolia* and the potentially new species *Microcorys* sp. Nov. for the Parker Range Iron Ore Project

Introduction and scope

Mineral Resources Limited (MRL) are proceeding to implement the Parker Range Iron Ore Project (the Project; Figure 1). The Project was approved under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC 2010/5435) on 3 November 2011 via the bilateral agreement between the Commonwealth and Western Australia (WA). The Project was approved under Part IV of *the Environmental Protection Act 1986* (EP Act) on 12 April 2012, subject to conditions and procedures outlined in Ministerial Statement MS 892 (Minister for Environment; Water 2012).

Phoenix Environmental Sciences Pty Ltd (Phoenix) have been engaged by MRL in undertaking the following works:

- a desktop review of significant environmental values for the Project (Phoenix 2020)
- phase one of flora and vegetation survey for environmental impact assessment for a proposed haul road
- baseline surveys of monitoring quadrats assessing vegetation health and weed infestations
- baseline surveys of monitoring quadrats assessing health of Threatened (*Isopogon robustus*) and Priority (*Lepidosperma* sp. Mt Caudan) flora
- targeted searches of *Chamelaucium* sp. Parker Range (P1)

Field surveys conducted for the phase one survey and the baseline vegetation health and weed infestations identified previously unknown records of *Westringia acifolia* (P1) and a potentially new species, belonging to the *Microcorys* genus, *Microcorys* sp. nov.

This report presents results from targeted field searches for *Westringia acifolia* and *Microcorys* sp. nov. conducted in February 2020. At the request of MRL the potential impact from Parker Range Iron Ore mining operations to the priority species *Westringia acifolia* and *Microcorys* sp. nov. have been calculated. An estimate of the number of plants present within the Project Development Envelope (DE) was calculated.

Methods

Targeted searches for *Westringia acifolia* (P1) and *Microcorys* sp. nov. were conducted from the 11th to the 14th of February 2020.

A search was conducted at each population record to locate plants of *Westringia acifolia* (P1) and *Microcorys* sp. nov. (Figure 2). Once plants were located the surrounding area was searched by foot in a series of parallel meandering transects. Transects were continued until no plants were sighted

after progressing several hundred metres following which the search moved approximately 50 m perpendicular to the transect and then the search proceeded back in the direction of the recorded plants. This transect was continued until the search passed the point of the initial plant locations and had progressed for several hundred metres without further detection of plants. This process was repeated to define the boundary of the population.

Populations of both *Westringia acifolia* and *Microcorys* sp. nov. were too large and/or dense to count all individuals in the field time available and so an estimated total was determined from the counts of individuals along the traversed transects. The number of plants recorded was divided by the area of the transect search to provide an estimate of plant density per unit area. This number was then extrapolated for the area of each population to provide an estimate of the total population size.

Spatial analysis of potential habitat was constructed using Shepherd *et al.* (2002) pre-European regional vegetation mapping and extrapolated based on the vegetation types *Westringia acifolia* and *Microcorys* sp. nov. were collected in the survey.

Site photos and descriptions were recorded in areas where *Westringia acifolia* and *Microcorys* sp. nov. occurred to establish vegetation descriptions and habitat types associated with each species (Appendix 1).

Results

The targeted searches identified two populations of *Microcorys* sp. nov. and one large (covering 163 hectares) population of *Westringia acifolia* within the Parker Range Project Area (Figure 2). Population calculations and impact estimates are summarised in Table 1.

Table 1: Summary of data from population searches and potential mining operation impact estimates of *Microcorys* sp. nov. and *Westringia acifolia*

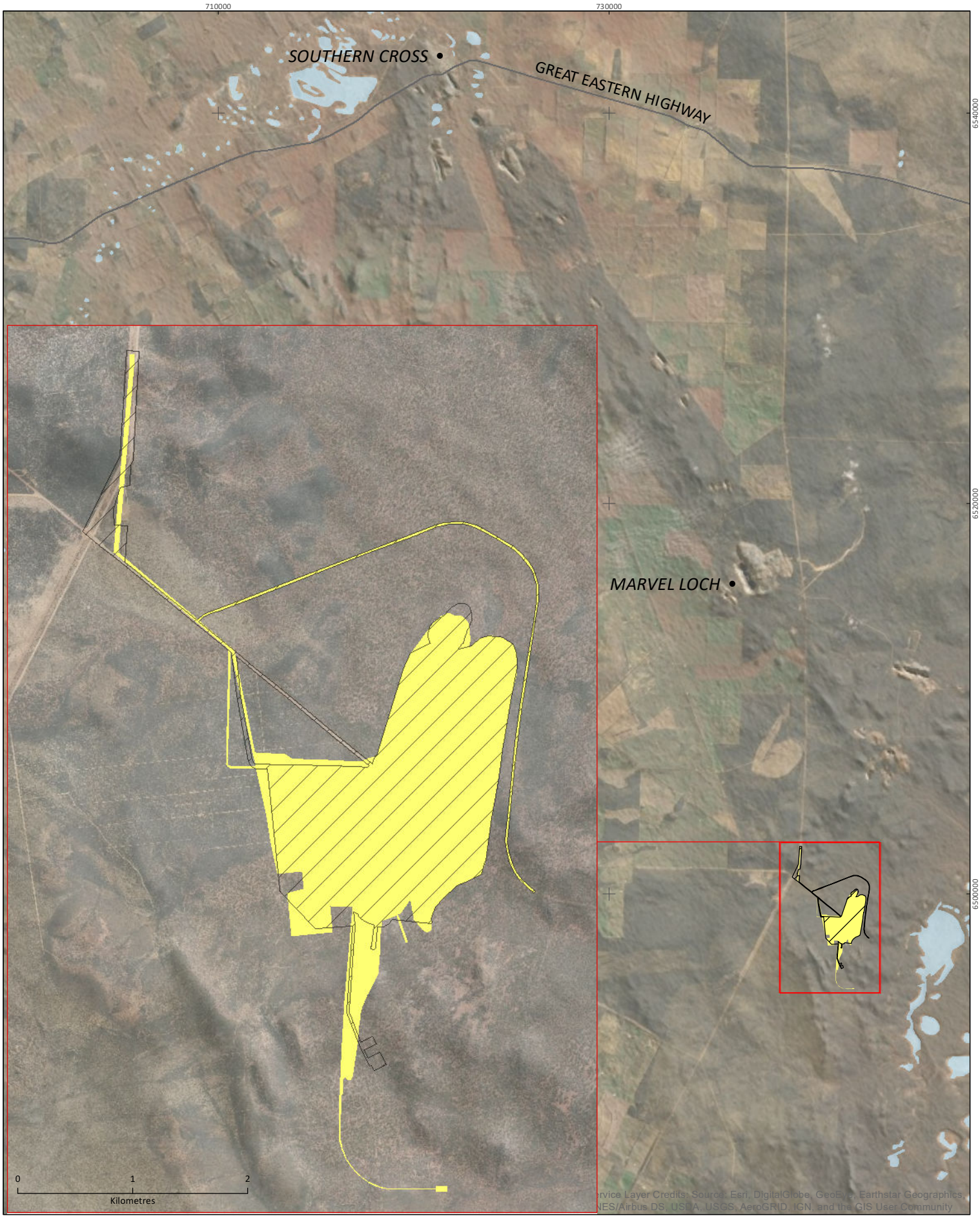
Species	Area (ha)	Estimated no. of plants[1]	Calculated no. of plants within the DE[1]	% of plants within DE	No. plants in MS892 'approved project area' (not previously identified)	% of plants in MS892 'approved project area' (not previously identified)	No. plants within 'gap areas' of new DE (specific to s45C assessment)	Records in 'approved Project area' that will no longer be impacted as part of change
Microcorys sp. nov.	46.55	2265	132	5.85%	199	8.79%	114	181
Westringia acifolia	163	4081	541	13.26%	679	16.64%	154	292

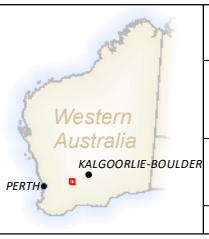
[1]Populations have been estimated from extrapolation of counts from transects walked

Microcorys sp. nov. were found in Shrublands and Mallee Woodlands of low hill slopes and plains in yellow/orange sandy clay/sandy loam soil, occasionally with ferrous ironstone. *Microcorys* sp. nov. was found associated with *Eucalyptus burracopanensis, Allocasuarina spinosissima* and *Melaleuca cordata* (Appendix 1).

Westringia acifolia were found in Mallee Woodlands of low hill slopes in yellow, sandy clay/sandy loam soil. *Westringia acifolia* was associated with *Allocasuarina spiossimma, Callitris preissii* and *Banksia shankledorium* (Appendix 1).

The two species occur within three of Shepherd's vegetation associations (1068 - Medium woodland; Salmon Gum, Morrel, Gimlet & *Eucalyptus sheathiana*; 552 - Shrublands; *Casuarina acutivalvus* and *C. calothamnus* (also *Melaleuca*) thicket on greenstone hills; and 1413 - Shrublands; *Acacia*, *Casuarina* and *Melaleuca* thicket) which are embedded within two of Shepherd's vegetation types (Thicket and woodland) (Figure 3). These vegetation associations cover a large area of the WA's southwest region.





Mineral Resources Ltd
Parker Range Iron Ore Project

Project No	1299
Date	19-Feb-20
Drawn by	AJ
Map author	GW

0 5 10
Kilometres

1:250,000 (at A4) GDA94 MGA zone 50

P:\GIS\Projects\ParkerRange_MR\1299-PR-MRL-BOT\Mapping\MapDocuments\Figures\1299_1-2_ProjectArea.mxd

Approved project area (MS 892)

New development envelope

Figure 1

Parker Range Iron Ore Project approved project area and new development envelope

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Figure 2
Microcorys sp. and *Westrignia acifolia* sp. nov. populations

740000

6500000

Approved project area (MS 892)

New development envelope

Microcorys sp. nov.

Westringia acifolia sp.

0 0.7 1.4

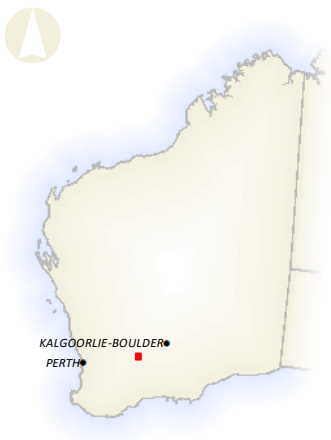
Kilometres

1:40,000

Client: MRL
Project: Parker Range Iron Ore Project (Mine)

Author: AJ
Date: 03-Mar-20

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994



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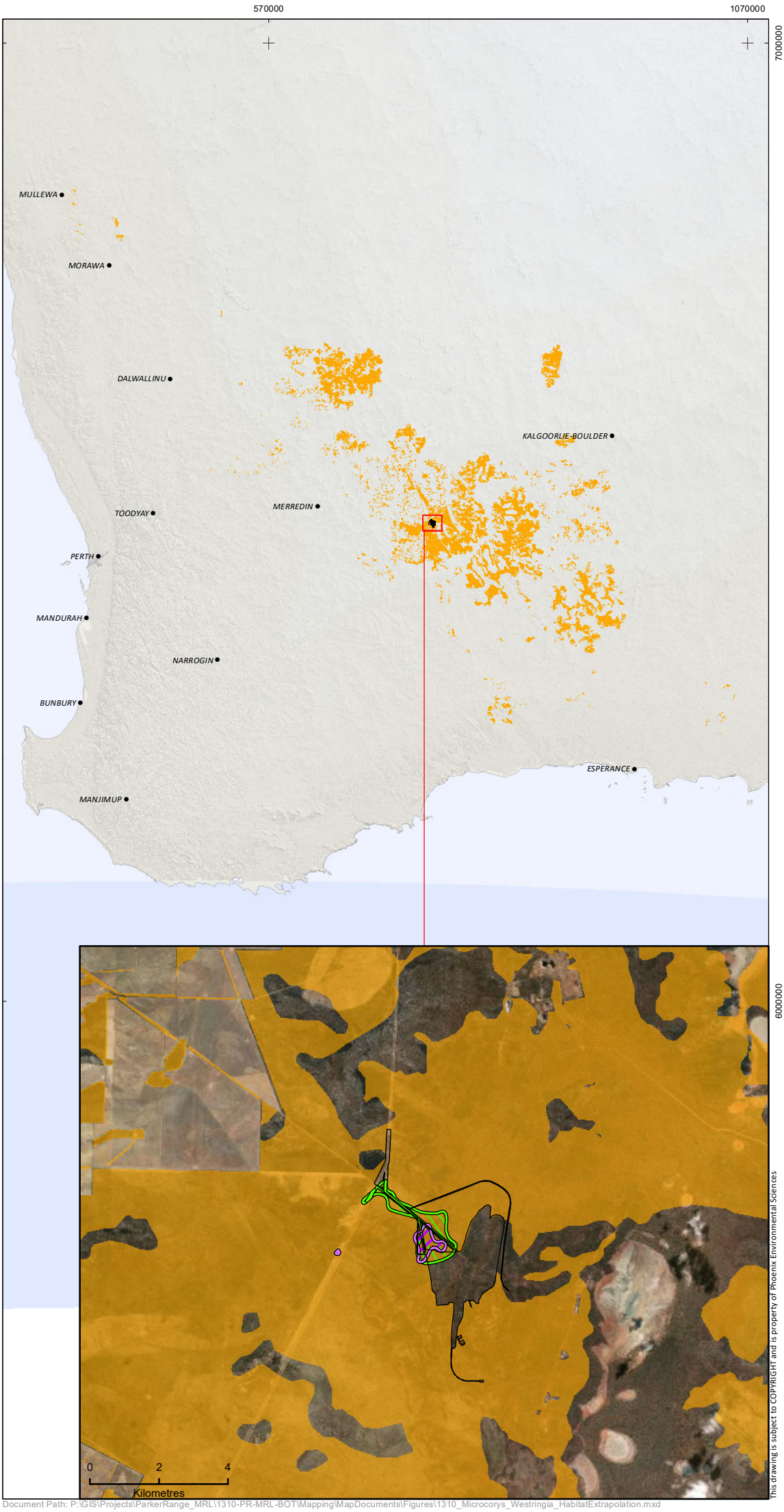
Document Path: P:\GIS\Projects\ParkerRange_MRL\1310-PR-MRL-BOT\Mapping\MapDocuments\Figures\1310_Microcorys_Westringia.mxd

Extent of potential habitat of *Microcorys* sp. nov. and *Westringia acifolia*



Survey area (Approved Minesite Project Area (MS892) and Revised Development Envelope)

Microcorys sp. nov.

Westringia acifolia

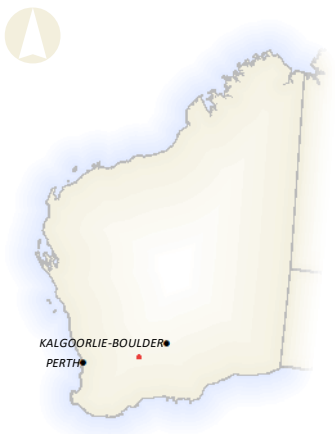
Potential habitat in remnant native vegetation

0 100 200
Kilometres
1:5,400,000

Client: MRL
Project: Parker Range Iron Ore Project (Mine)

Author: AJ
Date: 15-Apr-20

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994



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Discussion and conclusion

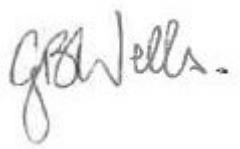
The field survey identified one very large population of the priority one species, *Westringia acifolia* within the Parker Range area. The total number of plants estimated from this survey is 4,081 individual plants covering an area of ca. 163 ha. The location of the original FloraBase record for *Westringia acifolia* was searched but the plants were unable to be relocated. The population identified in this field survey is the second known population of the species.

Two populations were identified for the potentially new species *Microcorys* sp. nov. with an estimate of 2,265 plants within the Parker Range area, covering an area of ca. 46.55 ha. One population, covering ca. 45.84 ha is expected to be impacted by mining operations.

Westringia acifolia and *Microcorys* sp. nov. has been found outside and within the DE. 13.26% of the total *Westringia acifolia* population counts and 5.83% of the *Microcorys* sp. nov. populations counts are estimated to be impacted from Parker Range Iron Ore mining operations.

From the vegetation site descriptions, it is evident that there is a lot of suitable habitat in the wider surrounding landscape for populations of both *Westringia acifolia* and *Microcorys* sp. nov. There is potential habitat in the vicinity of the known populations that could be targeted for searches to find more of both species.

Yours Sincerely,



Dr Grant Wells

Director/Principal Botanist

Phoenix Environmental Sciences

Reference

Minister for Environment; Water. 2012. *Ministerial Statement No. 892: Parker Range (Mt Caudan) Iron Ore Project*. Government of Western Australia, Perth, WA.

Phoenix. 2020. *Desktop Review – Biological values update work for Parker Range Iron Ore Project*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Memo report to Mineral Resources Ltd.

Shepherd, D. P., Beeston, G. R. & Hopkins, A. J. M. 2002. *Native vegetation in Western Australia. Extent, type and status.* Department of Agriculture, South Perth, WA. Resource Management Technical Report 249.

Appendix 1 Vegetation descriptions for *Westringia acifolia* and *Microcorys* sp. nov.

Site name	Habitat type	Soil and rock type	Topography	Disturbance	Vegetation condition (EPA 2016 Eremaean)	Vegetation description	Site photo
Westringia acifolia							
WA2	Mallee Woodland	Sandy clay, sandy loam	Hill slope	None evident	Excellent	Low *Eucalyptus* mallee woodland over tall open *Allocasuarina spiossimma* and *Callitris preissii* shrubland over low *Banksia shankledorium, Bertya diastigma* and *Beyeria* shrubland.	
Microcorys sp. nov							

MSN2	Mallee Woodland	Sandy clay, sandy loam	Plain	Exploration (drill pads and access tracks), historic clearing	Very good	Low *Eucalyptus burracopanensis* and *Euc* sp. woodland, over tall *Allocasuarina spinosissima* shrubland over low open *Bertya diastigma, Melaleuca cordata* and *Beyera* shrubland.	
MSN3-1	Mallee Woodland	Sandy loam, ferrous-ironstone	Hill slope	None evident	Excellent	Low *Eucalyptus* sp. woodland over tall open *Allocasuarina corniculata* and *Hakea* sp. shrubland over mid open *Melaleuca cordata, Leptospermum* sp. and *Grevillea* sp. shrubland.	

MNS3	Mallee Woodland	Sandy loam	Plain	None evident	Excellent	Low *Eucalyptus* mallee woodland over tall open *Allocasuarina spinosissima* and *Hakea francisiana* shrubland over mid *Petrophile* sp., *Beaufortia* and *Melaleuca cordata* shrubland.	
MSN	Shrubland	Sandy clay, sandy loam, ferrous-ironstone	Hill slope	Large-scale clearing	Good	Low *Melaleuca hamata*, *M. cordata* and *Microcorys* sp nov. shrubland.