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Memorandum: Bremer Range Priority Flora and Communities Conservation Assessment

Botanica Consulting Pty Ltd (Botanica) were commissioned by Audalia Resources Limited (Audalia) to assess whether the proposed development of the Medcalf Project would affect the current conservation status of Priority Flora (only those species proposed to be directly/ indirectly impacted) and the Bremer Range Vegetation Complexes Priority 1 Ecological Community (PEC). The assessment was conducted in response to public comment received for the Medcalf Project Environmental Review Document (dated 2nd March 2021). As specified in the Medcalf Project Environmental Review Document, a total of five Priority Flora are proposed to be directly/ indirectly impacted by the proposal and were included in the assessment:

- 1. Acacia mutabilis subsp. stipulifera (P3)
- 2. *Eucalyptus rhomboidea* (P4)-currently under nomination to be listed as Threatened under the *Biodiversity Conservation Act 2016* (BC Act)
- 3. Hakea pendens (P3)
- 4. Stenanthemum bremerense (P4)-being considered by DBCA for nomination as Threatened under the BC Act
- 5. Teucrium diabolicum (P3)

Prior to conducting the assessment, paid searches from the DBCA Threatened and Priority Flora database were conducted to obtain all available DBCA records of each Priority Flora taxon. DBCA database records vary considerably in the amount of detail regarding abundance that is available ranging from accurate counts or general abundance descriptions to no detail at all and only reflect the records currently entered into the database. Where databases provided no estimate of species abundance or numbers, it was assumed only a single individual plant was present. In most instances these assumptions are likely to result in a significant underestimate, and hence the final estimates of total individuals of each species are likely to be extremely conservative.

Each species was assessed against the International Union for Conservation of Nature (IUCN) Red List categories and criteria (as detailed in Appendix 1) in accordance with the *Guidelines for Using the IUCN Red List Categories and Criteria. Version 14* (August 2019) and the Threatened Species Scientific Committee Guidelines for assessing the conservation status of native species, obtained from the Department of Agriculture, Water and Environment (DAWE) website. Extent of Occurrence (EOO) spatial maps for each species are provided in Appendix 3. Results of the assessment are summarised in Table 1-5.

Based on currently available information, *Acacia mutabilis* subsp. *stipulifera* (P3), *Stenanthemum bremerense* (P4) and *Teucrium diabolicum* (P3) are unlikely to meet the criteria for Threatened status (based on current status or as a result of mining). *Eucalyptus rhomboidea* (P4) is currently under nomination to be listed as Vulnerable under the BC Act. The proposed mining activities are unlikely to increase the proposed Vulnerable status of this species. *Hakea pendens* potentially currently meets the criteria for listing as Vulnerable under Criteria B. The proposed mining activities also potentially meets the criteria for listing as Vulnerable under Criteria C.

The Bremer Range Vegetation Complexes PEC was assessed in accordance with the *Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria Version 1.1 (2017)* (as detailed in Appendix 2) in accordance with *An Introduction to the IUCN Red List of Ecosystems: The Categories and Criteria for Assessing Risks to Ecosystems* (2016). Extent of Occurrence (EOO) spatial map for the PEC is provided in Appendix 4. Results of the assessment are summarised in Table 6. Based on currently available information, the Bremer Range Vegetation Complexes PEC is unlikely to meet the criteria for Threatened status (based on current status or as a result of mining).

Table 1: Conservation Status Assessment: Acacia mutabilis subsp. stipulifera

Listi	ng Criteria	Current Status	Proposed Mining Impacts	
A	Population size reduction (evidence of decline)	There is currently insufficient quantitative information to assess against this criterion. However, based on available information it would appear <i>A. mutabilis</i> subsp. <i>stipulifera</i> would not currently meet Criterion A.	No change - mining will result in ~5% reduction in population size which does not meet any of the Threatened Criteria.	
в	Geographic range (EOO and AOO, number of locations and evidence of decline)	<i>A. mutabilis</i> subsp. <i>stipulifera</i> would not currently meet all the requirements of Criterion B.	No change - proposed mining will have minimal impact on extent of occurrence or area of occupancy, and will not reduce the number of locations to less than 10.	
с	Small population size and decline (population size, distribution and evidence of decline)	Known <i>A. mutabilis</i> subsp. stipulifera population size is approximately 348,452 and does not meet Criterion C.	No change - mining will result in ~2.87% reduction in population size which does not meet any of the Threatened Criteria.	
D	Very small or restricted population (population size)	Known <i>A. mutabilis</i> subsp. <i>stipulifera</i> population size is approximately 348,452, Area of Occupancy exceeds 20km ² and number of locations >5. Does not meet Criterion D.	No change - proposed mining will no reduce number of mature individua below 1000 (Vulnerable Criteria), Area Occupancy will remain above 20km ² ar number of locations will not be reduce below 5.	
Е	Quantitative analysis (statistical probability of extinction)	of Currently insufficient information to assess against criteria.		
Ass	essment Overview	Does not meet the criteria for Threatened	status (current or as a result of mining)	

Table 2: Conservation Status Asses	sment: Eucalyptus rhomboidea
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Listing Criteria		Current Status	Proposed Mining Impacts	
A	Population size reduction (evidence of decline)	There is currently insufficient quantitative information to assess against this criterion. However, based on available information it would appear <i>E. rhomboidea</i> would not currently meet Criterion A.	No change - mining will result in ~5% reduction in population size which does not meet any of the Threatened Criteria.	
в	Geographic range (EOO and AOO, number of locations and evidence of decline)	Currently meets the criteria for Endangered B1 ab(iii,v) and B2 ab(iii,v)	No change from Endangered - proposed mining will not reduce extent of occurrence below 100km ² or area of occupancy below 10km ² (Critically Endangered Criteria).	

Listi	ing Criteria	Current Status	Proposed Mining Impacts	
с	Small population size and decline (population size, distribution and evidence of decline)		No change - mining will result in ~5% reduction in population size which does not meet any of the Threatened Criteria.	
D	Very small or restricted population (population size)	Meets the criteria for Vulnerable D2.	No change from Vulnerable - proposed mining will not reduce number of mature individuals below 250 (Endangered Criteria).	
Е	Quantitative analysis (statistical probability of extinction)	Currently insufficient information to assess against criteria.	Currently insufficient information to assess against criteria.	
Assessment Overview		Pre-mining meets the criteria for listing a in listing as a result of mining.	s Vulnerable under Criteria D. No change	

Table 3: Conservation Status Assessment: Hakea pendens

Listing Criteria		Current Status	Proposed Mining Impacts		
A	Population size reduction (evidence of decline)	There is currently insufficient quantitative information to assess against this criterion. However, based on available information it would appear <i>Hakea pendens</i> would not currently meet Criterion A.	No change - mining will result in ~18% reduction in population size which does not meet any of the Threatened Criteria.		
в	Geographic range (EOO and AOO, number of locations and evidence of decline)	Based on current EOO, AOO and number of locations (<10), <i>Hakea</i> <i>pendens</i> potentially meets the criteria for Vulnerable under Criterion B.	No change - proposed mining will no reduce extent of occurrence below 5000km ² (Endangered Criteria).		
с	Small population size and decline (population size, distribution and evidence of decline)	Known <i>Hakea pendens</i> population size is approximately 6,783 (indicator of Vulnerable status) however does not currently meet C1 and C2 requirements and does not meet Criterion C.	Proposed impacts will reduce the known population size to approximately 5,543, and meets C1 (projected decline >10%). Will remain slightly above C2 requirements (number of mature individuals at Bremer Range population reduced to ~1173 plants). Assessment indicates <i>Hakea pendens</i> may meet the Criteria for Vulnerable.		
D	Very small or restricted population (population size)	Known <i>Hakea pendens</i> population size is approximately 6,783, Area of Occupancy exceeds 20km ² and number of locations >5. Does not meet Criterion D.	No change - proposed mining will not reduce number of mature individuals below 1000 (Vulnerable Criteria), Area of Occupancy will remain above 20km ² and number of locations will not be reduced below 5.		
Е	Quantitative analysis (statistical probability of extinction)	Currently insufficient information to assess against criteria.	Currently insufficient information to assess against criteria.		
Assessment Overview		Potentially currently meets the criteria for listing as Vulnerable under Criteria B. As a result of mining, also potentially meets the criteria for listing as Vulnerable under Criteria C.			

Table 4: Conservation Status	Assessment:	Stenanthemum	bremerense
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Listi	ng Criteria	Current Status	Proposed Mining Impacts	
A	Population size reduction (evidence of decline)	There is currently insufficient quantitative information to assess against this criterion. However, based on available information it would appear <i>S. bremerense</i> would not currently meet Criterion A.	No change - mining will result in ~8% reduction in population size which does not meet any of the Threatened Criteria.	
В	Geographic range (EOO and AOO, number of locations and evidence of decline)	There is currently insufficient quantitative information to assess against this criterion. However, based on available information it would appear <i>S.</i> <i>bremerense</i> would not currently meet all the requirements of Criterion B.	No change - proposed mining will have minimal impact on extent of occurrence or area of occupancy, and will not reduce the number of locations to less than 10.	
С	Small population size and decline (population size, distribution and evidence of decline)	There is currently insufficient information to meet Criterion C.	No change - mining will result in ~8% reduction in population size which does not meet any of the Threatened Criteria.	
D	Very small or restricted population (population size) Based on available information it would appear <i>S. bremerense</i> would not currently meet Criterion D.		No change - proposed mining will not reduce number of mature individuals below 1000 (Vulnerable Criteria), Area of Occupancy will remain above 20km ² and number of locations will not be reduced below 5.	
Е	Quantitative analysis (statistical probability of extinction)	Currently insufficient information to assess against criteria.	Currently insufficient information to assess against criteria.	
Ass	essment Overview	Does not meet the criteria for Threatened	I status (current or as a result of mining)	

Table 5: Conservation Status Assessment: Teucrium diabolicum

List	ing Criteria	Current Status	Proposed Mining Impacts	
Population size reduction (evidence of decline)		There is currently insufficient quantitative information to assess against this criterion. However, based on available information it would appear <i>Teucrium diabolicum</i> would not currently meet Criterion A.	No change - mining will result in ~7% reduction in population size which does not meet any of the Threatened Criteria.	
в	Geographic range (EOO and AOO, number of locations and evidence of decline)	<i>Teucrium diabolicum</i> would not currently meet all the requirements of Criterion B.	No change - proposed mining will have minimal impact on extent of occurrence or area of occupancy, and will not reduce the number of locations to less than 10.	
с	Small population size and decline (population size, distribution and evidence of decline)	Known <i>Teucrium diabolicum</i> population size is approximately 16,153 and does not meet Criterion C.	No change - mining will result in ~7% reduction in population size which does not meet any of the Threatened Criteria.	
D	Very small or restricted population (population size)	Known <i>Teucrium diabolicum</i> population size is approximately 16,153, Area of Occupancy exceeds 20km ² and number of locations >5. Does not meet Criterion D.	No change - proposed mining will not reduce number of mature individuals below 1000 (Vulnerable Criteria), Area of Occupancy will remain above 20km ² and number of locations will not be reduced below 5.	

Listing Criteria		Current Status	Proposed Mining Impacts
E	Quantitative analysis (statistical probability of extinction)	Currently insufficient information to assess against criteria.	Currently insufficient information to assess against criteria.
Assessment Overview		Does not meet the criteria for Threatened	status (current or as a result of mining)

Table 6: Conservation Status Assessment: Bremer Range Vegetation Complexes PEC

Listi	ing Criteria	Current Status	Proposed Mining Impacts	
Α	Reduction in geographic distribution	The Bremer Range PEC would not meet the requirements of Criterion A.	No change - mining will result in ~0.3% impact on the Bremer Range PEC which does not meet any of the Threatened Criteria.	
В	Restricted geographic distribution coupled with demonstrable threat (EOO and AOO, threat and associated timeframe)	The Bremer Range PEC would not currently meet all the requirements of Criterion B.	No change - mining will result in ~0.3% impact on the Bremer Range PEC which does not meet any of the Threatened Criteria. The proposed impacts are located on the far south-east extremity of PEC and does not impact the Mt Day, Round Top Hill and Honman Ridge on which the PEC has been centered. Development envelope represents 1.01% of the total PEC.	
С	Environmental degradation (% extent and severity)	Currently insufficient information to assess against criteria.	Development envelope represents 1.01% of the total PEC which does not meet any of the Threatened Criteria.	
D	Disruption of biotic processes or interactions	PEC mostly intact and not comprised of patches. No current evidence of reduction in community integrity.	Development envelope represents 1.01% of the total PEC which does not meet any of the Threatened Criteria.	
E	Quantitative analysis (statistical probability of ecosystem collapse)	Currently insufficient information to assess against criteria.	Currently insufficient information to assess against criteria.	
Ass	essment Overview	Does not meet the criteria for Threatened	status (current or as a result of mining)	

Appendix 1: Assessment of Priority Flora against IUCN Red List Categories and Criteria

A. Population size reduction (reduction in total numbers). Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4		Eucalyptus rhomboidea		Stenanthemum bremerense			
	Critically Endangered	Endangered	Vulnerable	Pre-mining	Mining*	Pre-mining	Mining*
A1	≥ 90%	≥ 70%	≥ 50%	Not applicable	Not applicable	Not applicable	Not applicable
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%	Not applicable	~5% reduction	Not applicable	~8% reduction
A1 Population reducti where the causes of	on observed, est the reduction are have	imated, inferred, or s clearly reversible A ceased.	suspected in the past ND understood AND		Not applicable		Not applicable
A2 Population reducti where the causes of r	on observed, est eduction may no OR may no	imated, inferred, or s t have ceased OR m t be reversible.	suspected in the past ay not be understood	Notapplicable	Not applicable	Not applicable	Not applicable
A3 Population reducti (up to a mat	ion projected, info ximum of 100 yea	erred or suspected to ars) [(a) cannot be u	b be met in the future sed for A3].		~5% reduction	Not applicable	~8% reduction
A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.			Not applicable		Not applicable		
B. Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy		Pre-mining	Mining	Pre-mining	Mining		
	Critically Endangered	Endangered	Vulnerable	Eucalyptu	s rhomboidea	Stenanthe	mum bremerense
B1. Extent of occurrence (EOO)	<100 km²	<5,000 km²	<20,000 km²	~114 km²	Will not reduce extent of occurrence below 100km ²	~1827 km²	Will not reduce extent of occurrence below 100km ²
B2. Area of occupancy (AOO)	<10 km²	<500 km²	<2,000 km²	~52 km²	Will not reduce area of occupancy below 10km ²	~100 km ²	Will not reduce area of occupancy below 10km ²
AND at least 2 of	the following 3	conditions indica	ating distribution is				
(a) Severely	/al:						
fragmented OR Number of locations	=1	≤5	≤10	1 location (6 populations)	1 location (impacts to 2 populations)	7 locations (25 populations)	7 locations (impacts to 3 populations)
 (b) Continuing declir extent of occurrence; (iv) number of locat 	ne observed, esti (ii) area of occup ions or subpopula	mated, inferred or pr ancy; (iii) area, exter ations; (v) number of	ojected in any of: (i) ht or quality of habitat; mature individuals	iii & v	iii & v	iii	iii
(c) Extreme fluct occupancy; (iii) num	tuations in any of ber of locations o indi	: (i) extent of occurre or subpopulations; (iv viduals	ence; (ii) area of /) number of mature	Not applicable	Not applicable	Not applicable	Not applicable
C. Population size ar	nd decline			Pre-mining	Mining	Pre-mining	Mining
	Critically Endangered	Endangered	Vulnerable	Eucalyptu	s rhomboidea	Stenanthe	mum bremerense
Number of mature individuals	<250	<2500	<10,000	<2500	Will not reduce no. mature individuals below 250	>10,000	Will not reduce no. mature individuals below 10,000
	AND at least	one of C1 or C2					
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)	Not applicable	~5% reduction	Not applicable	~8% reduction

C2. An observed, ea	stimated, projecte least 1 of the fol	ed or inferred contin lowing 3 conditions:	uing decline AND at				
(i) Number of mature individuals in each subpopulation	<50	<250	<1,000	>1000	Will not reduce no. mature individuals below 250	>1000	Will not reduce no. mature individuals below 1000
 (ii) % of mature individuals in one subpopulation = 	90-100%	95-100%	100%	Not applicable	Not applicable	Not applicable	Not applicable
Extreme fluctuations in the number of mature individuals	-	-	-	Not applicable	Not applicable	Not applicable	Not applicable
D. Number of mature	individuals			Pre-mining	Mining	Pre-mining	Mining
	Critically Endangered	Endangered	Vulnerable	Eucalyptu	s rhomboidea	Stenanthe	mum bremerense
D1. Number of mature individuals	<50	<250	<1,000	>1000	Will not reduce no. mature individuals below 250	Not applicable	Will not reduce no. mature individuals below 1000
D2. Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	-	-	D2. typically: AOO < 20 km² or number of locations ≤5	~3km ² and no. locations <5	~3km² and no. locations <5	Not applicable AOO>20km ² and no. locations >5	Not applicable AOO>20km ² and no. locations >5
E. Quantitative Analy	/sis			Pre-mining	Mining	Pre-mining	Mining
	Critically Endangered	Endangered	Vulnerable	Eucalyptu	s rhomboidea	Stenanthe	mum bremerense
Indicating the probability of extinction in the wild to be:	≥50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥10% in 100 years	Not applicable- Quantitative analysis not conducted	Not applicable- Quantitative analysis not conducted	Not applicable- Quantitative analysis not conducted	Not applicable- Quantitative analysis not conducted

*Mining impacts based on cumulative direct and indirect impacts

A. Population size reduction (reduction in total numbers). Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			Acacia mutabilis subsp. stipulifera		Hakea pendens		Teucrium diabolicum		
	Critically Endangered	Endangered	Vulnerable	Pre-mining	Mining*	Pre-mining	Mining*	Pre-mining	Mining*
A1	≥ 90%	≥ 70%	≥ 50%	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%	Not applicable	~3% reduction	Not applicable	~18% reduction	Not applicable	~7% reduction
A1 Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.					Not applicable		Not applicable		Not applicable
A2 Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be					Not applicable		Not applicable		Not applicable
A3 Population r met in the futur	eduction projecte re (up to a maxim be used	ed, inferred or su num of 100 years for A3].	spected to be (<i>a) cannot</i>	Not applicable	~5% reduction	Not applicable	~18% reduction	Not applicable	~7% reduction
A4 An observe population redu the past and th and where the may not b	ed, estimated, info uction where the ne future (up to a causes of reduct be understood OF	erred, projected (time period must max. of 100 yea ion may not have R may not be rev	or suspected include both irs in future), e ceased OR rersible.	Not ap	Not applicable		Not applicable		Not applicable
B. Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy			Pre-mining	Mining	Pre-mining	Mining	Pre-mining	Mining	
	Critically Endangered	Endangered	Vulnerable	Acacia muta stipul	bilis subsp. lifera	Hakea pendens		Teucrium diabolicum	
B1. Extent of occurrence (EOO)	<100 km²	<5,000 km²	<20,000 km²	~14,590 km²	Will not reduce extent of occurrence below 5,000 km ²	~5,555 km²	Will not reduce extent of occurrence below 5000 km ²	~15,860 km²	Will not reduce extent of occurrence below 5,000 km ²
B2. Area of occupancy (AOO)	<10 km²	<500 km²	<2,000 km²	~160 km²	Will not reduce area of occupancy below 10 km ²	~116 km²	Will not reduce area of occupancy below 10 km ²	~88 km²	Will not reduce area of occupancy below 10 km ²
AND at least 2 of the following 3 conditions indicating distribution is precarious for survival:									
(a) Severely fragmented OR Number of locations	=1	≤5	≤10	10 locations (20 populations)	10 locations (impact to 1 population)	6 locations (6 populations)	6 locations (impact to 2 populations)	11 locations (12 populations)	11 locations (Impact to 3 populations)
 (b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent or quality of habitat; (iv) number iii of locations or subpopulations; (v) number of mature individuals 				iii	iii	iii	iii and iv	iii	iii

 (c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals 			Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
C. Population size and decline			Pre-mining	Mining	Pre-mining	Mining	Pre-mining	Mining	
	Critically Endangered	Endangered	Vulnerable	Acacia mutabilis subsp. stipulifera		Hakea pendens		Teucrium diabolicum	
Number of mature individuals	<250	<2500	<10,000	348,452	338,451 (Reduction of 10,001)	6,783	5,543 (Reduction of 1240)	16,153	15,003 (Reduction of 1150)
AND at least o	ne of C1 or C2	-							
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)	Not applicable	~3% reduction	Not applicable	~18% reduction	Not applicable	~7% reduction
C2. An observ decline Al	C2. An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:								
(i) Number of mature individuals in each subpopulation	<50	<250	<1,000	>1000	Will not reduce no. mature individuals below 1000	>1000	Will reduce the Bremer Range population to ~1173 plants	>1000	Will not reduce no. mature individuals below 1000
(ii) % of mature individuals in one subpopulation =	90-100%	95-100%	100%	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Extreme fluctuations in the number of mature individuals	-	-	-	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
D. Number of mature individuals		Pre-mining	Mining	Pre-mining	Mining	Pre-mining	Mining		
	Critically Endangered	Endangered	Vulnerable	Acacia mutabilis subsp. stipulifera		Hakea pendens		Teucrium diabolicum	
D1. Number of mature individuals	<50	<250	<1,000	348,452	338,451 (Reduction of 10,001)	6,783	5,543 (Reduction of 1240)	16,153	15,003 (Reduction of 1150)
D2. Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could	-	-	D2. typically: AOO < 20 km² or number of locations ≤5	Not applicable AOO>20km ² and no. locations >5	Not applicable AOO>20km ² and no. locations >5	Not applicable AOO>20km ² and no. locations >5	Not applicable AOO>20km ² and no. locations >5	Not applicable AOO>20km² and no. locations >5	Not applicable AOO>20km² and no. locations >5

drive the taxon to CR or EX in a very short time.									
E. Quantitative Analysis				Pre-mining	Mining	Pre-mining	Mining	Pre-mining	Mining
	Critically Endangered	Endangered	Vulnerable	Acacia mutabilis subsp. stipulifera		Hakea pendens		Teucrium diabolicum	
Indicating the probability of extinction in the wild to be:	≥50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥10% in 100 years	Not applicable- Quantitative analysis not conducted	Not applicable- Quantitative analysis not conducted	Not applicable- Quantitative analysis not conducted		Not applicable- Quantitative analysis not conducted	Not applicable- Quantitative analysis not conducted

*Mining impacts based on cumulative direct and indirect impacts

Appendix 2: Assessment of Priority Ecological Community against IUCN Red List Categories and Criteria

A. Reduction in geographic distribution	over ANY of the following	Bremer Range PEC1				
	Critically Endangered	Endangered	Vulnerable	Pre-mining	Mining*	
A1 Present (over the past 50 years)	≥ 80%	≥ 50%	≥ 30%	Not applicable	Not applicable	
A2 Future (over the next 50 years)	≥ 80%	≥ 50%	≥ 30%	Not applicable	~0.3% reduction	
A2b Future (over any 50 year period	≥ 80%	≥ 50%	≥ 30%	Not applicable	~0.3% reduction	
A3 Historic (since 1750)	> 90%	> 70%	> 50%	Not applicable	Not applicable	
	£ 50 %	£ 7078	2 30 78			
B. Restricted geographic distribution in	dicated by EITHER B1, B2	or B3:		Pre-mining	Mining	
	Critically Endangered	Bremer Range PEC1				
B1 Extent of occurrence (EOO)	< 2000 km ²	< 20,000 km²	< 50,000 km ²	~1673 km ²	~0.3% reduction	
B2 Area of Occupancy (AOO) based on	-2	~20	~50	28	27	
10km X 10km grid cells	~2	~20	<30	20	21	
AND at least one of the following (a-c):						
 (a) An observed or interred continuing de a measure of spatial extent ag ii. a measure of environmental q iii. a measure of disruption to bio (b) Observed or inferred threatening proc environmental quality or biotic interact 	cline in EITHER: opropriate to the ecosystem; juality appropriate to charact tic interactions appropriate to esses that are likely to cause tions within the next 20 years	OR eristic biota of the ecosyst o the characteristic biota c e continuing declines in ge s.	tem; OR of the ecosystem eographic distribution,	Not applicable	The proposed impacts are located on the far south-east extremity of PEC and does not impact the Mt Day, Round Top Hill and Honman Ridge on which the PEC has been centered. Development envelope represents 1.01% of the total PEC	
(a) Econystam avieta at:	Critically Endangered	Endangered	Vulnerable	11 threat-based locations (based	11 threat-based locations (~0.3%	
(c) Ecosystem exists at.	1 threat-defined location	≤ 5 threat-defined locations	≤ 10 threat-defined locations	that constitute the PEC)	Range)	
B3 A very small number of threat-defined locations (generally fewer than 5) AND prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and thus capable of collapse or becoming Critically Endangered within a very short time period	-	-	Only applicable to VU listing	11 threat-based locations (based on the individual hills/ ranges that constitute the PEC)	11 threat-based locations (~0.3% reduction of one location; Bremer Range)	
C. Environmental degradation over AN	of the following time peri	ods:		Pre-mining Mining		
	Critically Endangered Endangered Vulnerable			Bremer Range PEC1		
C1 The past 50 years based on change in an <u>abiotic</u> variable affecting a fraction of the extent of the ecosystem and with relative severity	≥80% extent and ≥80% severity	≥50% extent and ≥50% severity	≥30% extent and ≥30% severity	Not applicable	Not applicable	
C2a. The next 50 years, based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity OR C2b. Any 50-year period including the past, present and future, based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity C2 Since 1750 based on change in an	≥80% extent and ≥80% severity	≥50% extent and ≥50% severity	≥30% extent and ≥30% severity	Not applicable	Development envelope represents 1.01% of the total PEC	
abiotic variable affecting a fraction of the	290% extent and 290% severity	≥70% extent and ≥70% severity	≤50% extent and ≥50% severity	Not applicable	1.01% of the total PEC	

extent of the ecosystem and with relative severity						
D. Disruption of biotic processes or inte	eractions over ANY of the	Pre-mining	Mining			
· · · ·	Critically Endangered	Endangered	Vulnerable	Bremer Range PEC1		
D1 The past 50 years based on change in a <u>biotic</u> variable affecting a fraction of the extent of the ecosystem and with relative severity	≥80% extent and ≥80% severity	≥50% extent and ≥50% severity	≥30% extent and ≥30% severity	Not applicable	Not applicable	
D2 (D2a) The next 50 years, or (D2b) any 50-year period including the present and future, based on change in a <u>biotic</u> variable affecting a fraction of the extent of the ecosystem and with relative severity	≥80% extent and ≥80% severity	≥50% extent and ≥50% severity	≥30% extent and ≥30% severity	Not applicable	Development envelope represents 1.01% of the total PEC	
D3 Since 1750, based on a change in a biotic variable affecting a fraction of the extent of the ecosystem and with relative severity	≥90% extent and ≥90% severity	≥70% extent and ≥70% severity	≥50% extent and ≥50% severity	Not applicable	Development envelope represents 1.01% of the total PEC	
E. Quantitative analysis showing probability of extinction Pre-mining Minin						
	Critically Endangered Endangered Vulnerable			Bremer Range PEC1		
A quantitative analysis that estimates the probability of ecosystem collapse	≥50% within 50 years	≥20% within 50 years	≥10% within 100 years	Not applicable- Quantitative analysis not conducted	Not applicable- Quantitative analysis not conducted	

*Mining impacts based on cumulative direct and indirect impacts **Based on extent within Development Envelope



Appendix 3: Priority Flora Extent of Occurrence and Area of Occupancy











Appendix 4: Bremer Range PEC Extent of Occurrence and Area of Occupancy