

PER 2016

J5 and Bungalbin East Iron Ore Proposal Response to Submissions – Attachment 4 Response to Public Comments



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RESPONSE TO PUBLIC SUBMISSIONS

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1. The Pro	. The Proposal - general comments				
1. The Pro-	Department of Parks and Wildlife (Parks and Wildlife)	ts The proposal is located on the Helena-Aurora Range (HAR), the banded iron formation (BIF range) in the Yilgarn Craton with the highest conservation significance and the most significant BIF range in the Mount Manning cluster of conservation significant BIF ranges. The Public Environmental Review (PER) does not directly address this fact, or recognise that the HAR is one of the few remaining large and undisturbed ranges in Mount Manning hotspot that is characterised by a high diversity of BIF specialist, rare and restricted flora and vegetation. The size, steepness of slopes (including cliffs) and landscape complexity of the Mount Manning cluster of BIF ranges correlates strongly with the biodiversity significance of these ranges, in particular the presence of unique flora species and vegetation communities. The correlation between high biodiversity value and landscape complexity is best exemplified in the HAR and the Die Hardy Range, which represent the BIF ranges	The PER clearly recognises the conservation significance of the HAR. The existence of a relationship between high biodiversity value and landscape complexity is acknowledged. The PER also recognises that the Proposal does not seek to mine the Helena-Aurora Range in its entirety, and that a balance between mining of the range and conservation of biodiversity, BIF landforms and other related values can be achieved whilst generating job opportunities and mining royalties for the State of Western Australia. The report of the EPA (2007) and BIF Strategic Review (2007) are appropriately acknowledged and discussed in Section 1.3 – Site History of the PER. Research papers such as those by Gibson et al (2012) are extensively referenced throughout the PER document, including in Section 3.2 – Biodiversity and throughout Chapter 5 – Flora and Vegetation and		
		 Goldfields. A number of published reports support the conclusion that the HAR has the highest conservation significance of any of the BIF ranges in the Yilgarn Craton, including for example: Environmental Protection Authority (EPA) (2007), the "concentration of conservation values associated with the Helena and Aurora Range, 	Any form of sustainable nature based tourism at the HAR has yet to be realised. Current visitor numbers are low (340 vehicles per year) and infrastructure is inadequate to support significantly larger visitor numbers. MRL is open to providing funding for such infrastructure and to hand over any suitable mining infrastructure for future tourism use after mining is completed, such as the road network and		





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		established that, for its size, the range is one of the more significant biodiversity assets in WA…" (page iii).	accommodation villages.
		 BIF Strategic Review (2007)¹, "In the south-east cluster (Mount Manning area), the Helena-Aurora Range is of the highest biodiversity significance and is at the exploration stage" (page 6). 	
		• Gibson et al. (2012) ² , this synthesis of scientific data from surveys of BIF ranges in the Yilgarn Craton confirmed that the Mount Manning cluster of BIF ranges supports the highest biodiversity conservation values of any of the BIF ranges in the Yilgarn Craton, in particular the HAR.	
		The size and landscape complexity of the HAR also contributes to the landscape amenity and existing and potential recreational tourism value of this area. In the context of the Mount Manning area, the HAR has been	
		appropriately reported as supporting "a majestic landscape of far greater scale and elevation than the other nearby ranges" (GHD, 2009) ³ . The HAR is a very distinct feature in the regional landscape that possesses outstanding landscape value, and is located within a current conservation reserve, with the potential	
		to support the continued development of sustainable	

³ GHD (2009) *Report for Koolyanobbing Iron Ore Project: Landscape Aesthetics Survey*. Perth, Western Australia.

¹ Department of Environment and Conservation and Department of Industry and Resources (2007) *Strategic Review of the Banded Iron Formation Ranges of the Midwest and Goldfields*. Perth, Western Australia.

² Gibson, N., Meissner, R., Markey, A.S. and Thompson, W.A. (2012) *Patterns of Plant Diversity in Ironstone Ranges in Arid South Western Australia* Journal of Arid Ecology **77**: 25-31.



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		nature based tourism within a few hours' drive of Perth.	
63	The Wilderness Society	Submitter refers to the work of Gibson <i>et al.</i> (2012) which brings together scientific data from surveys of BIF ranges in the Yilgarn Craton. This paper confirms the Mount Manning BIF Ranges (including the HAR) as being one of two major hotspots for specialist ironstone flora species in the Yilgarn Craton - the other being the Karara/Mungada/Koolanooka area – which is being mined.	This specific point is acknowledged in the PER. Section 3.2.1 states: "Within the published scientific literature on BIF ranges, there is recognition of two centres for endemic and BIF specialist taxa (otherwise called hotspots), with one of these hotspots being centred on the HAR (Gibson, et al., 2012)."
64	CSIRO ANON-TWYQ-WPJY-Y ANON-TWYQ-WPJC-9	 Several statements regarding the potential impact or control of impacts of the proposed development activities on biodiversity, landform and amenity values are not easily substantiated by existing data/literature. Further information should be provided to address the following: the PER does not provide the breadth of evidence or detail that might be required to support statements regarding the full ecological and amenity impacts and restoration/offset options, and account for current knowledge or future uncertainties; and the PER also does not fully address the significant amenity and environmental values of the woodland plains surrounding the HAR that will be impacted by the proposed development. <u>Cumulative and cryptic impacts</u> A key emerging finding in the ecological science literature is that impact assessments can underestimate the impacts of developments, because so-called 	The issues raised are similar in nature, sometimes identical, to those raised in respect of individual factors. In this regard, MRL refers the submitters to the detailed responses provided therein. <u>Cumulative and cryptic impacts</u> MRL notes that the submitters categorise cumulative and cryptic impacts as a subset of enigmatic impacts, other components of which include off-site impacts, secondary impacts and unpredictable interactions among impacts. MRL notes that the ESD for the PER does not explicitly require assessment of the full suite of "enigmatic" impacts as identified by the submitters. The ESD does, however, require assessment of direct, indirect and cumulative impacts to varying levels of detail with respect to individual environmental factors. This approach reflects the practical difficulties associated with assessment of "enigmatic" impacts.



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		'enigmatic' impacts are poorly accounted for (e.g. Pope et al. 2013 ⁴ ; Raiter et al. 2014 ⁵). Enigmatic impacts are proposed to include: 'cumulative' impacts of multiple small developments, 'off-site' impacts away from the development site, 'cryptic' impacts that are not readily evaluated (e.g. light pollution), and 'secondary' impacts that result from impacts of the initial development impact (e.g. increased human fire ignitions arising from greater levels of human activity and enhanced accessibility). They also include unpredictable interactions among impacts. It is in these four areas of cumulative impacts, off-site impacts, secondary impacts, cryptic and impacts where additional information would be valuable. 'Cumulative' impacts are particularly relevant to the current proposal. These involve 'the sum of individual <i>impacts that alone are considered negligible, but</i> <i>accumulate over space and/or time and are so</i> <i>numerous that they are significant when considered in</i> <i>totality</i> ' (Raiter et al. 2014). The strategic review of the BIF ranges of the Midwest and Goldfields (Department of Environment and Conservation (DEC) 2007 ⁶), indicates that all 28 of the BIF areas are targeted for exploration and/or mining. The review concludes that 'Unless appropriate guidance is in place there is a very high probability that, over time, none of the most	and mitigating the full breadth of enigmatic impacts is both ambitious and unlikely given constraints of money and knowledge". Please also refer to the response to Issue 60 in this regard. The submitters state that "the PER proposes that the precedents of existing related development projects indicate that the proposal should be accepted, but does not deal with the cumulative impact from the multitude of developments on this area." MRL advises that the PER does not advocate acceptance of the proposal based on development precedents elsewhere in the region, and that it explicitly deals with the cumulative impact from developments within the region as defined in the ESD. The submitters appear to contend that the Great Western Woodlands (GWW) would be an appropriate boundary for assessing cumulative effects of development, but this is clearly beyond the scope of the PER, and EIA more generally. <u>Net benefit claims</u> : A quantitative benefit-cost analysis in terms of the economic, environmental and social impacts is beyond the scope of the PER. It is not a requirement of the ESD for the Proposal nor is it common practice in relation to

⁴ Pope et al. (2013) Advancing the theory and practice of impact assessment: setting the research agenda. Environmental Impact Assessment Reviews 41, 1–9.

⁵ Raiter, Hobbs, Prober, Possingham (2014) *Under the radar: mitigating enigmatic ecological impacts*. Trends in Ecology and Evolution 29, 635-642

⁶ Department of Environment and Conservation and Department of Industry and Resources (2007) *Strategic Review of the Banded Iron Formation Ranges of the Midwest and Goldfields*. Perth, Western Australia.





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		outstanding range systems and very few of the remainder will be preserved intact [*] . Further, the DEC review identifies the HAR as one of the most outstanding examples that should be protected in its entirety. This context demonstrates that a strategic approach is essential to ensure that the BIFs with the highest environmental values, such as HAR, are protected. Other 'cumulative' impacts impinge on the areas surrounding the HAR. There is increasing cumulative impact of mining and mineral exploration in the Great Western Woodlands (GWW) more generally, and impacts of the proposal on the surrounding landscape, including the waste rock landforms (WRL), roads and other infrastructure. The PER proposes that the precedents of existing related development projects indicate that the proposal should be accepted, but does not deal with the cumulative impact from the multitude of developments on this area. Based on local historical outcomes, 'cryptic' impacts are also likely to result from the proposed development. For example, Raiter <i>et al.</i> (2014) describe 'Impacts of development on restricted-range endemics are often cryptic, with many species undescribed, poorly surveyed, and/or hard to find, owing to their cryptic nature (Harvey 2002 ⁷ ; Scheffers et al. 2012 ⁸ ; Karanovic et al. 2013 ⁹). In 2000 a mining operation in the GWW of	EIA in Western Australia. <u>Compromises to landform and amenity values:</u> Please refer to the relevant responses to the (similar) issues raised in respect of the landform and amenity factors. For example, Issue 147 in regard to landforms and Issue 278 in regard to amenity MRL advises that current visitor numbers to the MMHARCP are low (340 vehicles per year) and infrastructure is inadequate to support a significant increase in visitor numbers. MRL is not able to comment on the future tourism potential of the Helena-Aurora Range, but is remains open to providing offset funding for related infrastructure and to hand over any suitable mining infrastructure for future tourism use after mining is completed, such as the road network and accommodation villages. Similarly, there could be opportunities for MRL to negotiate indirect offsets that facilitate achievement of the objectives of the GWW Biodiversity and Cultural Conservation Strategy, but beneficial synergies of this nature will be foregone in the event the Proposal does not proceed.

⁷ Harvey (2002) Short-range endemism amongst the Australian fauna: some examples from non-marine environments. Invert. Syst. 16, 555–570.

⁸ Scheffers, et al. (2012) What we know and don't know about Earth's missing biodiversity. Trends in Ecology and Evolution 27, 501–510.

⁹ Karanovic, et al. (2013) Two new subterranean ameirids (Crustacea: Copepoda: Harpacticoida) expose weaknesses in the conservation of short-range endemics threatened by mining developments in Western Australia. Invert. Syst. 27, 540–566.



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		southwestern Australia was approved because the restricted-range ameirid copepod (a small invertebrate that inhabits underground water) found there was thought to occur elsewhere as well (Karanovic et al. 2013). However, the rapid timelines imposed precluded detailed morphological or molecular determination of conspecificity. Subsequent examination found that the two known populations belonged to different genera, with the initial population misidentified because of convergent morphology (Karanovic et al. 2013). Consequently, the ameirid is threatened with extinction by dehydration of its habitat.' Cryptic impacts could be better accounted for using a range of options (e.g. decision support tools can inform preferable courses of action under uncertainty, Raiter et al. 2014), but are not	
		Net benefit claims The PER states that the proposed developments and associated offsets aim for a 'net environmental benefit' (page 1-11) and that 'the significance of residual impacts of the Proposal are not so great as to justify a 'no development' decision' (page 2-9). More evidence would be required to support these claims. It would require quantification of the risks to the long term environmental, amenity, social and alternative long-term economic values, against the short-term economic and social benefits of the proposed development and the benefits of the proposed offsets. Compromises to landform and amenity values The PER utilises a restricted set of values to estimate the sector of the sector of t	



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		value, and does not fully address the issue that the landform and amenity values would be permanently compromised. Section 10.5 of the PER suggests that the residual amenity impacts of the proposal are ' <i>not</i> <i>considered to be significant</i> ', citing a set of six reasons. Below we provide commentary on the six reasons:	
		 'There are no permanent sensitive receptors or permanent residences within the MMHARCP, and visitation is considered to be low.' 	
		The PER concludes that residual impacts are not significant due to the lack of permanent sensitive receptors (such as hospitals, schools or convalescent facilities where the occupants may be more susceptible to the adverse effects of exposure to contaminants and pollutants) or permanent residences within the broader area. The lack of these permanent facilities does not detract from the residual impact of the proposal, and the assessment provided lacks quantified analysis of long- term impact to the public amenity of the Mount Manning - Helena-Aurora Regions Conservation Park (MMHARCP).	
		Recreational users seek the sweeping views, interesting biota and peaceful, aesthetic environment of the HAR and surrounding plains. Currently visitation is understood to be low, however consideration should be made of the potential value of the MMHARCP for future generations, especially considering relative proximity to Perth and the importance of the HAR as a key asset within the increasingly visited GWW. In particular, the GWW Biodiversity and Cultural Conservation Strategy prepared by the Western Australian Government (DEC	



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		undated ¹⁰) states: ' <i>There are clear opportunities to</i>	
		attract higher yield and environmentally aware visitors to	
		the Great Western Woodlands. Statewide in 2007, 14.8	
		million domestic overnight visitors, 14.5 million day	
		visitors and 3.4 million international visitors participated	
		in nature-based activities. The biodiversity, landscape,	
		culture and remote outback nature of the Great Western	
		Woodlands provide significant scope to attract	
		'experience seekers', looking for authentic, active	
		holidays in which they can get thoroughly involved.'	
		1. 'A number of tracks currently provide access to the MMHARCP and it is expected that most of these will	
		remain open to public access during the life of the	
		Proposal. Limited local track closures around the two mine nits will occur to ensure public safety.	
		The closure of some tracks that currently provide access	
		within the Conservation Park would have some impact	
		on some users seeking to utilise the area. However, in	
		comparison to other impacts, the closure of tracks for	
		public egress during the life of the mines has minimal	
		residual impact.	
		2. 'There are areas of the MMHARCP (including areas	
		at lower elevations) that do not have a clear line of	
		sight to the Proposal i.e. the Proposal is not visible	
		from these locations. Visitors can still experience the	
		remote and natural environment of the MMHARCP	

¹⁰ Department of Environment and Conservation (undated) *A Biodiversity and Cultural Conservation Strategy for the Great Western Woodlands.* https://www.dpaw.wa.gov.au/images/documents/conservation-management/off-road-conservation/gww/gww-strategy.pdf (accessed 22 October 2016).



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		at the same time that mining is occurring.'	
		Current understanding of national and international visitation to natural areas including national parks and reserves indicates visitor experience determined by an overall valuation or "opinion" of the aesthetic features of the area rather than by individual lines of sight. The removal of areas of the range with permanent alterations to the contour of ridgelines and crests and, addition of open pits and adjacent WRL, would have substantial, permanent impacts on visual amenity and hence visitor experience. Further, the above statement lacks recognition of human behaviour – visitors to areas of low relief naturally gravitate towards high points in the landscape to gain a broad landscape view. In the case of the GWW, experience a largely intact and relatively pristine landscape. The HAR is visible from high points across a wide region, and this development, if allowed to proceed, would be at least as visually intrusive as has	
		 2. 'The disturbance area of the Proposal within the MMHARCP is small compared to the area of the MMHARCP that remains undisturbed, and the Proposal is potentially located within an area of the MMHARCP which has the same landform values also represented elsewhere across the MMHARCP.' The footprint of the disturbance area of the proposed development does not reflect the much larger area in which visual amenity (and potentially other values) would be impacted. Further, the other ranges noted do not represent the same visual amenity as HAR, because other ranges such as Windarling, Mount Jackson/J4 and 	



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		 Koolyanobbing are already impacted by mines, and ranges to the north such as Die Hardy and Mount Manning do not occur within equivalent eucalypt woodland landscapes. One of Australia's most prominent biogeographic transition zones, between eucalypt and <i>Acacia</i>-dominated woodlands (known as the Mulga or Menzies line, Beard 1990¹¹, Prober <i>et al.</i> 2012¹²), begins between HAR and Mount Manning/Die Hardy Ranges; such that the latter are largely surrounded by more common Mulga (<i>Acacia</i> spp.) dominated landscapes (in mosaic with sandplain and other vegetation). <i>'The mine pits will remain as open voids, however the southern pit at Bungalbin East will be partially backfilled and the WRLs will be constructed in a manner that ensures these new landforms will be safe, stable, non-polluting and able to sustain native vegetation in the long term.</i> 	
		The EPA objective for landforms is 'to maintain the variety, integrity, ecological functions and environmental values of landforms' (page 6-1 of the PER). An objective assessment of the long-term residual impact in relation to landform change of the mine-site would consider more than just safely, stability, pollution and ability to have some form of vegetation coverage in and around	

¹¹ Beard (1990) *Plant life of Western Australia*. Kangaroo Press, Kenthurst.

¹² Prober, Thiele, Rundell, Yates, Berry, Byrne, Christidis, Gosper, Grierson, Lemson, Lyons, Macfarlane, O'Connor, Scott, Standish, Stock, van Etten, Wardell-Johnson, Watson (2012). Facilitating adaptation of biodiversity to climate change: a conceptual framework applied to the world's largest Mediterranean-climate woodland. Climatic Change 110, 227–248.



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		the pits themselves. Under most scenarios the removal of the landform and replacement with open pits would be considered a significant residual impact on landform integrity.	
		4. 'The Rehabilitation and Mine Closure Plan developed for the Proposal outlines the rehabilitation activities and the monitoring and maintenance framework that will be implemented to ensure the success of the mine rehabilitation and closure programs (see Appendix 12-D). This framework includes monitoring for physical stability and erosion of rehabilitated areas and allows for repair works where required and various monitoring methods to be implemented, with monitoring continuing until the completion criteria agreed for each of the closure domains have been achieved.'	
		The current proposal provides for a Rehabilitation and Mine Closure Plan (RMCP) which outlines the future rehabilitation and required monitoring of completion criteria for closure of the mines. The framework however does not detail how the proposal will address the issue of the residual impact of significantly altering the landform, including non-rehabilitated open voids, the creation of prominent WRL, as well as associated impacts from infrastructure development over multiple areas. Therefore, it should not be listed as a reason why the residual impacts could be considered as not significant.	
65	ANON-TWYQ-WP19-6	The PER is not adequate of what is expected from the Western Australian (WA) mining industry it contains	MRL does not accept the submitters' broad assertion that the PER is not adequate of what is expected from



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		motherhood statements, it does not support technical decisions with data and does not consider the data that is provided. The PER has failed to demonstrate that the proponent fully understands the principles of environmental management for mine site rehabilitation and closure.	the WA mining industry. The submitter makes various claims in respect of several factors throughout the summary of public submissions. These claims have been responded to at length and the submitter is referred to MRL's response to the relevant factors in this regard.
66	The Wilderness Society	Although the HAR is not currently on the <i>Environment</i> <i>Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) National Heritage List there is no doubt it should be. As one of the last intact BIF ranges with exceptional and unique natural and cultural values it should be placed on the National Heritage List as soon as the current mining proposal is rejected.	MRL is not able to comment on whether the Helena- Aurora Range should be considered for inclusion on the National Heritage List. This is a matter for the Australian Government to consider.
67	ANON-TWYQ-WP2E-K ANON-TWYQ-WP2Y-7 BHLF-TWYQ-WPP8-4 ANON-TWYQ-WPP8-J ANON-TWYQ-WPPR-X ANON-TWYQ-WPPP-V ANON-TWYQ-WPP5-1 ANON-TWYQ-WPPK-Q ANON-TWYQ-WPHB-6 Track Care WA ANON-TWYQ-WPHK-F ANON-TWYQ-WPHK-F ANON-TWYQ-WPHS-Q ANON-TWYQ-WPHS-Q	 The submitters object to the proposal as implementation of the proposal would cause irreversible damage to the unique natural values of the HAR. The HAR natural values include: The highest conservation value and is the best remaining example of an intact BIF range in the Yilgarn area of WA. For its size, it is one of the most significant biodiversity assets in Western Australia. It is also a Jewel in the Crown of the GWW with its unique flora, fauna and landscape values. Exceptional landforms and spectacular beauty. At 704m above sea level, the HAR is the highest in the Coolgardie Bioregion. Distinct and significant geodiversity values of an ancient landform. One of the geologically oldest areas in WA and the world. Remains relatively undisturbed. 	MRL notes the submitters' summary of the natural values of the Helena-Aurora Range, and the suggestion that these values are unique and will be irreversibly damaged by the Proposal. The PER provides a detailed assessment of the effects of the Proposal on these values but does not reach the same conclusion. MRL notes that the areas of highest elevation of the HAR including Bungalbin Hill and the unnamed 702m peak will not be be affected by the Proposal. The Yilgarn Craton extends over almost half of the Western Australian land mass. The Yilgarn Craton is characterised by granite and greenstone rocks of Archaen age. All of the BIFs of the Yilgarn Craton were deposited at the same time as part of a global event (~3 Ga). There is nothing unique about the HAR in this regard.



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	ANON-TWYQ-WPB9-Q	Scenically-beautiful landform (wilderness views from	
	ANON-TWYQ-WP23-1	all points of the range; outcrops, caves, rock faces;	
	BHLF-TWYQ-WPJ8-X	the most convoluted series of hills of all BIF ranges in the CW/W: highest BIE range in the CW/W: and it	
	BHLF-TWYQ-WPJV-V	is surrounded by vast Salmon Gum and Gimlet	
	BHLF-TWYQ-WPJ3-S	woodlands and sandplains).	
	BHLF-TWYQ-WPJK-H	Reservoirs of genetic diversity with high levels of	
	BHLF-TWYQ-WPJ2-R	species endemism and richness. This genetic	
	The Wilderness Society	diversity evolved with increased aridity in this	
	15; 36; 43; 49; 52; 79;	landscape, a process which marooned species on BIE ranges and enabled them to persist in the rock	
	87; 109; 253; 355; 358;	fissures, crevices, and caves. It has led to flora and	
	359; 360; 361; 362; 363; 364: 365	fauna species that are dependent on BIF habitats.	
	ANON-TWYQ-WPZ7-D	Some of these flora and fauna are endemic to	
	ANON-TWYQ-WPZX-E	Individual BIF langes.	
	ANON-TWYQ-WPZ6-C	 Onique, rare and intreatened nora (approximately 360 native plant species: 5 endemic flora species: 2 	
	The Subaru 4WD Club	Declared Rare Flora (DRF); 16 Priority Flora species	
	of Western Australia Inc	(3 Priority 1 (P1), 7 P3, 3 P4); 11 BIF dependent	
	ANON-TWYQ-WPP9-5	flora species; and flora species yet to be	
	ANON-TWYQ-WPPG-K	discovered).	
	ANON-TWYQ-WPPW-3	 Mature eucalypt woodlands, woodland sandplain and inadequately reserved communities 	
	ANON-TWYQ-WPPQ-W	The HAR occurs at the edge of a large nature	
	ANON-TWYQ-WPFC-5	reserve.	
	ANON-TWYQ-WPF1-K	 P1 Ecological Community: Helena and Aurora 	
	ANON-TWYQ-WPF9-U	Range vegetation complexes (PEC).	
	ANON-TWYQ-WPF7-S	• Subterranean fauna (9 endemic troglofauna species;	
	Bird Life Australia	and troglofauna species yet to be discovered).	
	ANON-TWYQ-WPFT-P	Terrestrial fauna (approximately 160 native fauna	



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	ANON-TWYQ-WPFV-R	species; 3 threatened fauna species; 1 specifically	
	ANON-TWYQ-WPFU-Q	protected fauna species; and terrestrial fauna	
	ANON-TWYQ-WPFR-M	species yet to be discovered).	
	ANON-TWYQ-WPF6-R	Aboriginal Heritage sites.	
	ANON-TWYQ-WPZR-8	Tremendous tourism potential.	
	ANON-TWYQ-WP4E-N	The HAR is a BIF range with unique natural values as it borders the transitional rainfall zone of	
	ANON-TWYQ-WP4M-W	biogeographic region separating the species rich	
	ANON-TWYQ-WP4T-4	South West Australian Floristic Region from the arid	
	ANON-TWYQ-WP4S-3	interior. The other BIF ranges bordering the	
	ANON-TWYQ-WP4N-X	transitional rainfall zone have already been severely	
	ANON-TWYQ-WPBA-Y	impacted by mining (Koolyanobbing, Mount Jackson and Windarling Panges)	
	WA Native Orchid Study		
	and Conservation Group		
	Inc.		
	ANON-TWYQ-WPJU-U		
	ANON-TWYQ-WPBR-G		
	ANON-TWYQ-WPB6-M		
	ANON-TWYQ-WPBX-P		
	ANON-TWYQ-WPJE-B		
	BirdLife WA		
	ANON-TWYQ-WPJN-M		
	ANON-TWYQ-WPB3-H		
	ANON-TWYQ-WPBJ-8		
	ANON-TWYQ-WPBK-9		
	ANON-TWYQ-WPBQ-F		
	ANON-TWYQ-WPJC-9		



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	ANON-TWYQ-WP4J-T		
	ANON-TWYQ-WP22-Z		
	ANON-TWYQ-WP2K-S		
	ANON-TWYQ-WPPC-F		
	ANON-TWYQ-WPPD-G		
	ANON-TWYQ-WP2Q-Y		
	ANON-TWYQ-WP2W-5		
	ANON-TWYQ-WP46-6		
	ANON-TWYQ-WP2K-S		
	ANON-TWYQ-WPBE-3		
	ANON-TWYQ-WP2Z-8		
	ANON-TWYQ-WPF2-M		
	ANON-TWYQ-WP1D-H		
	ANON-TWYQ-WP13-Z		
	ANON-TWYQ-WPFW-S		
	ANON-TWYQ-WPF5-Q		
	ANON-TWYQ-WPBC-1		
68	1; 3; 6; 7; 8; 10; 11; 13;	The submitters object to the proposal and call for the	MRL acknowledges the submitters' statements and
	14; 15; 17; 18; 21; 23;	HAR to be fully protected. They raised general concerns	awaits the EPA's recommendations and the Minister for
	24; 25; 26; 28; 29; 31;	regarding mining within the HAR, citing its uniqueness in	Environment's decision on the Proposal.
	32; 33; 34; 36; 38; 40;	relation to the areas natural aesthetic, natural and	
	41; 42; 43; 45; 46; 47;	cultural heritage, biodiversity, conservation significance,	
	50; 53; 54; 55; 56; 57;	geology and landform. The submitters called on the EPA	
	58; 59; 60; 61; 62; 63;	to again recommend against the proposal and to protect	
	64; 66; 67; 68; 70; 71;	the environment. Common themes centred on:	
	72; 73; 74; 75; 76; 77;	• precluding mining from the area to protect the range	
	80; 84; 86; 87; 88; 90;	for future generations;	
	91; 92; 93; 94; 95; 96;		



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Issue No.	Submitter 97; 98; 100; 102; 103; 105; 106; 109; 110; 112; 114; 119; 120; 123; 125; 126; 128; 130; 131; 132; 134; 136; 139; 142; 146; 147; 152; 153; 154; 156; 157; 158; 163; 164; 165; 166; 167; 168; 169; 170; 171; 172; 173; 174; 175; 176; 177; 178; 179; 181; 182; 184; 185; 186; 187; 188; 189; 190; 191; 192; 193; 194; 195; 196; 198; 199; 200; 201; 203; 204; 205; 208; 209; 210; 211; 212; 213; 214; 215; 217; 218; 220; 221; 222; 223; 225; 226; 228; 231; 232; 233; 234; 235; 236; 237; 238; 239; 241; 242; 243; 245; 248; 249; 251; 252; 253; 254; 255; 256; 257; 259; 262; 263; 264; 268; 269; 270; 271; 272; 274;	 Submission and/or issue protection of the HAR as a class A reserve or national park; protection and promotion of the area for (eco)tourism. Bungalbin and J5 have intrinsic values that are recognised by the many visitors coming from across Australia and internationally. This is an invaluable natural asset that should be protected, preserved and promoted; Rare plants and animals of the HAR may have as yet undiscovered pharmaceutical properties that may benefit human health. the inability to rehabilitate the area to its original state; the proposal being inappropriate for the location, with less sensitive areas preferred; mining in WA continuing to be approved to the detriment of the environment; the perceived focus on (private) profit as opposed to longer-term thinking and benefit for the wider community; the currently low price of iron ore and global stock piles; 	Response to comment
	275; 276; 277; 278; 279; 280; 282; 283; 285; 286; 287; 288; 289; 290; 291; 292; 293; 294; 295; 296; 297; 299; 300; 302; 303; 305; 306; 309; 311; 312; 314; 316; 318; 321; 323; 326; 328; 330; 331; 332;	 the submitters appreciate and admire the HAR's ecological and cultural significance through the stories and wisdom of others. The biodiversity in this state is unique in a global context. It seems short-sighted to consider a proposal like this in such a fragile ecosystem. While the proposal might seem relatively minor in scale compared to the vastness of the landscape, its effects will be incremental, 	



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	Bird Life Australia		
	ANON-TWYQ-WPFT-P		
	ANON-TWYQ-WPFV-R		
	ANON-TWYQ-WPFD-6		
	ANON-TWYQ-WPFB-4		
	ANON-TWYQ-WPFS-N		
	ANON-TWYQ-WPFG-9		
	ANON-TWYQ-WPFN-G		
	ANON-TWYQ-WPFU-Q		
	ANON-TWYQ-WPFA-3		
	ANON-TWYQ-WPF8-T		
	ANON-TWYQ-WPFF-8		
	ANON-TWYQ-WPFH-A		
	ANON-TWYQ-WPFP-J		
	ANON-TWYQ-WPF6-R		
	ANON-TWYQ-WPFE-7		
	ANON-TWYQ-WPZ3-9		
	ANON-TWYQ-WP4Z-A		
	ANON-TWYQ-WP4E-N		
	ANON-TWYQ-WP47-7		
	ANON-TWYQ-WP4B-J		
	ANON-TWYQ-WP4M-W		
	ANON-TWYQ-WP4T-4		
	ANON-TWYQ-WP4S-3		
	ANON-TWYQ-WP4G-Q		
	ANON-TWYQ-WP4U-5		

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	ANON-TWYQ-WP4V-6		
	ANON-TWYQ-WP4N-X		
	ANON-TWYQ-WPBA-Y		
	WA Native Orchid Study		
	and Conservation Group		
	Inc.		
	ANON-TWYQ-WPBX-P		
	ANON-TWYQ-WPBP-E		
	ANON-TWYQ-WPJE-B		
	ANON-TWYQ-WPJ7-W		
	ANON-TWYQ-WPJB-8		
	BirdLife WA		
	ANON-TWYQ-WPJY-Y		
	ANON-TWYQ-WPJT-T		
	ANON-TWYQ-WPJS-S		
	ANON-TWYQ-WPJN-M		
	ANON-TWYQ-WPJU-U		
	ANON-TWYQ-WPB3-H		
	ANON-TWYQ-WPBJ-8		
	ANON-TWYQ-WPBK-9		
	Pew Charitable Trusts		
	ANON-TWYQ-WPBQ-F		
	ANON-TWYQ-WPJC-9		
	ANON-TWYQ-WP1P-W		
	ANON-TWYQ-WPBC-1		
69	37	The submitter states that the evidence presented in the	The phrase "access was too hard" are the words of the
		PER is lacking and the proponent did not undertake	submitter, not MRL .In fact, the phrase "too hard" does



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		sufficient investigation of the area <i>(claiming "access was too hard")</i> . The submitter states the PER was poorly presented and believed it indicated that the proponent thought the general public would be indifferent to the area.	not appear in the PER or appendices. MRL does not agree with the submitter's view that the PER is poorly presented and does not believe that the general public is indifferent to the area.
70	36; 60; 121	The submitters raised concerns regarding public health and pollution of air, soil and water.	Dust, noise, vibration and light are considered in the PER (section 10) in respect of amenity.
			Potential contamination of surface water is also addressed in the PER (section 9.3.2), which concludes that as there are no permanent or semi-permanent surface water bodies within 60km of the Proposal, no measurable effect on surface water quality is predicted. The Proposal does not involve mining below the water table at either the J5 or the Bungalbin East deposits. This, coupled with the large depth to groundwater beneath the disturbance area, means that the potential risk of groundwater contamination is low.
			Contamination of soil can occur in association with workshops, storage of dangerous goods, machinery failure; but can be readily managed and/or remediated using relevant controls as per MRL's Environmental Management System
71	ANON-TWYQ-WPBC-1	The submitter does not support the proponent's statement in their PER executive summary that their "environmental practices, including minimising site disturbance, locating infrastructure away from sensitive areas, and backfilling and rehabilitating the southern pit at Bungalbin East, can positively balance conservation with mining". While all of these practices are important, it is untrue	MRL is committed to implementing the EPA's mitigation hierarchy in respect of environment impacts (avoid, minimise, rehabilitate, offset). The reduction in the extent of the proposal is demonstrates MRL's commitment to priorities of "avoid" and "minimise". A number of offsets have been proposed and MRL is open to further negotiation with government to agree a comprehensive offsets package.



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		that the proponent is locating infrastructure away from sensitive areas when they are locating their mining pits directly over one of the most significant and ecologically valuable landforms in the region. Further, a relatively small amount of backfilling in one of the southern pits does very little to mitigate the fact that all of the pits will remain as open voids and together with the WRL and supporting infrastructure, will remain as permanent scars in an otherwise relatively intact landscape. The words 'positively balance' imply that the benefits from mining will be equal to the detriments, but this is inaccurate. The environmental, social, and likely long-term economic costs borne by the state of WA will far outweigh the limited, short-term, and unsustainable, benefits derived.	The submitter is referred to Section 2.6 of the PER for further detail in this regard.
		The PER report compiled by the proponent is extensive and contains a lot of important information and research; it also contains many positive steps proposed by the proponent to reduce and compensate for detrimental impacts from the proposed mines. However, it is apparent that the impacts of their proposal are environmentally unacceptable, and that the steps that the proponent proposes to take to mitigate them are vastly insufficient to have any real mitigating effect.	
72	Wildflower Society of WA ANON-TWYQ-WPBH-6	The Principles of the BIF Strategic Review which are reproduced in the PER, specifically refer to the HAR and the need to protect them in their entirety (Principle 3). There is no accurate information available about the economic outcomes of the project. In 2015 a company spokesman said no new jobs would be created. This contradicts comments made in the proponent's Annual	MRL's current Yilgarn operations employ 425 workers in the mine, rail and port aspects of the operation. Economic modelling by AECOM estimates that the total direct and indirect employment throughout the generated by the operations is 1496 people. MRL makes payments to the WA State government of \$67M per annum in the form of royalties, port fees to the State





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		 Report 2016 to shareholders. Proposal Description The design life or design return periods utilised to develop the closure design of the waste dump are not presented. The closure design presented in the RMCP does not match the closure design presented in the PER. No modelling has been presented to support the design of the waste dump within the PER. Soil Water Group (2016) (Appendix 12-A) estimated that significant quantities of gravel could be developed for 45 centimetres (cm) at J5 and 80 cm at Bungalbin East. Water Erosion Prediction Project (WEPP) modelling was completed for the gravel soils, a few observations are included below: Interill erodibility was undertaken based upon a rainfall event the equivalent of a 10 year 6 minute average recurrence interval (ARI) (the relevant duration for a catchment area as small as the WRL). The mean monthly CLIGEN rainfall dataset presented on page 3-8 contained much lower peaks than either of the BoM averages for Bullfinch and Windarling. The peak monthly average for CLIGEN is 31 millimetres (mm), whereas Windarling is at 38 mm (23% greater) and Bullfinch is 42mm (35% greater). This may influence soil pre-conditions prior to a major rainfall event. The CLIGEN dataset does not appear to have incorporated any allowance for climate change. It is noted that the Climate Change Prediction Maps for WA project more frequent and 	owned Fremantle Port an Payroll Tax. If the Proposal is not approved, MRL's operations in the Yilgarn will not continue and all of the jobs and economic benefits will be lost. MRL acknowledge that the modelling work conducted to identify the optimal landform shape and design prescriptions was preliminary in nature, but was commensurate with the overall risk to the environment. MRL will however commit to completing detailed Landform Evolution Modelling (LEM), using SIBERIA or equivalent (over time periods of >1,000 years), for a wide range of climatic conditions and rainfall events, in order to establish the required WRL design prescription. This work will be submitted as part of the Mining Proposal and Mine Closure Plan for the Proposal which needs approval from the DMP, and other regulatory agencies, prior to commencement of the Proposal. Similarly, more detailed physical and geochemical characterisation of the various waste materials will evolve and their suitability for use on the WRL. Refer to Section 3 of Attachment 1 for MRL's approach to how approval of the Proposal could be staged. Further discussion regarding the stage d approach is provided in the response to Issue 16. It is important to reiterate that the materials present within the J5 and BE are the same as those at the previously approved Carina and J4 deposits (Mineral Resources) and the Koolyanobbing, Mt Jackson and Windarling deposits (Cliffs Asia Pacific). There are, therefore, plenty of examples where the materials





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		 more severe storm events combined with lower annual average rainfall for the area. The maximum 24 hour rainfall event contained within the CLIGEN dataset was a 50 year ARI. For a closure context, a typical design period of 200 years to PMP may be considered more appropriate. No allowance has been incorporated into the modelling parameters to account for changing surface conditions associated with material weathering or biological activities. WEPP modelling was completed only for 15 and 18 degree linear slopes at 10 and 20 metres (m) lifts and for two concave slopes at a 30 m lift height. The proposed WRL configuration is 20-15 degree concave slope at 45m slope height as presented in the PER. No evidence has been provided that the proposed design will be successful in achieving 	present at J5 and BE have been used in the construction of the WRLs and there is considerable knowledge as to the response of these materials to weathering and metalliferous drainage. MRL has utilised the expertise of a subject matter expert who has worked across all of these projects, and is also currently advising the DMP on the closure and rehabilitation of the Black Diamond and Ellendale mine sites. Both are significant liabilities that have been handed back to the State of Western Australia and require complex rehabilitation understanding and techniques. All aspects of the design, construction, rehabilitation and subsequent monitoring of the WRLs will be documented in the Mining Proposal and Mine Closure Plan to be submitted to and approved by the DMP prior to commencement of the project.
		 Only average annual erosion rates are presented. In the absence of a formal standard, a de facto industry standard erosion rate of 5t/ha/yr average and 10t/ha/yr maximum is regularly adopted. The landform design (pages 5-40 to 5-41 of Appendix 12-A) does not indicate the distance of the backslope on the top surface. The WEPP modelling assumes zero run-off from upper slopes. The design does not specify what the design rainfall event storage of the waste dump top surface. Cover design has not considered the physical properties of waste rock, only those of the surficial. 	



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		 gravels. This is a major oversight as the stability properties of the substrate waste rock will control the inherent stability of the waste dump. There does not appear to be a physical 	
		characterisation of waste rock to be contained within the waste dump. It is not possible to assess the ability to construct an erosional stable waste dump by assessing the gravel resources only.	
		• The Soil Characterisation report (Appendix 12-A) and the Surface Water Assessment (Appendix 9-A) both refer to the proposed gravel cover as having a very high infiltration rate. No indication is given as to the potential sub-surface erosion of the substrate. It is noted that the depth of ripping (0.4m) is insufficient to comingle the substrate with the cover surface to limit erosion at the interface between the substrate and the gravel.	
		 Construction standards, tolerances or controls are not presented within the RMCP or the Soil Characterisation Report. It is noted that the closure provisioning within the RMCP assumes that work will be completed by the mining contractor, who are typically operating larger fleet with operators who lack experience achieving the high standards required for implementing mine closure works. Based upon a 400 mm depth of ripping, only minor variations in the rip-line level would be required to begin the concentration of surface water flows, which would invalidate the WEPP modelling. Total metals were not tested. 	



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73	Wildflower Society of WA ANON-TWYQ-WPBH-6	The PER outlines the reasons for the importance of the HAR. It is a biodiversity hotspot. The proponent is trying to argue that development is appropriate in such areas by comparing what has happened in the Hamersley-Pilbara Region. The Hamersley-Pilbara biodiversity hotspot relates to fauna species and does not have any endemic species. In regards the argument for co-existence of biodiversity and development Karijini National Park has an area of 590,000 hectares (ha) as against the Local Assessment Unit (LAU) of 34,820 ha and the HAR being 3,451 ha of this. Within this area are two DRF and 16 priority flora. In addition, more than 800 million tonnes of iron ore are mined annually from the Pilbara. The proponent's project is as low as one month's production from the Pilbara and the impact on this biodiversity hotspot would be devastating. Considering both biodiversity and economics, it does not make any sense to mine this area.	MRL's production from its Yilgarn Operations is less than 5.4Mtpa, which is small compared to the large quantities produced by the majors in the Pilbara. The Pilbara majors will continue to optimise production independently and production from MRL's Yilgarn operations is over and above whatever they produce. As such, the economic benefits of the Proposal are standalone benefits and are also over and above whatever other economic benefits are generated in all of industry in Western Australia. In regard to biodiversity, and in particular threatened and priority flora, the Proposal will not result in the conservation status of any such flora taxa being upgraded.
74	ANON-TWYQ-WPFS-N	 The submitter refers to the indirect impacts listed in the PER as: dust deposition arising from blasting, earthmoving operations and vehicle movements; rill of broken rock downslope from blasting and mining; altered hydrological regimes as a result of removal or diversion of surface flows, drying of soil profiles adjacent to excavations or increased soil moisture or inundation from discharge of liquids from structures (e.g. WRL) or ponding caused by damming of 	All of these potential indirect impacts are discussed in section 5.3.1 of the PER. While these indirect impacts may occur to a greater or lesser extent inside the 20m buffer, for the purpose of EIA MRL has assumed that there will be 100% impact on vegetation within the buffer, which is extremely conservative. The plants counted in the 50m and 250m buffers in Table 3-3 of Appendix 5-H are presented in the context of ongoing monitoring of plant health, rather than for the quantification of impacts. Any confusion between direct and indirect impacts to



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		 surface flows by roads or other infrastructure; changes in microclimate due to changed environmental conditions resulting from the establishment of the mine; and weed incursion. The submitter queries in relation to the indirect impacts: To what extent are these effects permissible outside the disturbance line? Are these effects permitted in the buffer zone? Why are affected species counted individually for indirect effects and by percentage for direct and indirect effects combined? The submitter found this approach caused confusion. Are the numbers in Appendix 5-H (Table 3.3) for the indirect impacts, and therefore included in the percentages given in the conclusion page 14, or additional thereto? 	flora and vegetation should be resolved by referring to Tables 5-20 to 5-25 in the PER and in the revised impact tables in Attachment 1. Please also refer to the detailed response to Issue 1 in respect of the indirect impact buffer.
75	ANON-TWYQ-WPJY-Y ANON-TWYQ-WPJS-S ANON-TWYQ-WPBC-1	The PER understates the values of the Range, the risks associated with the proposal, and its impact on the Range and surrounding areas. The submitters note, for example, that the PER makes the point that previous mining developments on other BIF ranges in the Mid West comprise precedents for this development, which should on this basis be allowed to proceed. This argument runs completely counter to the EPA's stated objective to consider cumulative impacts: among other things, it is the fact that other similar ranges have been seriously and adversely impacted by mining that provides a powerful argument that this project should not proceed.	Cumulative impacts are considered throughout the PER. Note that for those species that are endemic to the HAR, no other impacts (other than historical exploration on the HAR) have occurred. The impact from linear infrastructure is accurately quantified in the PER. 125 ha of the total disturbance proposed in the PER is for haul roads. Mining also leaves enduring community benefits such as access tracks and roads. The visitor access into and around the HAR is along historical exploration and mining roads and tracks. Please also refer to the response to Issue 60 in regard



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		Cumulative impacts are even more acute in this case, given the demonstrated high conservation values of the HAR. For its size, the HAR is one of the most significant biodiversity assets in this region of WA. Only an 'A Class' Nature Reserve comprising the entire range and its surrounding landscape matrix provides an appropriate level of protection for this area. Currently, no BIF ranges in the Yilgarn region are protected from development in secure conservation reserves; if only one BIF range were to be so protected, it should be the HAR.	to the cumulative impact of the Proposal as a whole.
		The cumulative and offsite (direct and indirect) impacts of the proposal are significant and have not been adequately addressed in the PER.	
		Recently a submitter completed a large scale study on cumulative impacts of mining and linear infrastructure development and found that the cumulative impacts are large, and also largely unknown (Raiter 2016).	
		The submitter characterised and quantified the cumulative development footprint in the GWW, with extensive digitisation from aerial imagery across a random stratified sample of the region. In contrast to common perceptions of mining impacts as primarily	
		consisting of mine pits and associated 'hub' infrastructure, it was found that approximately 67% of the disturbance footprint consists of linear infrastructure. It was estimated that 150,000 km of tracks, roads, and railways exist in the region and that beyond the ~690	
		km^2 total disturbance footprint, a further 4,000–55,000 km^2 (3–35% of the GWW) lies within offsite risk zones. Moreover, the majority of linear infrastructure is	



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		unmapped, indicating that available data sources are not comprehensive and can lead to false conclusions about ecological impacts (Raiter 2016).	
		The lasting legacy of mining disturbances leave enduring environmental, community and public health impacts that are yet to be accurately assessed (Pepper <i>et al.</i> 2014) ¹³ .	
76	ANON-TWYQ-WPBC-1	The cryptic impacts are not adequately assessed, but are likely to be significant	Please refer to the response to Issue 64 in respect to cryptic impacts.
		Cryptic impacts elude detection and may be overlooked because of inherent limitations of impact evaluations, but they can be substantial. Reliable detection may be compromised by limited assessment time frames, spatial scales, statistical power, practitioner skill, technology and resources, and the practicalities of survey design (Treweek 1996). Often only impacts on specific taxonomic groups, ecological communities, or environmental features are evaluated (Alshuwaikhat 2005; Majer 2009; Puyravaud <i>et al.</i> 2010; Wickham <i>et al.</i> 2013).	
		Cryptic impacts include: noise and light pollution effects on animal communication, movement, foraging, reproductive behaviour and success, visual capabilities,	
		community structure, and predator–prey interactions (Longcore and Rich 2004: Tyler <i>et al.</i> 2014): air pollution	
		impacts on ovule and pollen viability (Houston and Dochinger 1977); fragmentation of populations and loss	

¹³ Pepper M, Roche C, Mudd GM Mining legacies – understanding life-of-mine across time and space. In: Life of Mine conference, Brisbane, Australia 2014. p. 449-465



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	Submitter	of genetic connectivity (Forman <i>et al.</i> 2003); and unwitting disease and invasive species introductions. Furthermore, statistical noise frequently masks trends in ecological data to the extent that early-warning indicators fail to give sufficient warning of potential regime shifts, particularly where data are sparse (Perretti and Munch 2012). Impacts of development on restricted- range endemics are often cryptic, with many species undescribed, poorly surveyed, and/or hard to find, owing to their cryptic nature (Harvey 2002; Karanovic <i>et al.</i>	
		2013; Scheffers <i>et al.</i> 2012). An investigation of potential cryptic impacts of mining infrastructure in the area of the current proposal has been undertaken. The investigation included the effect of linear infrastructure on predator activity, using a combination of motion-sensor cameras and spoor inspections to compare dingo, fox and cat activity on vehicle tracks and for three kilometres into the surrounding vegetation matrix was explored. Strong effects of roads on activity for all species studied was found: on-road activity was generally far higher than off- road activity, and roads appeared to affect predator activity even up to 2.5 km away (Raiter 2016). The research indicates that pervasive ecological impacts ovist but are commonly overlooked in conventional	
		impact evaluations such as the current PER, and undermine the potential for successful impact mitigation. Nevertheless, there is substantial scope for mitigating these impacts and conserving large, relatively intact landscapes such as the GWW in perpetuity, if the current proposal is assessed in a robust manner.	



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77	ANON-TWYQ-WPBC-1	The secondary impacts of the proposal have not been addressed, and may be substantial	The submitter's claims regarding secondary impacts are highly speculative in the context of the Proposal.
		Secondary impacts are not directly caused by developments but are facilitated by them, yet are generally not considered the legal responsibility of development proponents in impact evaluations. For example, secondary impacts of a hydroelectric dam include the (unintended) impacts of activities facilitated by the road network required for its construction and maintenance (Finer and Jenkins 2012). Indeed, secondary impacts are frequently associated with increased access to relatively undisturbed areas through such road networks. Such accessibility can attract poachers, loggers, miners, graziers, arsonists, land speculators, recreationalists, and even researchers. These uses almost inevitably result in further impacts that can extend far beyond the initial impacts of a development both in space and time, such as introductions of invasive organisms with major ramifications for ecosystems (e.g. Loss et al. 2012). The current proposal is likely to dramatically increase secondary impacts in and around the proposal area – an issue that has already been experienced with the proponent's Carina mine to the east, and other mining operations in the area. For example, anecdotal observations of increased vandalism, track disturbance, and possible feral pig introductions have been noted by Parks and Wildlife staff in and around mine-sites that house fly-in fly-out workers. The fragile ecosystem of HAR and surrounds would be negatively impacted by such secondary impacts, which may endure long past	The comparison with a hydroelectric dam having (unintended) impacts facilitated by the road network required for its construction and maintenance is misguided. The haul roads for the Proposal are constructed in-situ, meaning a road network, other than what is already in existence, is not required to physically construct the road. The MMHARCP is already accessible via an extensive track network, so it is difficult to see how the haul roads will have unintended consequences as a result of increased access. This is particularly so during mining operations as the haul roads are not open to the general public and are continually monitored. In any event, MRL has numerous management plans, procedures and processes to ensure that the security of the area surrounding the operations is maintained from illegal activities to the point where security will actually be enhanced than would otherwise be the case if the mining operations weren't there. Also, monitoring will be undertaken for invasive species and action taken if required. The submitter points to an increase in secondary impacts associated with MRL's Carina mine and other mines in the area, but it is not clear whether the "increased vandalism, track disturbance and possible feral pig introductions" referred to are attributed to these operations or others elsewhere that "house fly-in fly-out workers".



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		the end of mining operations.	
78	ANON-TWYQ-WPJ9-Y	Is there a compelling case that any one of these BIFs in the Yilgarn has unique species or genetic diversity? Based on experience and involvement in detailed genetic studies, no. There are differences within and between BIFs, and pollen and seed dispersal mechanism for some plant species are understood (e.g. Nistelberger et al. 2014, 2015a, b) ¹⁴ but are they radical or more than in some other studies across species ranges? No.	MRL acknowledges the submitters statement.
		Should places like HAR be conserved? yes. Mine-sites like Mount Gibson or Koolyanobbing cannot sustain the thermal or hydrological properties of intact BIFs. It is impossible to expect that the remaining flora and fauna would be "surviving" in radically modified landscapes; are there real prospects of long-term survival? These sites are on the edge of the WA Wheatbelt moving into the desert, a sharp transition zone in both flora and fauna (Rix <i>et al.</i> 2015) ¹⁵ . These peripheral sites may provide clues to how animals adapt to tougher	

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¹⁴ Nistelberger, H, Byrne,M, Coates, D & Roberts, JD. 2014. Strong phylogeographic structure in a millipede indicates Pleistocene vicariance between populations on banded iron formations in semi-arid Australia. PLOS ONE 9, e93038.

Nistelberger HM, Byrne M, Coates D & Roberts JD 2015a. Genetic drift drives evolution in the bird-pollinated, terrestrial island endemic Grevillea georgeana (Proteaceae). Botanical Journal of the Linnean Society 178, 155-168.

Nistelberger HM, Byrne M, Coates D & Roberts JD 2015b. Phylogeography and population differentiation in terrestrial island populations of Banksia arborea (Proteaceae). ,Biological Journal of the Linnean Society 114, 860–872.

¹⁵ Rix MG, Edwards DL, Byrne,M, Harvey MS, Joseph L & Roberts JD 2015. Biogeography and speciation of terrestrial fauna in the south-western Australian biodiversity hotspot. Biological Reviews 90,762-793.



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		environments; how they adapt to warming, drier climates (e.g. Reniers <i>et al.</i> 2016) ¹⁶ . In addition to any novel genetic properties, (Nistelberger <i>et al.</i> 2014, 2015a, b) and any unique species on sites such as HAR, they may also offer a history of adaptation to more extreme environments and the potential to predict the future for plant and animal species in the WA Wheatbelt: What might be required to manage fragmented populations in warming, drying climates amongst population fragmented by land use practices?	
79	Toodyay Naturalists Club	The submitter contends that the following proposal justification and objectives as described in the PER are conflicting: -"the Proposal will create a positive environmental legacy", and - "The Proposal will have an impact on the environmental values of the HAR and the broader [Mount Manning Range Helena Aurora Range Conservation Park] (MMHARCP), primarily in relation to conservation value associated with threatened and priority flora that are restricted to the range" The submitter is of the view that the second of these two statements is more accurate, for example the removal of over 25% of a threatened species is not a positive environmental legacy, and as such the proposal has not been justified.	The Proposal has been revised, such that the impacts are now below 20% to the threatened species in question. The PER clearly states that there will be residual impacts on the HAR, however the positive environmental legacy created by the Proposal that MRL refers to extends beyond the HAR. For instance, there has been a greater scientific/biological understanding of the MMHARCP generated through baseline studies for the Proposal, there will be enhanced conservation initiatives in the region through provision of offsets and access to and from the MMHARCP will be increased allowing opportunities for tourism.

¹⁶ Reniers J, Brendonck L, Roberts JD, Verlinden W & Van Schoenwinkel B 2015. Environmental harshness shapes life history variation in an Australian frog species - a skeletochronological approach. Oecologia 178:931–941.


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80	Toodyay Naturalists Club	While the PER notes in Section 1.2 with respect to Land Tenure that there are no class 'A' reserves in the MMRHARCP the PER does not acknowledge that there are a number of proposed. The submitter considers that the PER has acknowledged the reasons why the Government has previously endorsed actions to have the HAR vested as a class 'A' reserve, with an indicated pre disposition against development of these ranges as described in Section 1.3.2 Site History. The PER notes in Section 1.3.3 with respect to the BIF Strategic Review that there were numerous government- endorsed actions at this time arising from the review, including the commitment to the creation of class A nature reserves or national parks over the HAR, Die Hardy Range and Mount Manning Range (as generally recommended in EPA Bulletin 1256), with an indicated pre-disposition against development of these ranges. However the PER does not acknowledge that the actions proposed following the BIF review have not occurred and that WA Government policy in respect of the Mount Manning area, as announced in 2010, aunorabed entires proposed of the time.	The WA government's decision regarding conservation land tenure in 2010 was made in the full knowledge and consideration of all of the previous recommendations made.
81	Toodyay Naturalists Club	The submitter is concerned that the proponent has made commitments in the PER (page 2-12) certifying the Environmental Management System (EMS) for the proposal to the ISO 14001 standard within two years after commencing productive mining operations as part of the approach to environmental management. The submitter requests clarity as to how this will occur if	All mines and other industrial assets are subject to being bought and sold over time. Regardless of whether a new owner's EMS is certified to ISO14001 or not, the new owner of any mine in WA must continue to comply with all laws including any conditions that are included in any Ministerial Statement issued for the Proposal.



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		the proponent sells the mine as proposed.			
82	ANON-TWYQ-WP1Q-X	The submitter notes that the development envelopes for the proposal extend well beyond the nominated disturbance areas and incorporate substantial areas of high environmental values. The submitter considers that this approach demonstrates a lack of appreciation of for the environmental values of the HAR and conflicts with commitments to minimise environmental impacts. For example the development envelope at Bungalbin East captures numerous Tetratheca aphylla individuals not included within the impact assessment (refer to Figure 5-15), and which currently predicts a significant proportional loss in the population (29.4%). A genuine recognition of this risk would demand that the development envelope be drawn to exclude key environmental attributes and matters of conservation significance to the greatest extent possible.	Any approval under Part IV of the EP Act will include strict Ministerial Conditions to protect the environment. It will be up to the Minister and his advisors (e.g. the EPA) to place whatever conditions are deemed necessary. The conditions may include specific exclusion areas or maximum allowable disturbance in relation to specific environmental factors as appropriate. MRL will work within whatever conditions are imposed to optimise the mine design without exceeding the environmental impact authorised under any approval issued. The development envelope simply allows for flexibility with regard to mining operations, provided the conditions of approval are met.		
83	ANON-TWYQ-WP1Q-X	The submitter contends that the PER has not demonstrated that the proposal can be managed to meet the objectives of the EPA or community expectations, and nor could it be expected to with the removal of significant parts of the BIF landform a core and unavoidable component of the proposal.	MRL acknowledges the submitter's view of the Proposal and advises that the EPA will ultimately assess whether or not it meets the relevant EPA objectives.		
2. Flora a	2. Flora and vegetation				
84	Parks and Wildlife	<u>Tetratheca aphylla subsp. aphylla</u> <i>T. aphylla</i> subsp. <i>aphylla</i> is a threatened flora species that was listed in 1987 without a threat ranking. The species was given a ranking of vulnerable in 1997.	Impacts on <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> have been further reduced through a reduction in the proposed footprint. This is discussed in more detail in the responses below.		

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		under the 1994 version of the International Union for Conservation of Nature (IUCN) criteria C2a; D1+2 when it was known from six populations and 947 plants. Since then, additional individuals have been mapped, taking the number of individuals for the species as identified in the PER up to 87,921 ¹⁷ . <i>T. aphylla</i> subsp. <i>aphylla</i> is endemic to BIF habitat on the central portion of the HAR as a single population ¹⁸ .	
		The PER indicates that the proposal would have a 29.4% impact (25,887 plants) on <i>T. aphylla</i> subsp. <i>aphylla</i> , of which 28% is based on direct impact (PER, page 5-52; Table 5-20). These impacts are less than proposed in the previously reviewed draft PER, as further individuals have been recorded (see issue number 89 below).	
		Indirect impacts Indirect impacts such as dust are not identified in the PER to be a significant consideration due to comparisons to monitoring of the threatened <i>T</i> . <i>paynterae</i> subsp. <i>paynterae</i> at Windarling. However, the monitoring at Windarling is not conclusive on this matter (the interpretation of the data from monitoring the <i>T</i> . <i>paynterae</i> subsp. <i>paynterae</i> has an inherent level of subjectivity, and evidence has not been provided that conclusively establishes that mining related	Indirect impacts on threatened flora as a result of dust emissions will not be significant in the context of the Proposal. MRL recognises the broad debate within the literature on dust impacts from mining and, more specifically, that causal factors for the loss of some threatened flora at Windarling have yet to be agreed between Cliffs and DPaW. However, the long term outcome of monitoring at

¹⁷ Please see comments in issue number 89 on the number of individuals cited in the PER.

¹⁸ There also appears to be several outlying sub-populations 0.6-1.8 km from the main population, but these outlying plants were not sampled in the genetic analysis and therefore their relationship to the main population is unknown.



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		activities/impacts have not influenced the monitored decline of <i>T. paynterae</i> subsp. <i>paynterae</i>). Any conclusions that mining is not having an impact at Windarling are therefore considered by Parks and Wildlife to be presumptive. Monitoring results indicate that there is a decline in both <i>T. paynterae</i> subsp. <i>paynterae</i> and threatened <i>Ricinocarpos brevis</i> at Windarling, although there is not enough information to identify or eliminate particular causal factors. The results of a study by Yates and Williams (2005) ¹⁹ also showed an increased mortality and decline in plant health for <i>T. paynterae</i> subsp. <i>paynterae</i> observed at Windarling following mining. Further discussion on indirect impacts is provided in issue number 89 below.	Windarling (and also at Barrow Island) has been the subject of a paper ²⁰ published in a peer-reviewed scientific journal. It concluded that there was no evidence to support the perception that dust accumulation on plants causes negative impacts. MRL has undertaken some additional investigation into this issue (see Attachment 5, Tables A5-1 and A5-4). In considering some further studies undertaken on the impacts associated with dust, MRL has not changed its previous position that indirect impacts are not likely to amount to significantly more than has been estimated in our assessment, and may well be less. In respect of Yates and Williams (2005), who recorded increased mortality and decline in plant health for <i>T. paynterae</i> subsp. <i>paynterae</i> at Windarling, MRL understands:
			 the sampling design of Yates and Williams (2005) was skewed through the inclusion of mortalities that occurred within the approved mining area (specifically large portions of Blocks 50 and 90);
			• year-to-year variables such as climate (rainfall) were not factored into the analysis, despite summer drought preceding the 2004-2005 monitoring, and
			 when Blocks 50 and 90 are removed from the analysis, mortality in both monitoring years (2003)

²⁰ Matsuki, M., Gardener, M.R., Smith, A., Howard, R.K. and Gove, A. (2016) Impacts of dust on plant health, survivorship and plant communities in semi-arid environments. *Austral Ecology* **41**: 417-427.

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¹⁹ Yates, C.J. and Williams, M. (2005) *Patterns of plant mortality and changes in condition in the Tetratheca paynterae subsp. paynterae population at Windarling W3 between 2003 and 2005.* Perth, Western Australia.



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			and 2004-2005) becomes similar (Yates and Williams, 2005).
			MRL does not dispute the scientific method adopted by Yates and Williams but their findings must be considered in the light of the points listed above, some of which may not have been evident at the time of their investigation.
			MRL recognises that mining has the potential to affect plants occurring beyond the direct disturbance area. Therefore a conservative approach has been taken for the purpose of impact assessment, assuming that all plants inside the proposed abandonment bund, and for a further 20 m beyond, will be lost. In practice, this is very unlikely to occur.
			Further response on indirect impacts is provided in Issue 8 below.
		Genetic assessment	
		The report on a genetic assessment of impacts by Curtin University states that "the loss of 10% of alleles and, in particular, 65% of private alleles in T. aphylla subsp. aphylla, represents a significant amount of the species genetic diversity and may impact on its ability for future adaptation and persistence although this is difficult to quantify" (Appendix 5-E, page 32). This genetic study has significant limitations as it assesses the impact of proposed mining on the basis of only the immediate impact of the removal of individuals on genetic parameters (it assesses the amount of variation left remaining at that moment). There appears to be an assumption that departs forgeneticing and	The genetics assessment (PER Appendix 5-E) meets the brief required of it which was to estimate the loss of diversity that would occur with the removal of certain populations. A revised assessment has been undertaken to take account of the reduced footprint - see Appendix B. This report addressed the reduced impact as a result of the reduced footprint). It is MRL's view that the assessment provides sufficient basis for the impact assessment process to be conducted. The available information on likely means of seed dispersal and pollination vectors was presented in the PER (Tables 5-18 and 5-19).



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		other indirect impacts of mining, genetic variation remaining immediately following clearing for mining and gene flow (connectivity) would remain for the longer term (without supportive evidence). The study does not include consideration of:	
		how levels of gene flow would be maintained in the long term taking into account the habitat fragmentation resulting from mining; or	
		how genetic and demographic processes are interrelated and whether the present genetic and demographic characteristics of species populations would be affected by the impacts of this proposal.	
		An understanding of pollinators, seed dispersal, reproductive success, and the impacts of fragmentation on each species is also important to properly understand the potential indirect impacts of this proposal on genetic processes and structure ²¹ ; and this has not been conducted for the PER.	
		The loss of approximately 10% of alleles, and in particular the loss of 65% of private alleles, in <i>T. aphylla</i> subsp. <i>aphylla</i> is of concern to Parks and Wildlife as these values represent a significant amount of the species genetic diversity. Although levels of heterozygosity, as measured in the study, do not initially change, the loss of such a significant amount of allelic	
		richness may have detrimental effects on the maintenance of heterozygosity over future generations.	

²¹ Indirect impacts could, as outlined in the environmental scoping document for this proposal, including dust, changed microclimate, microhabitat, hydrology, ecosystem processes including pollinators, reproductive success, fragmentation, weeds/disease, trampling and changes to seed dispersal.



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		It is noted that the most north easterly populations (among others) are already experiencing a genetic bottleneck and the removal of individuals from the proposed mine footprint is likely to result in the further isolation and reduced effective population size for these populations. This is then likely to further affect genetic and demographic processes into the future for the species.	
		<u>IUCN assessment</u> There appears to be some deficiencies in the proponent's interpretation of the IUCN categories and criteria regarding <i>T. aphylla</i> subsp. <i>aphylla</i> used for the PER. The extent of occurrence (EOO) calculated in Appendix 5-D appears to be erroneous and may be miscalculated by a factor of 10. Also, the assessment states that the proposal would not change the area of occupancy (AOO), presumably due to the 2 kilometre (km) x 2 km grid method of calculation, yet it would still affect the area, extent and/or quality of habitat as used under IUCN criterion B sub-criterion (iii). As criterion B can be used, <i>T. aphylla</i> subsp. <i>apyhlla</i> could be assessed to meet the criteria for critically endangered under B1ab(iii, v) if the proposal proceeds due to a continuing decline in the area or quality of habitat, and the number of plants, and the EOO being less than 100 km ² .	Bioscope Environmental (2016) assessed the impact of the Proposal on the conservation status (threat) of <i>T.</i> <i>aphylla</i> subsp. <i>aphylla</i> and concluded that its current threat criteria ranking of vulnerable would remain unchanged. MRL clarifies that the Extent of Occurrence (EOO) for <i>T.</i> <i>aphylla</i> subsp. <i>aphylla</i> was calculated to be 3,497 hectares (35 km ²), not 3.5 km ² as stated in Appendix 5-D. This does not alter the assessment for criterion B1 as the minimum area assigned to threat categories for this criterion is 100 km ² . The Area of Occupancy (AOO) was calculated to be 52 km ² based on the 4 km ² grid cell method recommended by the IUCN Guidelines. The Proposal is not predicted to change the AOO for the taxon. MRL disagrees that IUCN criterion B sub-criterion (iii) applies in respect of the Proposal and its effect on <i>T.</i> <i>aphylla</i> subsp. <i>aphylla</i> . The Proposal will affect the area, extent and/or quality of habitat for the taxon; however, to satisfy this criterion continuing decline must be observed, estimated, inferred or projected.



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			Continuing decline is defined by the IUCN (2016) as a
			recent, current or projected future decline (which may be
			smooth, irregular or sporadic) which is liable to continue
			without remedial measures. MRL considers that
			"remedial measures" in this context refers to an easing
			or cessation of the cause of the decline – in this case,
			mining activity. Continuing decline may apply in cases
			where, for example, uncontrolled grazing of a threatened
			plant species is allowed to continue and will continue to
			impact on the target species without intervention. In this
			case, remedial measures could comprise removal of the
			grazing animals from the area or their exclusion using
			fencing. MRL's interpretation is that "remedial
			measures" does not refer to rehabilitation or other
			mitigation measures associated with mining but rather
			the process of mining itself.it is not clear from the
			comments how DPaW has formed the view that the
			taxon satisfies the requirement for continuing decline,
			nor is there any detail provided with respect to the extent
			of decline to date. If DPaW is suggesting that ongoing
			decline might occur as a consequence of future
			unspecified mining proposals, this is mere speculation
			and irrelevant for the purposes of this assessment. As
			far as MRL is aware, there are no other proposals to
			mine in this area before the EPA or in the public domain.
			Future mining is not reasonably foreseeable and should
			not be presumed on the basis of this Proposal, in
			respect to which the boundaries of the potential impacts
			are clearly stated.
			Whilst there will be effects on the taxon during the
			mining phase, these effects will cease to occur once



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			mining is complete.
			The IUCN Guidelines state that any projected decline must be justified and that there must be a high degree of certainty that they will take place (i.e. merely 'plausible' future declines are not allowed to be factored into an assessment).
			The proposed change to the "Section 43A footprint" very substantially reduces the impact on both <i>T. aphylla</i> subsp. <i>aphylla</i> and <i>L. bungalbin.</i> MRL asked Bioscope to review their findings in the light of the revised footprint. They concluded:
			• <i>T. aphylla</i> subsp. <i>aphylla:</i> no change to original assessment – taxon meets criteria to be considered vulnerable, its current level of assessment.
			• <i>L. spectabilis:</i> no change to original assessment – taxon meets criteria to be considered vulnerable, current level of assessment is critically endangered.
			• <i>L. bungalbin:</i> original assessment has changed – taxon does not now meet criteria to be considered vulnerable, current level of assessment is P1.
			A report on the revised Bioscope assessment is included in the appendices to these responses.
		Comparisons	
		Comparisons are made to <i>T. paynterae</i> subsp.	MRL accepts DPaW's contention that each proposal
		paynterae at Windarling Range, stating that while the	should be decided on a case-by-case basis and that
		percentage impacts for <i>T. aphylla</i> subsp. aphylla is	decisions on previous proposals do not constitute a
		approximately the same, the amount of plants remaining	precedent on which future decisions should be based.
		is almost tenfold of <i>T. paynterae</i> subsp. <i>paynterae</i> and	Information presented in the PER on other projects is
		given the experiences at Windarling Range by another	not seeking to establish or demonstrate precedents but
		proponent, this proposal should be "manageable and	rather to simply inform the impact assessment process



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		of less significance" (PER, page 5-29). The inclusion of these comparisons could possibly be based on a view that the approved impacts of other proposals should be regarded as a sound basis for decisions on impacts of this proposal. Such a view is not supported by Parks and Wildlife as it discounts the importance of decisions based on appropriate case by case scientific analysis, policy and bioregional context. Assessment of proposals impacting on conservation significant species and biotic communities needs to take into consideration the specific circumstances of the particular proposal, the affected species/community and the local environment (e.g. context and significance of the value, underlying tenure etc.). Matters that need to be considered in relation to risks to conservation of species and communities posed by particular impacts include, for example, biology and ecology, specific habitat requirements, spatial arrangement in respect to the proposed disturbance, population size and community extent and the proposed residual population or habitat/area. The assessment or approval of any proposal should not be taken as indicative of the level of potential acceptability of other proposals. Levels of impact approved for individual species, communities or proposals should not be considered on a generic basis and assessment of acceptable impacts and risks from specific mining proposals need to be assessed on a case by case basis utilising appropriate scientific information specifically or otherwise relevant to the species, community and situation. The significance of an	 by reference to relevant past processes. Consideration of previous decisions is also important to ensure that the process delivers equity and proportionate outcomes in respect to 'like' impacts. The experience in relation to <i>T. paynterae</i> subsp. <i>paynterae</i> at Windarling makes for a compelling comparison with <i>T. aphylla</i> subsp. <i>aphylla</i> to help inform the decision to be made in respect of the current proposal and is important context to the assessment of this Proposal. The available information suggests: The current proposal, involving partial removal of a BIF ridge, is very similar to the mine at Windarling. Both <i>Tetratheca</i> taxa are threatened and very restricted in their range, although the inclusion of all plants of T. <i>aphylla</i> subsp. <i>aphylla</i> within a conservation park is a point of difference. Indirect impacts on T. <i>paynterae</i> subsp. <i>paynterae</i> at Windarling have not been significant: "the population remains healthy and viable after >10 years of mine operations, with the key outcomes identified including the maintenance of population health, flowering/fruiting continuing, and germination of new individuals within the population". MRL has presented some further information on monitoring of indirect impacts at other projects (see Attachment 5, Table A5-1). The theme is that there may be a loss of condition in some plants but that plant mortality due to indirect impacts is typically not recorded.





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		impact on species and communities is not based on numbers or proportions of individuals removed or areas affected alone, but on a range of different factors that should include considerations on whether the area is included in a formal reserve.	associated with the mine pit at Bungalbin East. See further discussion in this regard in the responses to the OEPA's comments above.
		Additionally, noting that in some cases final approval decisions for mining proposals take into account social and economic considerations, a previous government decision to allow a given level of impact may also have taken these considerations into account and, therefore, cannot necessarily be used to infer support for a particular level of impact.	
		<u>Management, mitigation and offset</u> The environmental management section of the PER states that the proponent aims to reinstate <i>T. aphylla</i> subsp. <i>aphylla</i> plants through its rehabilitation program, particularly the southern pit of Bungalbin East which would be backfilled. The PER notes that the species has specific habitat preferences, so this would need to be replicated as much as possible to support the re- introduction of <i>T. aphylla</i> subsp. <i>aphylla</i> . Proposed measures to create suitable non-biological micro habitats (same high elevation, south-facing slopes and shaded areas, with rock fissures and crevices which trap moisture) and planting of associated species to support biological process such as pollination and seed dispersal are not incorporated into the documentation provided but	Under the proposed "Section 43A" footprint, the impact on T. <i>aphylla</i> subsp. <i>aphylla</i> would be 17,020 plants, down from 25,069 plants as outlined in the PER. MRL did not propose re-introduction of all of these plants – it is not feasible to do so due to the reduction in habitat. MRL considers a target of 10%, approximately 1,700 plants, established over both rehabilitated landforms and in existing suitable habitat, is achievable. The Botanic Gardens and Parks Authority (BGPA) has successfully established this taxon from seed and from cuttings in the past in greenhouse conditions. This measure is offered as a means by which the understanding of this taxon can be improved and the number of plants post-mining is increased. MRL
		in any case may be challenging or not feasible. The PER states that there is the potential for successful	understands both DPaW and DEE may have concerns



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		propagation, establishment and survival of <i>T. aphylla</i> subsp. <i>aphylla</i> while also noting that success in post- mining rehabilitation that includes conservation significant species and communities is yet to be proven as " <i>most iron ore projects on BIF are not mature and</i> <i>therefore an opportunity to demonstrate successful</i> <i>establishment has yet to arise</i> " (PER, page 5-55). Further discussion on translocations is provided in issue number 381 below. There is no discussion/demonstration that the proponent is able to successfully establish more than 25,000 T. <i>aphylla</i> subsp. <i>aphylla</i> plants and Parks and Wildlife has not previously reviewed or approved any threatened flora translocation of this magnitude. The Curtin University report on the genetic assessment (Appendix 5-E, page 33) states that " <i>any genetic impacts of</i> <i>proposed mining could be minimized in situ by</i> <i>maintaining plants from the distinct geographic clusters</i> <i>and particularly geographically adjacent sites that are</i> <i>genetically clustered but where one is to be removed as</i> <i>part of mine development</i> ", but there are no specifics within the PER on how this may be achieved for each of the threatened and Priority flora. The PER includes offsets for <i>T. aphylla</i> subsp. <i>aphylla</i> that propose to prepare and implement an interim recovery plan (IRP) for the species. Development and implementation of an IRP by a proponent is not	about translocation of plants into existing habitat (termed "conservation location" by DEE ²²). While proposed by MRL, this is not a measure necessary for the survival of the taxon and may be withdrawn if either the Commonwealth or the State does not wish it to occur. The approach has been used elsewhere, with Appendix 12-C of the PER discussing a number of examples of approaches to translocation. With regard to the Interim Recovery Plan, MRL proposes to provide funds for DPaW to prepare and implement this Plan. In accordance with the mitigation hierarchy, MRL first and foremost has pursued all practical opportunities to avoid impacts. The appropriateness of and relative level of risk associated with proposed management, mitigation and offset measures must be viewed in context of the substantial avoidance of impact that has been achieved.

²² Department of Sustainability, Environment, Water, Population and Communities (2013). Environment Protection and Biodiversity Conservation Act 1999 (CTH) Policy Statement. Translocation of Listed Threatened Species—Assessment under Chapter 4 of the EPBC Act.



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considered an approp discussed in issue nu	riate offset and is further mber 380.	
85 Parks and Wildlife <u>Leucopogon spectable</u> L. spectabilis is a long is endemic to the HAI in BIF. The surveys for the P plants and population plants over eight popu for the species which <i>"It is considered that a</i> <i>populations is critical</i> <i>that all wild population</i> <i>Habitat critical to the</i> <i>the area of occupanc</i> <i>habitat surrounding a</i> <i>providing potential ha</i> <i>for pollinators</i>)" (DEC The PER proposes to terms of plants taken impact to the species reduce the number or eight to six by removi populations and the E	<i>lis</i> g lived threatened flora species and R and appears restricted to cracks ER have expanded the number of s known for the species to 14,434 ulations. There is an existing IRP states in the Summary section that all known habitat for wild to the survival of the species, and hs are important populations. survival of <u>L. spectabilis</u> includes of populations, areas of similar ind linking populations (these bitat for population expansion and 2010^{23}). remove 130 individuals (0.9%). In this number is low. However, the would be significant as it would populations for the species from ng the two most eastern 200^{24} for the species by about	At the time of publication of the Interim Recovery Plan (IRP), <i>L. spectabilis</i> was restricted to four populations together containing approximately 898 mature individuals. These populations were spread over a geographic range of approximately 7 km, having an EOO of approximately 3 km ² (DEC, 2010). Botanical surveys undertaken by MRL since that time have doubled the number of locations (from 4 to 8) and increased the number of individuals from 989 to 14,434 plants. Therefore the conclusions in the IRP may be revisited in light of the new information and substantial increased in known <i>L. spectabilis</i> plants. As documented in the PER, the entire extent of <i>L. spectabilis</i> is considered to be one population owing to the relatively small total distribution of this species (a linear distance of less than 9 km) and the relatively small distance between the eight discrete point locations shown in Figure 5-12 of the PER (greatest distance 1.7 km; smallest distance 550 m). The threat assessment for the species by DPaW indicates that it occurs in one location, therefore meeting

²³ Department of Environment and Conservation (2010) Interim Recovery Plan No. 300 ironstone beard-heath (<u>Leucopogon spectabilis</u>) interim recovery plan 2010-2015. Perth, Western Australia.

²⁴ Appendix 5-D assesses the IUCN criteria for *Leucopogon spectabilis* and states that the EOO for the species is 1.5km² and the AOO is 32km². The EOO calculated in the Appendix appears to be erroneous as the AOO for a species is defined as the area within its extent of occurrence which is occupied by the taxon, therefore the EOO should not be less than the AOO.



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		<i>L. spectabilis</i> is currently ranked as critically endangered under IUCN criteria B1ab(iii,v)+2ab(iii,v) due to its EOO being less than 100 km ² , its AOO being less than 10 km ² , being only known from a single location (HAR) and there being a continuing decline in the area, extent and/or quality of habitat and number of mature individuals.	critically endangered. This is confirmed by Bioscope (2016) who note that although DEC (2010) identify four populations in the IRP for the species, these populations would be considered a single population under the IUCN criteria as it cannot be assumed that these populations are independent of each other.
		The PER states that "A review by Bioscope Environmental (Appendix 5-D) considered the effect the Proposal would have on the threat category of this taxon with reference to the International Union for the Conservation of Nature (IUCN) Red List. It concluded that the current category of threat for <u>L. spectabilis</u> of "Critically Endangered" should not change if the Proposal is implemented. Based on the accepted IUCN criteria. L. spectabilis could be described as Vulnerable	Further, all areas within the known distribution of the species may be subject to the same threatening process (fire) which, under the IUCN definition, suggests that distribution is one location.Based on the application of the IUCN criteria, it can be reasonably concluded that the Proposal will remove part of a single population of the species.In addition, the eastern-most population will remain
		rather than Critically Endangered as it is considered that neither the taxon nor its habitat is being exposed to a continuing decline" (PER, page 5-24).	given the changes to the Proposal as documented elsewhere in this response document. This also reduces the impact on the EOO for the species.
		Under the IUCN Red List guidelines, continuing decline may be observed, estimated, inferred or projected, and may be either continuous or sporadic in nature. Habitat for <i>L. spectabilis</i> have been cleared in the past due to exploration and other activities on the HAR, and further	MRL clarifies that the EOO was calculated to be 1,479 ha (~15 km ²) not 1.5 km ² as reported in Appendix 5-D. This does not alter the assessment for criterion B1 as the minimum area assigned to threat categories for this criterion is 100 km ² .
		decline in individuals and habitat is projected with ongoing mining-related activities within or affecting the habitat of this species, including through the proposed implementation of this project if approved. Thus <i>L</i> .	MRL notes DPaW's assessment in 2015 that the species is currently ranked as critically endangered under IUCN criteria B1ab(iii, v) and B2ab(iii, v). With regard to criteria B1b(iii, v) and B2b(iii,v) it remains



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		<i>spectabilis</i> appears likely to continue to meet the IUCN interpretation for continuing decline and meet the IUCN criteria for critically endangered under criterion B.	unclear why the taxon was assessed as experiencing continuing decline in the area, extent and/or quality of habitat and number of mature individuals.
		L. spectabilis is already listed at the highest threat category and therefore at the highest risk of extinction. This level of risk of extinction will remain until the species is adequately protected from ongoing mining- related activities, and observed or projected decline in the area, extent or quality of habitat or number of mature individuals ceases to represent a risk to the species. Appendix 5-E states that " <i>Initial population genetic</i> studies of plant species in the region show that patterns are complex and variable" (Appendix 5-E, page 7), and that making predictions of genetic patterns is therefore difficult. There is the potential for significant genetic diversity to be lost, however, as genetic studies were not conducted for <i>L. spectabilis</i> no specific comments can be made on the impacts to genetic diversity as a result of clearing the two populations. It is noted that no specific mitigation or offset measures are proposed for <i>L. spectabilis</i> .	DPaW advises that habitat for <i>L. spectabilis</i> has been cleared in the past due to exploration and other activities and that further decline in individuals and habitat is projected with ongoing mining-related activities, including through the Proposal if implemented. MRL is not aware of any significant habitat for this species having being cleared in the past whether from mining exploration or otherwise. Mining exploration has not been undertaken at Bungalbin East since 1971 and was limited to the steep slopes and ridge tops of the range in this area. Habitat for <i>L. spectabilis</i> is confined to cracks within vertical surfaces that occur primarily on the south-eastern edge of the Helena-Aurora Range. For obvious reasons (e.g. drill rig access) these areas have never been subject to exploration drilling. As far as MRL is aware, there are no other proposals to mine in this area before the EPA or in the public domain. Future mining is not reasonable foreseeable and should not be presumed on the basis of this Proposal, in respect to which the boundaries of the potential impacts are clearly stated. The IUCN assessment undertaken by Bioscope (2016) concludes that <i>L. spectabilis</i> should be currently listed as Vulnerable rather than Critically Endangered, in which case it would not be at the highest risk of ovtination.



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			Regardless of the conservation threat status assigned to the species, this status will not change following implementation of the Proposal (Bioscope, 2016).
			The intent behind EOO is to measure the degree to which risks from threatening factors are spread spatially across the taxon's geographical distribution (IUCN, 2016).
			EOO is not intended to be an estimate of the amount of occupied or potential habitat, or a general measure of the taxon's range (IUCN, 2016).
			It is therefore possible for EOO to be less than AOO and when this occurs EOO should be changed to make it equal to AOO to ensure consistency with the definition of AOO as an area within EOO (IUCN, 2016).
			Note also that, under the revised ("Section 43A") footprint, the northernmost sub-population of <i>L. spectabilis</i> would not be removed.
			The proposed change to the "Section 43A footprint" very substantially reduces the impact on both <i>T. aphylla</i> subsp. <i>aphylla</i> and <i>L. bungalbin.</i> MRL asked Bioscope to review their findings in the light of the revised footprint. They concluded:
			<i>T. aphylla</i> subsp. <i>aphylla:</i> no change to original assessment – taxon meets criteria to be considered vulnerable, its current level of assessment.
			<i>L. spectabilis:</i> no change to original assessment – taxon meets criteria to be considered vulnerable, current level of assessment is critically endangered. MRL acknowledges DPaW's difference of opinion with this assessment, mainly relating to the interpretation of



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			"continuing decline" – see Issue 84 for a discussion on this interpretation.
			<i>L. bungalbin:</i> original assessment has changed – taxon does not now meet criteria to be considered vulnerable, current level of assessment is P1.
			A report on the revised Bioscope assessment is included in the appendices.
			Implementation of the Proposal will not change the IUCN status of any flora taxa.
86	Parks and Wildlife	The proposal described in the PER relies upon a number of monitoring and management measures to ensure the impacts are not greater than predicted and identifies that the proponent is "confident these impacts can be managed" (PER, page 5-55) or "effectively managed" (PER, page 8-29) using existing procedures complimented by monitoring and some site-specific procedures. The appended environmental management plan (EMP) including associated procedures is dated 2016, and therefore an evaluation of potential effectiveness at the proponent's existing operations cannot be made. Further, the EMP appears to be generic in nature and measures documented within the EMP have not been specifically developed to address the risks and requirements for management of this proposal, operations on and around the HAR or operations within the MMHARCP. Their potential effectiveness is therefore unclear at this time. A high level review has identified a number of areas in the proposed monitoring and management that would	 Regarding the EMP and procedures: The EMP is generic – it applies across MRL, as clearly stated in the PER (p2-12). It was provided with the PER to demonstrate MRL's corporate approach to environmental management. Nowhere does it purport to be an EMP to address specific issues associated with the Proposal. While the EMP and procedures are dated 2016, MRL is moving from site-based management to establish common approaches across the group. Similar procedures have been in place at individual sites for some time. A revised version of the CSSCMP has been provided (Appendix C).



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		benefit from detailed consideration and clarification as without further information; they cannot be confirmed as being suitable for conservation significant species or communities. These are outlined as follows:	
		Remote sensing	
		Monitoring of conservation significant vegetation with remote sensing is proposed. As a review of previous studies or methodology has not been provided and it is not clear how suitable this monitoring method is in comparison to the more proven on ground monitoring.	It is well beyond the scope of the PER to provide "a review of previous studies or methodology" with respect to remote sensing. Remote sensing is an established technique in widespread use, including by DPaW (examples include vegetation condition at the Lake Warden and Lake Gore RAMSAR wetland sites, and vegetation health (presence of dieback) at the Stirling Range complex and Mount Lindsey National Parks). Furthermore, its' use is not proposed in isolation – on ground monitoring is also proposed, as clearly outlined on p5-59 of the PER and also in the PER Appendix 5-H (now revised – see Appendix C).
		Sample size	
		Four conservation significant flora species are proposed to be monitored along transects with the number of monitored plants identified in the PER (page 5-59) to be <i>"A minimum of 30 plants"</i> for <i>T. aphylla</i> subsp. <i>aphylla</i> , <i>L. bungalbin</i> and <i>A. adinophylla</i> , and <i>"A minimum of 10 plants"</i> for <i>L. spectabilis</i> .	The revised CSSCMP (Appendix C) provides an amended monitoring program – see Table 3-5 for details.
		A robust sample size would include monitoring of a much larger number (hundreds) of plants for each species as the specified minimum numbers are not likely to be sufficient to provide statistical certainty in regard to making robust conclusions based on interpretation of results. This limitation is notable in the context of the	



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		number of deaths recorded at Windarling Range as part of the implemented threatened flora monitoring program for the Koolyanobbing Expansion Project (approximately 1,100 <i>T. paynterae</i> subsp. <i>paynterae</i> plants have been monitored since 2011; and between 2011 and 2014 there was a monitored net loss of 86 plants).	
		Scope and parameters No information is provided on the location of the proposed monitoring points (e.g. transects for conservation significant flora species). Without this information, it is not possible to evaluate the adequacy of the proposed monitoring program in relation to sites that are suitable for detection or comparison of impacts and ensuring there is monitoring of representative sites. The parameters to be measured as part of the	The CSSCMP presented in the PER has been substantially revised (see Appendix C) to address these concerns. Table 3-6 in the CSSCMP outlines the proposed monitoring program.
		conservation significant flora monitoring are largely qualitative rather than quantitative (PER, page 5-59; Table 5-28). Trigger and threshold criteria should be based on measurable factors like recruitment and mortality. Monitoring reproductive health should also be considered. Relying on plant health scores based on qualitative assessment by individual assessors may result in variability in results that makes reliable interpretation difficult or impossible.	
		The effectiveness of the use of foliage chlorophyll as a measure to trigger actions for conservation significant vegetation has not been demonstrated and the selection of species to be included in the foliage chlorophyll sampling is unknown. Without information to justify and calibrate use of foliage chlorophyll as an appropriate measure for early identification of potential indirect	



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		impact(s), the appropriateness of this technique is unknown. With regard to the selection of species for monitoring, morphology, physiology and life history of potentially monitored species, should be considered in addition to their conservation significance or status or that of their associated vegetation community, ²⁵ and it is unclear if this in the intention.	
87	Conservation and Parks Commission (CPC)	The PER states "the entire extent of Leucopogon spectabilis is considered to be one population owing to the relatively small total distribution of this taxonAll plants are within conservation tenure (i.e. Mount Manning Helena and Aurora Conservation Park)" It is not clear from this statement whether the entire extent of <i>L. spectabilis</i> will be threatened to extinction as a result of the proposal.	"One population" is a reference to DPaW guidelines that describe how populations and sub-populations are defined ²⁶ . Our knowledge of <i>L. spectabilis</i> is that it comprises one population with eight sub-populations (defined by separation distance). The Proposal will removal one of the eight sub-populations (as shown in revised Figure 5-12), about 0.8% of the total population. MRL's impact assessment concluded that the proposal does not materially affect the status of <i>L. spectabilis</i> .
88	Parks and Wildlife	Priority 1 (P1) <i>Lepidosperma bungalbin</i> <i>L. bungalbin</i> is P1 flora. The species is endemic to the HAR, restricted to BIF habitat. The number of individuals for this species is quoted in the PER as 45,976 ²⁷ with the proposal proposing to clear 18,046 (a further 187 plants are included within the indirect impact footprint). The proposal would have a significant residual impact on <i>L. bungalbin</i> , with a proposed direct and indirect 39.7%	Under the revised "Section 43A" footprint, impacts on <i>L. bungalbin</i> will be significantly reduced from those identified in the PER (from 39.7% down to 8.3%). As a result, the potential impacts of the Proposal on <i>L. bungalbin</i> are materially reduced. This is a practical demonstration of MRL's ongoing commitment to the avoidance of impacts to the greatest extent possible.

²⁵ For example, Are there species that have large stomates sensitive to fugitive dust (e.g. stomatal plugging)? Are there species that have hairy or glabrous leaves (i.e. likely to trap dust on leaves)? Are the species short lived and likely to naturally senesce during the monitoring period?

²⁶ Environmental Protection Authority and Department of Parks and Wildlife (2015). *Technical Guide – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment* (eds. K Freeman, G Stack, S Thomas and N Woolfrey). Perth, Western Australia.

²⁷ Please see comments in issue number 89 on the number of individuals cited in the PER.



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		impact on plants known from the species. The species and its habitat is also at risk of significant indirect impacts as <i>L. bungalbin</i> has been described as showing marked geological specificity, surviving on the rocky ironstone range by means of increased runoff from sporadic rainfall events. Changes in hydrology, and microclimate, could be important factors influencing the level of potential indirect impact to the species and its habitat.	With regard to indirect impacts associated with changes in hydrology, there are no plants along the downstream boundary of the Bungalbin East pits (see Figure 5-20). Therefore, the risk of 'water starvation' due to reduced runoff is very low.
		Genetic assessment	
		The genetic assessment of impacts by Curtin University states that for <i>L. bungalbin</i> " <i>most of the plants in the</i> "green" genetic cluster will be removed with the proposal" (Appendix 5-E, page 26; see also Figure 11 on page 25) and what is unclear as stated in Appendix 5-E (page 32) "the longer-term genetic consequences of reducing the number of individuals both overall and in particular genetic groups (i.e. 'green' cluster in L. bungalbin)". As with <i>T. aphylla</i> subsp. <i>aphylla</i> , the genetic assessment is significantly limited as it assesses the impact of proposed mining on the basis of only the immediate impact of the removal of individuals on genetic parameters (it assesses the amount of variation left remaining at that moment). The general comments in issue number 84 on this matter for <i>T. aphylla</i> subsp.	Regarding "limitations" in the genetics assessment, the assessment meets the brief required of it which was to estimate the loss of diversity that would occur with the removal of certain populations. It is MRL's view that the assessment provides sufficient basis for the impact assessment process to be conducted. The genetics assessment presented in the PER has been revised to take account of the revised footprint (Appendix B). The newly proposed "Section 43A" footprint significantly increases the number of plants remaining at the northern extension of the population. Population 8, included in the footprint shown in the PER, is now substantially outside of the "Section 43A" footprint. This will reduce the expected impact on genetic diversity discussed in Appendix 5-E of the PER. The effect of this change is that an additional 15,000 plants from the
		The proposal would largely remove one of the three	green cluster now occur outside of the footprint.
		distinct genetic clusters in <i>L. bungalbin.</i> This would represent a significant loss of unique genetic diversity for the species. As this cluster is central to the species	



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		distribution, its removal would also be likely to have a significant impact on genetic connectivity among the remaining clusters.	
		IUCN assessment The PER on page 5-30 states L. bungalbin meets the criteria as threatened flora "If the Proposal was implemented, on current information, the taxon would be considered as Vulnerable under IUCN criteria A3 and A4 as less than half the known population would be cleared". Parks and Wildlife has assessed the species against IUCN threat criteria, and the species currently meets the criteria for threatened flora with a threat category of vulnerable under criterion D2 (restricted population with a plausible threat). It can be inferred that there has been a decline in the area, extent and/or quality of habitat through clearing for tracks and drill lines at the HAR, indicating that the species could meet the criteria for critically endangered under criterion B if the proposal proceeds due to meeting the definition for continuing decline.	DPaW assessment of <i>L. bungalbin</i> against the IUCN criteria indicates that the species currently meets criterion D2 having a threat category of vulnerable (the only category available under this criterion). IUCN criterion D2 applies to species having a restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to Critically Endangered or Extinct in a very short time. The data underlying DPaW's assessment have not been made available, but it appears the assessment may not take into account the increased number of individuals of <i>L. bungalbin</i> recorded by ecologia (2016). To satisfy criterion D2, the plausible future threat (in this case, mining as per the Proposal) must be capable of driving the taxon to Critically Endangered or Extinct in a very short time. DPaW suggests that the species would meet criterion B if the Proposal proceeds because it would meet the definition of 'continuing decline' as per the criterion. The conservation threat status of the species was reviewed by Bioscope (2016) who concluded that, following implementation of the Proposal, the species currently does not meet the criteria for threatened status. MRL does not agree that the species would be eligible for categorisation as Critically Endangered under



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			criterion B following implementation of the Proposal.
			The key point of contention is DPaW's broad interpretation of what constitutes 'continuing decline'.
			The IUCN guidelines note that a population reduction is possible without continuing decline: if a reduction has 'ceased' under criterion A, there cannot be a continuing decline.
			Further, the IUCN guidelines also state that "continuing declines can be sporadic, occurring at unpredictable intervals (i.e. not continuous), but they must be likely to continue into the future".
			MRL considers DPaW's interpretation of "remedial measures ", central to the determination of the IUCN classification, is not correct – see discussion in response to Issue 84.
			Once mining is complete there is no plausible evidence to suggest that the species will continue to decline into the future. As far as MRL is aware, there are no other proposals to mine in this area before the EPA or in the public domain. Future mining is not reasonable foreseeable and should not be presumed on the basis of this Proposal, in respect to which the boundaries of the potential impacts are clearly stated.
			MRL's offset of surrendering E77/842 and other MRL group exploration tenure within the MMHARCP to be replaced by a Section 19 area under the <i>Mining Act 1978</i> , makes continuing decline due to further mining in these areas not only implausible, but also impossible.
			The proposed change to the "Section 43A footprint" very substantially reduces the impact on <i>L. bungalbin</i> . MRL



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			asked Bioscope to review their findings in the light of the revised footprint. They concluded the original assessment has changed – taxon does not now meet criteria to be considered vulnerable, current level of assessment is P1. A report on the revised Bioscope assessment is included in the appendices.
		Management, mitigation and offset The environmental management section of the PER includes the same comments for <i>L. bungalbin</i> as for <i>T.</i> <i>aphylla</i> subsp. <i>aphylla</i> whereby the proponent proposes to reinstate individuals through its rehabilitation program and develop an IRP for the species. The comments in issue number 84 that there is little evidence to suggest a large translocation of a species that grows in BIF habitat would be successful and that an IRP is not an appropriate offset are also relevant for <i>L. bungalbin</i> .	As for <i>T. aphylla</i> subsp. <i>aphylla</i> , translocation or re- establishment of all plants occurring within the footprint is not proposed. MRL considers a target of 10%, approximately 400 plants, established over both rehabilitated landforms and in existing suitable habitat, is achievable. With regard to the Interim Recovery Plan, MRL proposes to fund the preparation and implementation of this Plan. It is assumed the process of preparation and implementation of the Plan would be undertakent by DPaW. MRL notes that Recovery Plans are listed as an offset type in the Offsets Register (https://offsetsregister.wa.gov.au/). In accordance with the mitigation hierarchy, MRL first and foremost has pursued all practical opportunities to avoid impacts. The appropriateness of and relative level of risk associated with proposed management, mitigation and offset measures must be viewed in context of the substantial avoidance of impact that has been achieved. See also response to Issue 52.



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89	Parks and Wildlife	Clarification of Impa It appears from Tab targeted <i>T. aphylla</i> surveys have been reviewed, but limiter surveys were condu provided. The chang <i>aphylla</i> subsp. <i>aphy</i> draft and final PER It is requested that to information to explain table below:	acts le 5-2 (PE subsp. <i>ap</i> conducted d informat ucted or the ge in num <i>Ala</i> and <i>L.</i> are substa the proportion in the diffe	ER, page and hylla and d since the tion on ho heir results bers and bungalbin antial. ment provi erences a	5-5) that a <i>L. bungal</i> e draft PE w and whe s has been impact for n between des additi	addition bin flora R was ere the n r T. n the onal d in the	The increase in numbers of individuals of <i>T. aphylla</i> subsp. <i>aphylla</i> , <i>Acacia adinophylla</i> and <i>L. bungalbin</i> recorded between the draft PER and the final PER is a result of further targeted survey of the Helena-Aurora Range undertaken by ecologia during June-July 2016, as outlined in Appendix 5-A (p22) of the PER: <i>"An additional targeted flora survey to increase the known distributions and population sizes of Tetratheca aphylla subsp. aphylla and Lepidosperma bungalbin was undertaken by a team of six botanists between 27 June to 6 July</i>
		Differences betwee impacts cited betw PER Taxon ¹	en numbe veen the o Total number	ers of ind draft PER d raft PE I Direct im	lividuals a R and the R	and final Total number ³	2016, with a survey effort totalling 48 person- days." The flora and vegetation assessment report that accompanied the draft PER was subsequently revised include the pertinent aspects of the additional survey work , including the additional numbers of individuals recorded as per Table 1 of DPaW's comments, and w included as an appendix to the final PER.
		<i>Tetratheca aphylla</i> subsp. <i>aphylla</i> (T)	69,367	25,067	36.1%	87,921	for transect density to bias the count of rare plants inside and outside of the disturbance area. Prior to the 2016
		<i>Acacia adinophylla</i> (P1)	9,386	1,189	12.7%	10,529	targeted survey, there were parts of the HAR with suitable habitat for rare plants that had been under- surveyed. The 2016 survey sought to correct this, with
		Lepidosperma bungalbin (P1)	36,396	18,046	49.6%	45,976	50m spaced traverses across most parts of the HAR (i.e. the same transect density to that surveyed in the disturbance areas). There are however some areas of
		¹ Conservation status P1 = Priority 1.	of taxa shov	vn in parentl	hesis. T = th	reatened;	the HAR that remain surveyed on only 100-200m traverses, making the impact calculation percentages



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		² As the draft PER did not include an indirect or cumulative impact assessment for conservation significant flora, the numbers presented are of the cited direct impact to the taxa (draft PER; Table 5-9, page 5-18; Table 5-10, page 5-23; Table 5-11, 5-30).	conservative. The traverses are illustrated in Figure 5-2 and available in the spatial dataset.
		³ The numbers presented are of the cited direct and indirect impact to the taxa (PER; Table 5-20 and Table 5-21, page 5-52).	
90	Parks and Wildlife	<u>Cumulative impact assessment</u> The proposed cumulative direct and indirect impacts of this proposal on a number of conservation significant flora, vegetation units and ecological communities are considered to be significant. This significance is further elevated when considered in the context of the management purpose of MMHARCP and in recognition that the conservation (threat) status of species (as assessed using IUCN criteria) is directly and significantly affected by the degree of security protection that the species have in dedicated conservation reserves. It would appear from Table 5-11 (PER, page 5-38), that the proponent has conducted the impact assessment on the current (remaining) numbers of plants for conservation significant species excluding those that have been previously approved for disturbance. This is not the correct way to conduct a cumulative impact assessment, and the proponent should revise the impact predictions for conservation significant species to take into account cumulative impacts to species from pre- disturbance/pre-impact records and numbers (rather than the total plants remaining after other approved disturbances have taken place). A recalculation of cumulative impacts from pre-impact records can be substantially different for some species (e.g. for Priority	Table 5-11 reported direct impacts on P3 and P4 flora as a result of the Proposal as well as previous MRL and Cliffs proposals for which data could be obtained. It does not purport to present cumulative impacts although the data can be used this way. Nevertheless, MRL has revised the information contained within Table 5-11 (see Attachment 1, Table 5- 22) to reflect DPaW's preferred approach to cumulative impact assessment. The revised numbers take into account cumulative impacts to species from pre- disturbance/pre-impact records and numbers. MRL confirms that the flora dataset includes all plants recorded by Cliffs NR including those at the Koolyanobbing F and Deception Deposits, and the Ularring Project. The approach taken with all of the impact calculations is that if an area is approved for disturbance, it is conservatively assumed that the disturbance has actually occurred, even if the Proposal is uneconomic and has not been developed for example. <i>B. arborea</i> has a linear distribution of approximately 150 km, from Koolyanobbing Range in the south to Perrinvale Range in the north, including the Helena- Aurora Range, Die Hardy Range, Mt Elvire, Mt Finnerty Range Mt Jackson Range Mt Manning Range
		3 BIF specialist and local endemic Stenanthemum	



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		newbeyi the change is from 11.3 to 15.1%).	Windarling Range and the Yorkradine Range (Cliffs,
		It is also requested that the proponent provides	2015).
		information on what proposals were used to inform the	The data for total plants surveyed as presented in Table
		assessment of cumulative impacts on individual species.	5-11 of the PER is based on records held by Cliffs, MRL
		Without this information, it is not clear if the predictions	and others over relevant exploration and mining tenure.
		on cumulative impacts include consideration on all	As such the total number of plants for the species is
		approved proposals. For example, there are proposals	considerably higher than that reported as:
		that have been recently approved (but have not yet	a) the data held by MRL and Cliffs does not include
		commenced) or at advanced stages at the	additional records that are presumed to exist but
		Koolyanobbing Range (D, E and F Deposit) and	nave not been made available, and
		impacts on species that are also part of this proposal	b) many individuals of this species have yet to be
		and for which cumulative impacts may be becoming	recorded on other forms of tendre.
		significant. One taxa of concern here is the Priority 4	See also the response to Issue 7.
		Banksia arborea, a slow growing local endemic, which	
		has a cumulative impact as cited in the PER of 18.8%	
		for the species (based on remaining numbers, which if it	
		was recalculated from total numbers in Table 5-11 the	
		cumulative impact is 22.4%). <i>B. arborea</i> is also	
		proposed to be impacted further at Koolyanobbing	
		Range and Windarling Range and it is unclear if all	
		impacts have been included in the cumulative	
		assessment.	
		The calculations for the impact of the proposal on	
		conservation significant species should also be provided	
		at both the project/local level and species/regional level.	
		In the PER, the impacts appear to be calculated at the	
		species/regional level not the project/local level, but this	
		requires clarification. In the case of the Priority 4	
		Eucalyptus formanii, a local endemic, 260 of the 620	
		(41%) plants recorded by the proponent would be	



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impacted. This would be a high local impact to the species.	
91 Parks and Wildlife and Department of the Environment and Energy (DEE) Indirect impacts With A number of conservation significant species are located close to the proposed operations, and at high risk of indirect impacts. The PER states that the proponent has inform With asset inform Toodyay Naturalists Club "adopted a conservative approach to the quantification of indirect impacts for assessment purposes. A 20 m buffer around the Proposal disturbance area (excluding the haul roads) has been proposedfor assessment purposes, it has been assumed that all plants within the buffer are lost" (PER, page 5-23). A con purpor Values at risk, a distance of 20 m from disturbances is not considered to provide an adequate basis for conservative estimates of impacts on conservation significant species and communities at risk from this proposal. A precautionary approach should be applied to address uncertainty in impact predictions by considering realistic potential worst case scenario impacts and evaluating the potential range of impacts on species and communities on that basis. A more conservative approach that should be applied which would be to utilise a 50 to 100 m buffer around pits and waste dumps, and perhaps a smaller buffer along drainage lines and other infrastructure like the haul road. The PER assesses indirect impacts on <i>T. aphylla</i> subsp. aphylla, L. spectabilis, A. adinophylla and L. bungalbin, rather than considering all conservation significant With	Vith regard to the use of the 20 m buffer for impact assessment purposes, MRL has provided additional formation in its response to Issue 1. RL is unaware of any other BIF mining project where direct impacts have proven to be significantly greater an predicted in the impact assessment. The basis for oplication of a 50-100 m buffer as suggested is not upported by any evidence. conservative approach has been taken for the urpose of impact assessment, assuming removal or ss of all plants within an open pit footprint plus the pit urrounds (area between the pit edge and the bandonment bund) plus a 20 m buffer outside of the bandonment bund. The distance between the pit edge and the abandonment bund will depend on the setback equired when applying the DMP guidelines for bandonment bunds but would be a minimum of 10 m hen the pit reaches its maximum extent. However, the bandonment bund will be located within the pit footprint is depicted in the PER and subsequent proposed evised footprint (the "Section 43A" footprint - see ttachment 2, Figure 5-20). The abandonment bund esign requires a width of 5 m at the base. Therefore, hen the pit is at its maximum extent, the distance to e nearest plant outside the buffer would be 35 m.



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		gaining sites at multiple scales provides many refugial opportunities for plants (Gibson <i>et al.</i> , 2010 ²⁸). Maintenance of hydrological processes, ecological processes (including pollinators and seed dispersal) and microhabitats (including changed exposure to wind and solar radiation; rock fractures/fissures; temperature, etc.) does not appear to be adequately addressed in the section on indirect impacts. This aspect needs to be considered more fully and with scientific justification where it is available as part of refining the impact assessment on all conservation significant species. The submitters consider the proponent's assessment of indirect impacts to the Bungalbin Tetratheca and Ironstone Beard-heath associated with foliar dust deposition (Section 5.3.1, page 5-45) does not contain sufficient justification to support the conclusion that impacts from foliar dust deposition on high value flora is likely to be minimal and restricted to areas immediately adjacent to the open pits. The PER cites the results at Windarling Range to support an assertion that indirect impacts are likely to be minimal (PER, Section 5.3.1, page 5-45) but does not provide details or reasons why the observations at Windarling Range should be considered representative/comparable to what can be expected to	MRL considers this reasonable for an impact assessment considering the ridgeline beyond the direct disturbance associated with the establishment of the pits will remain intact. With regard to foliar dust deposition, MRL has based its assessment on the available information. The submission does not provide any additional information that might alter the outcome of the impact assessment. Regarding the use of Windarling as a case study, the experience in relation to <i>T. paynterae</i> subsp. <i>paynterae</i> at Windarling makes for a compelling comparison to help inform the decision to be made in respect of the current proposal. The current proposal, involving partial removal of a BIF ridge, is very similar to the mine at Windarling and is important context for the assessment of this Proposal. The Windarling dust study cited in the PER31 stated "the observed change in health condition (in <i>Tetratheca paynterae</i> subsp. <i>paynterae</i>) was not related to the distance from the pit". Six monitoring 'sections' were used ranging from 0-40 m from the pit to 920-940 m from the pit. This long term outcome of monitoring at Windarling (and also at Barrow Island) has been the subject of a paper published in a peer-reviewed scientific journal. See also response to Issue 1 for

²⁸Gibson, N., Yates, C.J. and Dillon, R. (2010) Plant communities of the ironstone ranges of south western Australia: hotspots for plant diversity and mineral deposits. *Biodiversity and Conservation* **19**:3951–3962.

³¹ Matsuki, M., Gardener, M.R., Smith, A., Howard, R.K. and Gove, A. (2016) Impacts of dust on plant health, survivorship and plant communities in semi-arid environments. *Austral Ecology* **41**: 417-427





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		occur as a result of the proposed actions from this proposal. For example the PER states that monitoring was undertaken at Windarling of dust levels at locations close to open pits and control plants further away, but does not describe what "further away" is. Without an understanding of scale and the deposition rates occurring at the "further away" locations, conclusions cannot be drawn. The PER also states that the Cliffs Asia Pacific Iron Ore did not record any difference in the health of threatened flora, but does not detail what threatened flora species was being monitored or discuss why this/these species should be considered representative of Bungalbin Tetratheca and Ironstone Beard-heath. Interpretation of the data from monitoring <i>T. paynterae</i> subsp. <i>paynterae</i> at Windarling has an inherent level of subjectivity, and the data collected in this case can be interpreted differently if the increasing number of dead plants is considered in relation to the number of new seedlings is taken into account. Evidence has not been provided that conclusively establishes that mining related activities/impacts have not influenced the monitored decline of <i>T. paynterae</i> subsp. <i>paynterae</i> at Windarling and concluding from the available data that mining is not having an impact is considered presumptive. Monitoring indicates that there is a decline in the species at Windarling although there is not enough information identify or eliminate particular causal factors.	additional information. Regarding the Yates and Williams findings, Cliffs note that their sampling design was skewed through the inclusion of mortalities that occurred within the approved mining area (specifically large portions of Blocks 50 and 90). When Blocks 50 and 90 are removed from the analysis, mortality in both monitoring years (2003 and 2004-2005) becomes similar. MRL does not dispute the scientific method adopted by Yates and Williams but their findings must be considered in the light of the points listed above, some of which may not have been evident at the time of their investigation. The recommendation of the Air Quality Assessment that the dust monitoring programme be extended to include dust deposition monitoring in the vicinity of DRF species will be adopted (see revised CSSCMP included as Appendix C). See also the response to Issue 84 regarding propagation of <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> .



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		Williams (2005) ²⁹ also showed an increase in mortality and a decline in plant condition (vigour) across the entire <i>T. paynterae</i> subsp. <i>paynterae</i> population between 2004 and 2005 (after mining began). A long hot dry summer period undoubtedly contributed to this trend. However, the magnitudes of the changes were largest at the eastern end of the population adjacent to the mine. The increase in plant mortality was strongly related to the proximity of the mine and plant aspect. Plants adjacent to the mine on northerly and easterly aspects experienced highest rates of mortality. These results indicate that exposure to the mine was an interacting factor with climate influencing plant mortality and condition. The DEE agrees with the recommendation of the Air Quality Assessment ³⁰ that the dust monitoring programme be extended to include dust deposition	
02	Parks and Wildlife	Acacia adinonhulla	
		<i>A. adinophylla</i> is a P1 flora that is a BIF specialist and the PER states there are 10,529 plants. The proposed impact in the PER is 12.3% of the species. This would reduce the total population size to less than 10,000	With regard to confirmation of the range of <i>A.</i> <i>adinophylla</i> , it is not possible to confirm the findings of past surveys. MRL has no reason to believe these

³⁰ Pacific Environment Ltd (2016) *Air Quality Assessment for J5 and Bungalbin East Iron Ore Project*. Perth, Western Australia.

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²⁹ Yates and Williams (2005) *Patterns of plant mortality and changes in condition in the Tetratheca paynterae subsp. paynterae population at Windarling W3 between 2003 and 2005.* Perth, Western Australia





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		individuals which is considered to be entering the threshold for small population size for a species and would increase the risk of extinction due to stochastic effects. The species is understood to be endemic to the HAR (see Appendix 5-A and PER, page 5-30), however there are some outlier records shown in Figure 5-16 (PER, page 5-31) that require investigation to confirm the range of the species and existing impacts ³² . This information would assist in informing an assessment on whether the species meets the criteria for listing as threatened, at what category and whether there would be a change in category from the implementation of this proposal.	records are not accurate. Regarding the more eastern occurrence of this taxon, Mattiske Consulting ³³ recorded a single plant along the transport route between the Carina mine and the Mount Walton siding to the south, approximately 37 km east of the Bungalbin population. The taxon was also recorded at the J4 deposit west of the current Proposal. ³⁴ . Note that further investigation has identified that a single record shown in Figure 5-16 of the PER to the northeast of the Carina mine is a confirmed error whereby the GPS data point was entered incorrectly by the consultant. This means the taxon extends from the Carina haul road in the east to the J4 deposit in the west although it is clearly concentrated in and around the HAR.
		genetic assessment for <i>A. adinophylla</i> is limited as it assesses the impact of proposed mining on the basis of only the immediate impact of the removal of individuals on genetic parameters (it assesses the amount of variation left remaining at that moment). The general comments in issue number 84 on this matter for <i>T.</i> <i>aphylla</i> subsp. <i>aphylla</i> are also relevant for <i>A.</i> <i>adinophylla</i> .	MRL considers there is adequate information now to conclude <i>A. adinophylla</i> has a broader range than the HAR. The brief for the genetic assessment provided with the PER was to assess the impacts attributable to the direct removal of plants. This brief has been met and the results discussed within the PER. The concluding statements within the genetics assessment indicated areas where further work could be done. Should the

³² Figure 5-16 shows a record in the approved J4 development and another record on the Carina haul road.

³⁴ Mattiske Consulting (2013). Flora and Vegetation Survey of the Jackson 4 Mine and Haul Road. Report for Polaris Metals NL, June 2013.

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³³ Mattiske Consulting (2009). Flora and Vegetation Survey of the Proposal Carina Transport Route Carina Mine to Mount Walton Road Siding. Report for Polaris Metals NL, October 2009.



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			Proposal be implemented, further work may be undertaken to inform future management of key taxa.
93	Parks and Wildlife	Priority Flora Thirty Priority flora taxa have been recorded within the study area, all of which are considered locally significant; three are endemic to the HAR (P1 <i>Acacia adinophylla</i> , P1 <i>Acacia shapelleae</i> and P1 <i>Lepidosperma bungalbin</i>) and 15 are BIF specialists (distributions that are centred on BIF habitat).	Noted. Priority Flora are discussed at length in the PER (Section 5 and Appendix 5-A).
94	Parks and Wildlife	VegetationA suite of the vegetation complexes on BIF in the Yilgarn Craton are listed as P1 PEC, including the 'Helena and Aurora Range vegetation complexes (banded ironstone formation)' PEC, based on the high level of endemicity and rarity of the vegetation units, and level of interest from exploration and mining development.The vegetation communities found on the HAR do not occur on the adjacent ranges, consistent with the work published in Gibson <i>et al.</i> (2010) ³⁵ on the Mount Manning area and Gibson <i>et al.</i> (2012) ³⁶ on the wider meta-analysis of ranges.The appropriate scale at which to inform assessment of the proposal on vegetation units mapped in the study	With regard to the assessment conducted at supergroup level, MRL accepts the general point made in the submission that the PEC is broad and assessment at supergroup level may obscure the presence or absence of particular vegetation units. For this reason, analysis at the vegetation unit level is also undertaken, as required by the Environmental Scoping Document. The higher level analysis at supergroup/PEC level was included to inform the community as to how the DPaW-defined PEC was impacted. See also response to Issue 11 which discusses the delineation of supergroups and the relationship between quadrats and the mapped vegetation units. The comments regarding the restricted nature of the PSRN6 and PSRN7 vegetation units are noted. However regarding their potential listing as Threatened

³⁵ Gibson, Yates, and Dillon (2010) *Plant communities of the ironstone ranges of south western Australia: hotspots for plant diversity and mineral deposits.* Biodiversity and Conservation **19**:3951–3962

³⁶ Gibson, Meissner, Markey and Thompson (2012) *Patterns of Plant Diversity in Ironstone Ranges in Arid South Western Australia* Journal of Arid Ecology **77**: 25-31.



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		area, not the PEC as a single unit, or the supergroups. Assessment of the impacts on the supergroups in particular is not appropriate for this assessment as these units are too broad for an assessment of the impacts on vegetation communities occurring on a BIF range and would obscure the consequence of the impact of the proposal on vegetation plant communities that comprise the PEC. This type of assessment is also not consistent with the scoping document for this assessment.	Ecological Communities (TECs) in their own right, this is an issue for DPaW to consider. Presently, PSRN6 and PSRN7 are not TECs and should not be treated as such until and if they are listed. MRL notes from a review of the current list of TECs that there is likely to be an element of subjectivity in deciding what warrants listing. In the case of the PSRN6 and PSRN7 vegetation units, MRL queries whether they are sufficiently different in form and composition to other
		Table 5-23 lists a number of vegetation units within the 'Helena and Aurora Range vegetation complexes (banded ironstone formation)' PEC, which are highly restricted and proposed for impact.	vegetation units identified in our surveys to warrant listing individually. Other than direct losses, MRL has concluded that indirect impacts are not likely to be significant, particularly given the temporary nature of the Proposal
		proposals on the regional distribution of vegetation units (as mapped in Appendix 5-A) that are components of the PEC are shown on page 5-53 and 5-54 of the PER. Of note, the PSRN6 and PSRN7 vegetation units, which	Note also that the revised "Section 43A" footprint reduces the proposed impact on both the PSRN6 and PSRN7 vegetation units as well as a number of other restricted vegetation units.
		are associated with the core habitats of the rare and endemic flora species on the HAR, have very restricted distributions of 60.1 ha and 47.3 ha respectively.	Comments on the MISP5 vegetation unit are noted. This unit occurs north of the Proposal and there will be no impact.
		Impacts resulting in the loss of approximately 37.2% of the extent of PSRN6, and 36.3% of the extent of PSRN7 are proposed and this level of cumulative impact on these communities is of concern. These represent significant impacts on vegetation units that are confined to very specific habitats, within which " <i>Conservation</i>	With regard to the use of the "30%" criterion, MRL acknowledges the comments in the submission. Regarding the "30%" criterion, the PER states "given the conservation significance of the vegetation, a much higher level of protection would be warranted".
		<i>significant taxa are strongly represented</i> " (PER, page 5-42) and with highly restricted distributions along the HAR. The residual impact on the PSRN7 unit is identified as "significant" in the PER (PER, page 5-60).	



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		The impact of the proposal on PSRN7 could increase significantly if the zone of impact was expanded slightly based on a more realistic and conservative assessment of potential indirect impacts.	
		Other highly restricted vegetation units proposed to be impacted includes PSNR18 that is known from 135.6 ha of which 5.2 ha (3.9%) is proposed for impact and PSNR23 that is known from 85.4 ha of which 10.3 ha (12.9%) is proposed for impact. These units also represent unique components of the PEC diversity.	
		It is noted that if they were assessed individually, based on their extremely restricted nature and threats, the PSRN6 and PSRN7 vegetation units would meet criteria for consideration as Threatened Ecological Communities (TEC), potentially as critically endangered. There are very few vegetation-based TECs in WA that have a total known distribution of <50 ha, with most being known to cover at least 100 ha. Extents of 47 ha and 60 ha indicates an extreme level of natural rarity. It is also worth noting that a criterion for listing critically endangered TECs under commonwealth legislation specifies that a highly restricted distribution is <1,000 ha.	
		The MISP5 vegetation unit (<i>Eucalyptus yilgarnensis</i> open woodland, over <i>Duma florulenta</i> open shrubland, over <i>Sclerolaena diacantha</i> low open shrubland) is an ephemeral wetland community that is highly restricted (84.95 ha mapped) and will be considered for inclusion on the PEC list.	
		In summary, the PEC is a complex of plant communities comprised of a series of vegetation units and flora taxa, several of which are rare and potentially threatened in	



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		their own right and are proposed to be heavily impacted by this proposal. On page 5-60 of the PER there is reference to residual impacts to the PEC being less than the 30% retention level required by the EPA. This is considered to be inappropriate for this situation, given the restricted distribution and internal diversity represented by this PEC. The significance of impacts is also increased by the location of the affected communities within a conservation reserve.	
95	Parks and Wildlife	Priority flora representation in reserves The PER provides information on the representation of conservation significant flora in conservation reserves, as required by the Environmental Scoping Document (ESD) (PER, page 5-39). Please note, however, that the highest level of protection would be inclusion within a class A nature reserve or national park and no BIF ranges or their associated specialist and restricted species or communities (including those proposed to be impacted under this proposal) are currently afforded that level of protection in WA.	Noted. Decisions about the State's reserve system are ultimately made by the Western Australian government. To date, government has not thought fit to include the HAR in a class A nature reserve or national park. MRL notes that the conservation park classification considers the existence of competing land uses, such as mining, occurring within parks (subject to appropriate environmental impact assessment and approvals).
96	DEE BHLF-TWYQ-WP1A-E	The PER indicates the proposal would result in the loss of significant proportions of two flora species the Bungalbin Tetratheca (<i>Tetratheca aphylla</i> subsp. <i>aphylla</i>) and Ironstone Beard-heath (<i>Leucopogon</i> <i>spectabilis</i>) which are each endemic to the HAR and which are each listed as threatened under the EPBC Act. The submitters are concerned that the proposal would have a significant residual impact on both these species particularly, the loss of genetic diversity within the	MRL acknowledges the impact described within the PER on <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> is significant. MRL has modified its proposal to reduce the impact, as outlined in Attachment 1. The revised proposal reduces impacts on <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> to 19.7% of the population. It also reduces fragmentation and potential impacts on genetic diversity through retention of plants at the northern end of the Bungalbin East pit. The Commonwealth Government has released a Conservation Advice on each of these taxa. These


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		Bungalbin Tetratheca. The submitters consider that the additional numbers of the Bungalbin Tetratheca and Ironstone Beard-heath recorded in botanical surveys commissioned by the proponent within the HAR must be validated by the WA	documents describe the threats to each taxon, research priorities, and regional and local priority actions. They require impacts to be "minimised", an approach extensively canvassed within the PER and the Response to Submissions.
		Herbarium.	MRL disagrees that validation of the numbers of plants recorded during the final surveys is necessary. The surveys were conducted by an independent professional consultancy with no involvement from MRL. The following information was included within the
			project brief for the final round of surveys and describes the approach taken:
			"ecologia has conducted multiple phases of flora and vegetation assessments in the Proposal area since 2012. The currently proposed survey will focus on areas and strategic locations identified in the Curtin University habitat suitability modelling for both targeted species (Di Virgilio, 2015) as well as those areas determined during the field planning phase and in close consultation with MRL (and Polaris). Before the field survey, botanical guides for the target taxa will be prepared for the field teams and these will facilitate rapid field identifications.
			In the first instance, a seven-day, intensive targeted survey will be conducted by six experienced botanists (seven full days of sampling, plus one day mobilisation/demobilisation to and from site, during the period 20 to 27 June 2016). If necessary, this may be extended for an additional seven days, until 4 July 2016.
			As per previous targeted surveys, a series of transects will be conducted in areas of suitable habitat for the target species, the precise spacing of which will be



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			confirmed during the sampling design and field preparations. Determination of transect spacing, and the balance of effort between impact and non-impact areas, will be a key priority during the planning phase.
			Maps will be prepared prior to mobilisation, which will dictate the density of transect searches and represent nominal 'track files' for field transects. Field personnel will orient themselves along these nominal transects using handheld GPS units. ecologia has demonstrated his technique to work successfully in the Proposal area for Polaris in the past.
			The locations of all conservation significant taxa located will be recorded using a handheld GPS and the local abundance, landform and associated species noted. The taxa T. aphylla subsp. aphylla and L. bungalbin will be specifically targeted; however, the Priority 1 species Acacia adinophylla will also be recorded opportunistically if observed.
			The data collected in the field will be sufficient to allow the completion of DPaW Threatened and Priority Flora Report Forms, which will form a separate appendix to the final report. Where discrete populations of the target taxa are observed, the boundaries of the population will be defined using a handheld GPS and an estimate will be made of the population size. "
97	DER	The Air Quality Assessment states that its objective is to assess the potential air quality impact from the proposed operations on the flora in the immediate vicinity. The difficulty with this objective is an absence of relevant criteria for assessing impacts of dust on native vegetation. To work around this, the report refers to	The NSW deposited dust criterion is commonly used as a guideline when considering potential impacts from dust. DER correctly states that the deposited dust criterion has no direct relationship to the assessment of impacts on plants. For this reason, MRL's proposed monitoring program includes regular assessments of

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		monitoring of vegetation populations at other mines, however, little detail is provided apart from concluding that there was no clear relationship between deposited dust and a plant condition index. Given the lack of relevant assessment criteria, the Air Quality Assessment chose to use the New South Wales	plant condition and does not rely on the deposited dust criterion for this purpose.
		(NSW) criterion for deposited dust. However, the NSW deposited dust criterion is not pertinent to assessing dust impacts on plants.	
98	DER	Section 6 of the Air Quality Assessment discusses model uncertainty. While it identifies a number of sources of error which might impact the model results, the implications of this uncertainty in light of the current assessment are not discussed.	Air quality modelling is commonly carried out in environmental impact assessments in Western Australia. The assessment presented in Appendix 10-D of the PER was conducted in accordance with the DER's own guidelines (DOE 2006).
		Usually, the largest source of uncertainty for fugitive dust models is in the estimation of emissions as these are generally themselves modelled approximations based on factors such as wind speed and ore moisture levels. Another source of uncertainty that should be considered is the selection of background concentration. The overall conservatism of the modelling cannot be discussed due to the combination of conservative and non-conservative assumptions. As a consequence of the high degree of uncertainty, modelling assessments of dust from proposed mines is a very coarse indicator of risk of dust impacts.	As discussed in the previous response, the model does not seek to determine impacts from dust but estimates the likely PM ₁₀ and PM _{2.5} concentrations and deposited dust in the local area as a result of the mine operations. The assessment is useful in this respect because it provides an indication of the potential impact of the mine operations on air quality and dust load, and provides a basis for developing management measures. The assessment does not claim to accurately predict future air quality or dust loads. The issue of uncertainty within the model is canvassed within the report (PER Appendix 10-D) and this uncertainty is acknowledged by MRL. Should the proposal proceed, MRL will be required to manage dust sufficiently to minimise or prevent environmental
			impacts. While not anticipated, MRL will adopt management measures beyond those stated in the PER



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			if it is necessary to do so to meet this requirement. The output of the model will not be a material consideration at that stage.The proposed dust monitoring program is outlined in the revised CSSCMP (Appendix C).
99	Department of Mines and Petroleum (DMP) Wildflower Society of WA ANON-TWYQ-WPBH-6 ANON-TWYQ-WP1Q-X Toodyay Naturalists Club 365 BHLF-TWYQ-WP1A-E	The submitters consider that impacts of 29.4% to <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> (Bungalbin Tetratheca) and 30.7% to <i>Lepidosperma bungalbin</i> may represent a significant residual impact on flora and vegetation. The submitters seek clarification of the impacts on Threatened Flora <i>T. aphylla</i> subsp. <i>aphylla</i> as there are inconsistencies in the PER. Some sections state that the impact is about 28% of plants (page 5-29 and Table E-1 (page v)) while Table 5-9 (page 5-24) report the proportional impact on <i>T. aphylla</i> subsp. <i>aphylla</i> as 29.4%. Furthermore, the PER Executive Summary (page v) states that " <i>In considering the EPA's objective for flora and vegetation, representation and diversity will be unaltered as there are no taxa, vegetation units or supergroups that will be removed in their entirety." The submitters do not support this statement as the removal of species in its entirety, such as <i>T. aphylla</i> subsp. <i>aphylla</i> which only occur on the HAR would result in its extinction and would be unacceptable.</i>	MRL agrees that the proposal represents a significant residual impact on <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> and <i>Lepidosperma bungalbin</i> . In response to this submission and others received, MRL is proposing a reduction to the Proposal disturbance area (the "Section 43A" footprint) which reduces the impact on both of these taxa. With regard to the clarification requested about <i>T.</i> <i>aphylla</i> subsp. <i>aphylla</i> , Table 5-9 of the PER incorrectly includes indirect impacts and should read 28%. When direct and indirect impacts are aggregated, the PER estimates a 29.4% impact. Under the revised "Section 43A" footprint, direct and indirect impacts total 19.7%. MRL agrees that the removal of a species in its entirety would be unacceptable and would be inconsistent with the EPA's objective. MRL's impact assessment concluded no species would be placed at risk of extinction as a result of this Proposal.
100	DMP	Table 5-13 in the PER (page 5-41) outlines the extent of proposed land clearing on vegetation units with the proposal resulting in the clearing of 37.2% of the total mapped vegetation unit PSRN6 and 31.2% of PSRN7.	MRL has modified the proposed footprint to reduce impacts on vegetation and flora, including the PSRN6 and PSRN7 vegetation units. Regarding the "30%" threshold, MRL understands this to



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		The DMP notes the "threshold level" below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at a level of 30% of the pre-clearing extent of the vegetation type (EPA 2000 ³⁷). The proponent should demonstrate that clearing of vegetation associated with the proposal would not result in the above threshold level being exceeded for any mapped vegetation unit.	apply to vegetation in the broad sense and that vegetation units within native vegetation might be considered on an individual basis. However, in the case of the PSRN6 and PSRN7 vegetation units, are they sufficiently different in form and composition to other vegetation units identified in our surveys to warrant individual consideration?
101	CSIRO	Specifying weed invasion targets Regarding the potential for weed invasion, the PER states (page 5-51) ' <i>This risk can be readily reduced</i> <i>through the application of routine weed monitoring and</i> <i>hygiene/treatment procedures applied to vehicle and</i> <i>equipment movements</i> '. While these are important actions and some risks can be reduced, it is important to recognise that reducing the weed risk does not necessarily mean minimal impact. In line with this, evidence suggests impacts can be significant. First, data on weed distributions demonstrate that areas of greater human activity in the GWW have	MRL shares the views of CSIRO in considering weed management an important issue and recognises that many human settlements in Western Australia, including mine sites, support weed populations and may act as loci for their further spread. Many of these sites, however, have not been subject to weed hygiene programs with multiple opportunities for weeds to be introduced through vehicle movements, especially vehicles coming in from agricultural areas. MRL aims to prevent weed introduction and/or spread at the proposed mine site and any associated
		higher levels of weed invasion. These include areas around settlements (relevant to 'A new accommodation village will be constructed at the intersection of the J4 and proposed Bungalbin East haul roads' (PER, page	infrastructure, including the proposed camp. The program will target all weed species but the comments in respect to the particular risks posed by Buffel grass are noted.

³⁷ EPA (2000) Environmental Protection of Native Vegetation in Western Australia – clearing of native vegetation, with particular reference to the agricultural area. Perth, Western Australia.



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		2-9)) and geological formations of high significance for mining (Gosper <i>et al.</i> 2014 ³⁸). Second, while benefits will be gained through vigilant weed control programs, effective avoidance or control of all incursions can require significant investment (Scott unpub. data ³⁹). Finally, climate projections suggest a potential shift to increasing summer rainfall; if this occurs it could permit invasion by Buffel grass (<i>Cencrus ciliaris</i>) (Prober <i>et al.</i> 2012 ⁴⁰). Buffel grass is an ecosystem transformer species (particularly promoting fire) (Scott <i>et al.</i> in press), so has potential for significant impacts. Quarantine and eradication programs to maintain the current very low weed abundance in the proposed development area are currently not sufficiently articulated to assess potential effectiveness. A specific management plan to prevent introduction of transformer species such as Buffel grass would need to be part of such programs.	The basics of MRL's approach to weed hygiene and management are outlined in the procedure MRL-EN- PRO-0007 (PER Appendix 2-A). Should the Proposal proceed, further documentation will be produced to guide employees and contractors through the specific processes that will apply. For the J5 and Bungalbin East Proposal, weed hygiene will be the centrepiece of the weed management program as the local weed load is very low. Weed hygiene and control procedures are well established within MRL and the mining industry generally. MRL's procedure requires cleaning of all vehicles, earthmoving equipment and other equipment or materials that may carry weed seed prior to arrival at site. Inspection certificates are issued at the point or origin with inspection checks occurring upon arrival. The procedure includes the option of refusal if vehicles or equipment arriving do not meet the requirements. The procedure also considers the management response to control any occurrence of weeds.
102	CSIRO	Impacts on the surrounding temperate eucalypt woodland plains While the PER mentions the woodland plains surrounding the HAR, it generally does not reflect on the significance of this broader landscape in which the HAR	Responses to specific issues raised appear below.

³⁸ Gosper, Prober, Yates, Scott (2015) *Combining asset- and species-led alien plant management priorities in the world's most intact Mediterranean climate landscape*. Biodiversity and Conservation 24, 2789-2807.

³⁹ Scott, Friedel, Grice, Webber (in press) *Weeds in Australian arid regions*. In: Lambers H et al (ed) On the Ecology of Australia's Arid Zone.

⁴⁰ Prober, Thiele, Rundell, Yates, Berry, Byrne, Christidis, Gosper, Grierson, Lemson, Lyons, Macfarlane, O'Connor, Scott, Standish, Stock, van Etten, Wardell-Johnson, Watson (2012). *Facilitating adaptation of biodiversity to climate change: a conceptual framework applied to the world's largest Mediterranean-climate woodland*. Climatic Change 110, 227–248.



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		is set. There is limited consideration of impacts on high quality, old-growth temperate eucalypt woodlands (also known as semi-arid woodlands in this region; see Watson <i>et al.</i> 2008 ⁴¹ ; Prober <i>et al.</i> 2012 ⁴² ; Prober <i>et al.</i> in press ⁴³) that surround the range, and of the integral relationship between the range and the woodland plains from amenity and landform perspectives. (Here we consider temperate eucalypt woodlands to include PCS 1,2,4,6,7 and PNC 3,5,6,7 and PSRN 7,9 mapped in Section 5 of the PER, although PSRN 7 occurs on the range itself). This is despite recognition of such values in an earlier EPA report: <i>'Recommendation: Reserve the range as an 'A Class' Nature Reserve for the protection ofmature eucalypt woodlands that are declining in the Wheatbelt ' (EPA Bulletin 1256, 2007⁴⁴)</i>	
		The PER states that to avoid impacts on the HAR, supporting operations would be located in the surrounding woodland footslopes and plains, e.g. 'Locate the WRLs adjacent to the HAR, rather than disposing of waste rock on the HAR (for example, through valley fill).' (PER, page 6-50); 'Locating facilities away from the HAR, as much as possible'; (PER, page	

⁴¹ Watson, Judd, Watson, Lam, Mackenzie (2008) *The Extraordinary Nature of the GWW*. The Wilderness Society, Perth.

⁴² Prober, Thiele, Rundell, Yates, Berry, Byrne, Christidis, Gosper, Grierson, Lemson, Lyons, Macfarlane, O'Connor, Scott, Standish, Stock, van Etten, Wardell-Johnson, Watson (2012). *Facilitating adaptation of biodiversity to climate change: a conceptual framework applied to the world's largest Mediterranean-climate woodland*. Climatic Change 110, 227–248.

⁴³ Prober, Gosper, Gilfedder, Harwood, Thiele, Williams, Yates (in press) *Temperate Eucalypt Woodlands*. In: Keith (ed.) Australian Vegetation, 3rd Edition. Cambridge University Press.

⁴⁴ Environmental Protection Authority (2007) *Advice on areas of the highest conservation value in the proposed extensions to Mount Manning Reserve*. Advice of the Environmental Protection Authority to the Minister for the Environment under Section 16 (e) of the Environmental Protection Act 1986. Bulletin 1256. Perth, WA



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		6-50) 'placing facilities within woodlands on adjacent plains rather than on foot slopes or ridges of the HAR' (PER, page 10-27).	
		(PER, page 10-27). Here we suggest that impacts of the proposed development on the woodland plains require greater consideration, because of the national and international importance of these woodland landscapes. Temperate eucalypt woodlands are among the most threatened ecological communities in Australia (Yates & Hobbs 1997 ⁴⁵ ; Prober <i>et al.</i> in press), particularly as a consequence of their widespread occurrence on lands readily amenable to cropping or grazing. The eucalypt woodlands of the GWW are significant in this context – they represent the largest and most intact temperate woodlands remaining in Australia, and arguably the most intact Mediterranean-climate woodlands on Earth (Watson <i>et al.</i> 2008 ⁴⁶ ; Prober and Hobbs 2014 ⁴⁷). For this reason, the woodlands of the GWW are not listed under state or federal listings as threatened	
		communities; rather, they need to be considered in the	
		wider national and global context for their significance in	
		conserving and understanding temperate woodlands at	
		landscape scales. Regionally, the GWW woodlands	

⁴⁵ Yates, Hobbs (1997) *Temperate eucalypt woodlands: a review of their status, processes threatening their persistence and techniques for restoration.* Australian Journal of Botany 45, 949-973.

⁴⁶ Watson, Judd, Watson, Lam, Mackenzie (2008) *The Extraordinary Nature of the GWW*. The Wilderness Society, Perth.

⁴⁷ Prober, Hobbs (2014) *Temperate Eucalypt Woodlands*. In: D Lindenmayer and S Morton (eds) Ten Commitments Revisited: Securing Australia's Future Environment. CSIRO Publishing, Melbourne, pp. 21-30.



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		serve as an important refuge for many species from the adjoining WA Wheatbelt (Recher <i>et al.</i> 2007 ⁴⁸), where related woodlands are listed as 'critically endangered' at the national level (http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=128).	
		The proposal would impact on temperate/semi-arid eucalypt woodlands from a number of perspectives and the PER does not adequately consider potential impacts including the following:	
		Vulnerability to fire	
		The PER demonstrates an awareness that fire is important in the ecology of the HAR area, in particular it is stated 'Morton et al (2011) report a return interval of fire within Acacia shrubland of 30-100 years and within semi-arid woodland of 20-100 years.' However, this is not as relevant to the GWW eucalypt woodlands; and hence an understanding of fire regimes on the eucalypt woodland plains, and associated risks and management opportunities, should be considered.	With regard to specific potential impacts, MRL aims to maintain the existing fire regime (PER p5-51) and will implement measures to prevent inadvertent fires resulting from our operations. This primarily relates to control over 'hot' works that generate sparks but will also involve workforce education. Note that there are no potential sources of fire within the resource itself, such as occurred at the Hazelwood mine in Victoria. Where feasible to do so, other MRL operations in the
		Unlike much of the eucalypt-dominated vegetation across Australia, fires in GWW woodlands are considered to have been historically rare (about 300-400 year intervals, owing to the sparse distribution of fuels), and tend to be stand-replacing (i.e. resulting in mortality of the mature trees and replacement by seedlings; Yates <i>et al.</i> 1994 ⁴⁹ . O'Donnell <i>et al.</i> 2011 ⁵⁰). Some of the	region have assisted with control of naturally-occurring bushfires in the past and the provision of assistance would continue should the Proposal proceed. MRL notes that the survey area features a mixture of burnt and unburnt locations (PER Appendix 5-A p92) although few of the locations showing evidence of fire were recent.

⁴⁸ Recher, Davis Jr, Berry, Mackey, Watson, Watson (2007) *Conservation inverted: birds in the GWW*. Wingspan 17:16–19.

⁴⁹ Yates, Hobbs, Bell (1994) *Landscape-scale disturbances and regeneration in semi-arid woodlands of southwestern Australia*. Pacific Conservation Biology 1, 214–221.





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		eucalypts (e.g. E. salubris) are understood to attain ages	
		of 500+ years, but at growth rates of about 1 millimetre	
		(mm) in basal stem diameter per year (demonstrated for	
		E. salubris, with potentially greater growth rates in	
		seedlings and young saplings; C. Gosper, S. Prober, C.	
		Yates unpub. data), can take 200 years to reach a stem	
		diameter (above base) of just 25 centimetre (cm), or 450	
		years to reach 50 cm. This highlights the very long time	
		frames required for the recovery of old-growth	
		woodlands, hence the importance of managing for	
		persistence of old-growth woodlands, both from the	
		perspective of fire management and restoration after	
		developments. Furthermore, intermediate-age	
		woodlands are more prone to fire than old growth	
		woodlands, resulting in a potential fire trap that limits	
		recovery from intermediate to more floristically diverse	
		old-growth woodlands (O'Donnell et al. 2011; Gosper et	
		<i>al.</i> 2013a,b,c ⁵¹).	
		Increasing human activity and use of vehicles and	
		machinery such as the proposed development could	
		provide additional sources of fire ignition (DEC undated)	
		For example, the GWW Biodiversity and Cultural	

⁵⁰ O'Donnell, Boer, McCaw, Grierson (2011) Vegetation and landscape connectivity control wildfire intervals in unmanaged semi-arid shrublands and woodlands in Australia. Journal of Biogeography 38, 112-124.

⁵¹ Gosper, Prober, Yates (2013a) *Multi-century changes in vegetation structure and fuel availability in fire-sensitive eucalypt woodlands*. Forest Ecology and Management 310, 102-109.

Gosper, Yates, Prober (2013b) *Floristic diversity in fire-sensitive eucalypt woodlands show a U-shaped relationship with time since fire*. Journal of Applied Ecology 50, 1187-1196.

Gosper, Prober, Yates, Wiehl (2013c) *Estimating the time since fire of long-unburnt Eucalyptus salubris (Myrtaceae) stands in the Great Western Woodlands. Australian Journal of Botany* 61, 11-21.

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		Conservation Strategy (DEC undated) states 'in more recent times new ignition sources have proliferated along road and rail links and from fires burning into the Great Western Woodlands from townships and adjacent developed areas.' While the woodlands are relatively fire resistant, greater risk of intense fires resulting from increased ignitions could lead to loss of old-growth woodlands well beyond the footprint of the proposal. Alternatively, the proposal could potentially invest in leading a rapid response program to prevent or reduce the extent of large, intense fires that might result from natural or human-induced ignitions.	
		Woodland clearing Supporting infrastructure of the proposal would lead to direct clearing of old-growth woodlands. The extent of old-growth woodlands in the GWW is already declining for a range of reasons, including increasing frequency and extent of intense fires and the impacts of developments (Watson et al. 2008 ⁵² ; Prober <i>et al.</i> 2012 ⁵³ ; Raiter 2016 ⁵⁴). While the extent of clearing proposed in the PER is argued to be minimal, it is still significant (>200 ha in the PCS and PNC classes), and is not recognised as a residual impact. Woodland clearing is significant in the context of:	MRL acknowledges the values associated with eucalypt woodlands and in particular those in the Greater Western Woodlands (GWW). However, the proposed use of an area of eucalypt woodland for storage of waste rock and for other infrastructure recognises its relative abundance compared to BIF ridges which are far more restricted. The proposed disturbance to the vegetation communities listed is approximately 304 ha compared with the full extent of the GWW of 16,000,000 ha. This is not to imply that the level of disturbance is of no

⁵² Watson, Judd, Watson, Lam, Mackenzie (2008) *The Extraordinary Nature of the GWW*. The Wilderness Society, Perth.

⁵³ Prober, Thiele, Rundell, Yates, Berry, Byrne, Christidis, Gosper, Grierson, Lemson, Lyons, Macfarlane, O'Connor, Scott, Standish, Stock, van Etten, Wardell-Johnson, Watson (2012). *Facilitating adaptation of biodiversity to climate change: a conceptual framework applied to the world's largest Mediterranean-climate woodland*. Climatic Change 110, 227–248.

⁵⁴ Raiter (2016) *Enigmatic ecological impacts of mining and linear infrastructure development in Australia's GWW*. PhD Thesis, School of Plant Biology, University of WA.



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		the poor national conservation status of temperate eucalypt woodlands (e.g. Yates and Hobbs 1997; Prober <i>et al.</i> in press);	consequence. However, the disturbance associated with Proposal alone is unlikely to affect the structure and function of the GWW.
		the cumulative effects of such developments on the world's most intact Mediterranean-climate woodlands (Watson <i>et al.</i> 2008). As noted above, Raiter <i>et al.</i> (2014) emphasised the importance of accounting for cumulative effects in developments: few old-growth temperate eucalypt woodlands of the GWW are protected in secure gazetted reserves and many have suffered or are similarly threatened by development impacts; hence individual developments need to be considered in a broader strategic context;	
		the declining occurrence of old growth temperate eucalypt woodland that has escaped grazing by livestock. The area surrounding HAR has some of the most intact and least disturbed old-growth woodlands nationally and within the GWW itself (S. Prober, pers. obs.). Many of the other northern GWW woodlands, which are the most fire resistant, have a history of livestock grazing, resulting in varying levels of degradation. By contrast, the relatively intact woodlands on crown lands between HAR (proposal area) and Koolyanobbing offer important reference landscapes for the functioning of healthy temperate eucalypt woodlands;	
		the WRL would be permanently placed over some of the woodland leading to no possibility of future restoration of the original character; and	
		30% of the extreme eastern outlier of <i>Eucalyptus capillosa</i> subsp. <i>capillosa</i> woodlands PSRN7 will be	



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		affected (as noted in the PER). These woodlands are otherwise largely confined to the WA Wheatbelt where they are a part of the WA Wheatbelt woodlands threatened ecological community.	
		<u>Cumulative impacts of roads and tracks</u> As noted above, additional haul roads and access tracks can add to the dissection, fragmentation and other cumulative impacts of roads in GWW woodland landscapes (Raiter <i>et al.</i> 2014 ⁵⁵). Such roads and tracks can impact on predator behaviour and hydrology of sensitive semi-arid landscapes (Waddell 2012 ⁵⁶ ; Raiter 2016 ⁵⁷); and there are likely to be other cryptic or undocumented effects of roads (Raiter <i>et al.</i> 2014). For example, Raiter (2016) emphasises that the hydrological impacts of roads can extend over large areas in subdued semi-arid landscapes such as the GWW, well- beyond the direct infrastructure footprint. Impacts are driven by increasing overland flow generated along relatively impermeable and unvegetated road surfaces, and interception of stream, overland or subsurface flows	 MRL accepts the general premise that roads and tracks may have some level of disruptive influence on ecosystem processes. However, the main access to the proposed sites is an existing access road. Note the following: Only 30 km of road will be required to connect both sites (J5 and Bungalbin) to the existing access road. The roads will be designed to include drainage features, including ephemeral creeklines, to replicate natural drainage to the extent possible. Unless required by subsequent land users, these roads will be rehabilitated when mining is finished and the original land contours restored. "There is virtually no measurable catchment up-
		from upslope areas (e.g. Duniway 2010 ⁵⁸ ; Raiter 2016). Typical impacts observed globally include erosion due to increased runoff, altered stream function, and	slope from the mine and infrastructure areas at J5 and Bungalbin East. Therefore, little to no surface runoff is expected to flow into these areas from

⁵⁵ Raiter, Hobbs, Prober, Possingham (2014) *Under the radar: mitigating enigmatic ecological impacts*. Trends in Ecology and Evolution 29, 635-642.

⁵⁶ Waddell et al. (2012) A report on the Gascoyne River catchment following the 2010/11 flood events. In Resource Management Technical Report 382. Department of Agriculture and Food WA.

⁵⁷ Raiter (2016) *Enigmatic ecological impacts of mining and linear infrastructure development in Australia's GWW*. PhD Thesis, School of Plant Biology, University of WA.

⁵⁸ Duniway, Herrick, Pyke, Toledo (2010) Assessing transportation infrastructure impacts on rangelands: test of a standard rangeland assessment protocol. Rangeland Ecology & Management 63:524-536





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		downslope water starvation due to interception of flows; each with their own cascading effects. Indeed, in the GWW including the HAR, Raiter (2016) found that alterations in surface water movement associated with linear infrastructure (mostly roads and tracks) were numerous and pervasive, with direct impacts including erosion, pooling and alteration of ephemeral stream flows, resulting in an estimated total of 335,000 occurrences of linear infrastructure impacts on hydrology within the GWW already. The PER makes an assessment of impacts of haul roads on stream crossings ' <i>two major and five minor</i> <i>drainage lines crossing the haul roads</i> ', but Raiter (2016) would predict an average of one hydrological impact per km of road or track, suggesting this could be an underestimate of impacts. Further, the only statement regarding potential impacts on sheet flow are that there are no ' <i>sheet-flow dependent vegetation communities</i> ' (PER, page 9-9). Raiter (2016) recommended significant efforts to restore old roads and minimisation of future roading, as well as accounting for unavoidable impacts of roads in impact evaluations.	 higher in the catchment"(PER p9-4). "No permanent creek lines will be crossed" (PER p9-5). Given the local hydrological conditions and the temporary nature of the disturbance, material impacts of the nature described by the submitter are not expected.
l		Long timeframes for restoration	
		Ability to restore these woodlands is not well proven owing to the long timeframes required to establish mature woodlands. Even if reseeding or replanting is successful, old-growth woodlands like these require	MRL accepts the general premise that restoration of woodlands involves a long time frame. Landscape amenity is one of many considerations in this proposal and is discussed at length in Section 10 of the PER.



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		timeframes of 300+ years, i.e. about 12 human generations, to replace (e.g. Gosper <i>et al.</i> 2013a,b,c ⁵⁹ for <i>Eucalyptus salubris</i> woodlands as noted above). From a landscape amenity perspective they are thus not recoverable within timeframes even remotely relevant to people today.	Restoration of landscape amenity, to the degree it will occur, will be a function of the ability to establish stable post-mining landforms and the rate of vegetation establishment on those landforms.
		Exotic invasions	
		As described above, evidence indicates that development activity will promote invasion by exotic species (Gosper <i>et al.</i> 2015 ⁶⁰), and proposed weed control targets are not well specified in the PER. Section 5.2.2 notes ' <i>Surveys recorded only ten species of</i> <i>environmental weed andweed numbers and</i> <i>distribution were low throughout the study area.</i> ', highlighting the significance of the woodland plain in comparison with high invasion status of many temperate eucalypt woodlands elsewhere (Prober <i>et al.</i> in press ⁶¹), and emphasising the importance of a more rigorous quarantine and management strategy.	MRL concurs that invasion by exotic species is a risk and, as a general premise, development activity promotes invasion by exotic species. However, it is not correct to compare levels of weed invasion in temperate eucalypt woodlands generally with the potential for weed invasion at a particular location where weed hygiene and management procedures will apply (PER p5-50). See also the response to Issue 101.
103	Toodyay Naturalists	The submitter questions the need for clearing 186 ha (in	The extent of the footprint for this proposal has been

⁶¹ Prober, Gosper, Gilfedder, Harwood, Thiele, Williams, Yates (in press) *Temperate Eucalypt Woodlands*. In: Keith D. (ed.) Australian Vegetation, 3rd Edition. Cambridge University Press.

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⁵⁹ Gosper, Prober, Yates (2013a) *Multi-century changes in vegetation structure and fuel availability in fire-sensitive eucalypt woodlands*. Forest Ecology and Management 310, 102-109.

Gosper, Yates, Prober (2013b) Floristic diversity in fire-sensitive eucalypt woodlands show a U-shaped relationship with time since fire. Journal of Applied Ecology 50, 1187-1196.

Gosper, Prober, Yates, Wiehl (2013c) Estimating the time since fire of long-unburnt Eucalyptus salubris (Myrtaceae) stands in the Great Western Woodlands. Australian Journal of Botany 61, 11-21.

⁶⁰ Gosper, Prober, Yates, Scott (2015) *Combining asset- and species-led alien plant management priorities in the world's most intact Mediterranean climate landscape*. Biodiversity and Conservation 24, 2789-2807



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	Club	total) of vegetation for WRL as described in Section 2.3.2 of the PER, it is considered that given the smaller yields of ore at J5 only one WRL should be required not two. Similarly, the submitter requests clarity as to why such a large area (92 ha) is required to be cleared for supporting infrastructure with 47 ha at J5 and 45 ha at Bungalbin East.	reviewed a number of times since the original proposal to reduce it to the smallest necessary area. With regard to the waste rock landforms, the footprint is dictated by the volume of waste rock overlying the ore, final height restrictions (below the height of the adjacent ridge), the need to batter down the slopes for allow for rehabilitation and long term stability, and for drainage control to prevent or control erosion. The infrastructure areas are mainly required for stockpiling of ore prior to transport off site for processing. Sufficient room is required for ore to be stockpiled according to grade so blending to achieve iron ore supply contract requirements can be met.
104	ANON-TWYQ-WPH1-N ANON-TWYQ-WP27-5 ANON-TWYQ-WP2U-3 ANON-TWYQ-WP2A-F ANON-TWYQ-WPPH-M ANON-TWYQ-WPPH-M ANON-TWYQ-WPP2-X ANON-TWYQ-WP17-4 ANON-TWYQ-WP4H-R ANON-TWYQ-WP4H-R ANON-TWYQ-WP4F-5 Wildflower Society of WA ANON-TWYQ-WP4F-6 BHLF-TWYQ-WPJF-C BHLF-TWYQ-WPJV-V	 The HAR has rare and endemic flora that can't be seen elsewhere. Previously, rare and endemic flora could be seen at Mount Jackson Range, but there is no longer access to this range because of mining activity. Previous biological surveys have demonstrated the very high biodiversity and landscape conservation values of the HAR. The level of impact of the proposed development, even if managed with a high degree of sensitivity and conservation management, provides too high a level of risk to be mitigated or offset. The HAR is an integral component of the GWW, a biodiversity hotspot, cited as '<i>The Jewel in the Crown</i>' of this wonderful asset that WA has on its doorstep with its unique flora, values include the following: 5 endemic flora species—found only on this range 2 declared Threatened Flora 14 priority flora species 	MRL does not dispute the conservation values of the area. These values are discussed at length within the PER. The means by which these conservation values may be maintained in and around active mines has been carefully considered and MRL is proposing a management program to minimise its impacts. MRL agrees the eastern end of the HAR supports most of the significant flora values. However, only a portion of this area is proposed for mining with the remainder, including Bungalbin Hill, left undisturbed. While some taxon are very restricted in their distribution, all occur outside of the footprint of the proposed mine. In response to the submissions received, MRL has reduced the Bungalbin East pit footprint further to decrease the impact. Access to the eastern end of the HAR will stil be possible, even during active mining (see PER Figure 10-3).



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	The Wilderness Society ANON-TWYQ-WPJT-T ANON-TWYQ-WPJY-Y ANON-TWYQ-WP2C-H ANON-TWYQ-WP4D-M ANON-TWYQ-WP4D-M ANON-TWYQ-WPF5-Q ANON-TWYQ-WP55-Q ANON-TWYQ-WP2J-Z Toodyay Naturalists Club	 3 threatened fauna species 10 BIF-dependent flora species 1 Priority One ecological community 350 native plant species The proposed Bungalbin East mine site is the only access to the top of the range at its eastern area and the area where most of the unique flora grows. The submitters object to the proposal based on the impacts to flora and the loss of about 30% of a restricted and threatened species is unacceptable. The HAR contains flora species that are endemic to the area and is a biodiversity hotspot. The area contains intact woodlands of the GWW and the proposal would fragment these woodlands. The PER states that there is no evidence that any flora species will be lost. Yet there are five endemic species in the area of the development that will unlikely grow elsewhere. It is unclear how the loss of 40% of six priority species be considered to meet the EPA's objective "to maintain representation, diversity, viability and ecological function at the species population and community levels". The flora and vegetation communities of HAR are spectacular and unique – as has been documented and highlighted on many occasions through many expert studies and reports over many decades. 	Regarding access to the Jackson Range, MRL acknowledges there are access restrictions where active mining occurs for safety purposes. However, other points of access remain open along the range. With regard to the EPA's objective for flora and vegetation, MRL maintains that the objective can be met. While MRL acknowledges that there are flora and vegetation communities that are naturally restricted in their occurrence, the impacts of this Proposal are not so great as to reduce populations to the extent they become non-viable. In response to submissions, MRL has offerred a modified footprint (the "Section 43A" footprint) to reduce the impacts below those outlined in the PER.
105	ANON-TWYQ-WP18-5	The GWW are internationally significant as the largest remaining relatively intact area of temperate woodlands on earth. Despite low research effort the area is currently known to support around 3,000 flowering plant species (20% of Australia's known flora) and is a known	MRL does not contest the value of the GWW. However, the government of Western Australia does not exclude other land uses in this area, as evidenced by the number of exploration and mining leases occurring over prospective ground and also the extensive pastoral





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		centre for <i>Eucalyptus</i> species diversity. The proposal is considered to be incompatible with the goals of the Biodiversity and Cultural Conservation Strategy for the GWW (DPaW 2010). A priority objective of the strategy is "to retain the composition, structure and function of native ecosystems in the Great Western <i>Woodlands</i> ". The HAR as a whole lie within the GWW and comprise a diverse ecosystem comprising eucalyptus woodlands, sandplains and BIF, each retaining rare flora and fauna. The HAR are the only remaining area within the GWW that contain BIF but remain minimally impacted by mining, and is considered as "one of the more significant biodiversity assets in WA" (EPA 2007).	leases. We note the footprint of the Proposal is 575 ha whereas the GWW covers an area of 16,000,000 ha.
106	The Wilderness Society	 The submitter rejects the proponent's suggestion that the proposed impacts to rare, threatened and endemic flora species is 'insignificant' or 'manageable'. First, these species would be seriously impacted and compromised far beyond the immediate 611 ha "disturbance area" by, for example, dust, introduced species and potential changes to water regimes and hydrological processes. These 'indirect' impacts have not been adequately addressed in the PER. Second, given that the five endemic, BIF dependent species identified by the proponent are only found within this small area (~3000 ha) of the world, any loss of populations or habitat within that area is unacceptable. Third, the proposed mines would eliminate the two most northerly and easterly outlier populations of 	 The submitter raises a number of issues for which responses are provided as follows: Potential indirect impacts were discussed at length in the PER (Section 5.3.1). Each of the indirect impacts listed were evaluated. The assessment assumed all flora and vegetation within the pit surrounds and in a further 20 m buffer zone would be lost. The assessment concluded there would be a number of significant residual impacts for which offsets would be warranted. Regarding L. spectabilis, the overall impact is less than 1% of the population. MRL is also proposing a revised footprint (the "Section 43A" footprint) which would remove the northernmost plants from the proposed disturbance.



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		 Leucopogon spectabilis – an unacceptable reduction in the already limited range of this threatened species. The suggestion that destroying over 29% of the world's entire population of <i>Tetratheca aphylla</i> is 'of little significance' indicates that the proponent has little regard for the environment and its project's impacts on threatened species. Similar issues arise in relation to other Priority species in the HAR, including <i>Lepidosperma bungalbin</i>. The proponent does acknowledge that at least one Priority species would move to a higher threat level if proposed mining proceeds: L. bungalbin: "If the Proposal was implemented, on current information, the taxon would be considered as Vulnerable under IUCN criteria A3 and A4 as less than half the known population would be cleared (Appendix 5-F)." Knowingly impacting a species to the extent it would move to a higher threat level contravenes the EPA's objective for flora and vegetation, which is: "To maintain representation, diversity, viability and ecological function at the species, population and community level." Further serious and unacceptable impacts to the Range's flora and vegetation includes: "PSRN7, a eucalypt woodland occurring on the slopes below the ridgeline, has a current extent of less than 50 ha of which just over 30% would be removed under the Decenard "" 	 Regarding Tetratheca aphylla subsp. aphylla, the assessment concluded the impact was considered significant. Offsets were proposed (PER Section 13) and a revised footprint is now proposed which will significantly reduce the proposed impact on this taxon. Regarding Lepidosperma bungalbin, again, the assessment concluded the impact was considered significant. Offsets were proposed (PER Section 13) and a footprint reduction is now proposed. Regarding the IUCN criteria attributable to L. bungalbin, this taxon should not be considered for listing as threatened flora (see appendices for updated IUCN review). Regarding the vegetation community PSRN7, the assessment concluded the impact was considered significant. Offsets were proposed (PER Section 13).





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		The proposed level of direct and indirect impacts to endemic, threatened and restricted flora species and communities is unacceptable, including loss of over 29% of <i>Tetratheca</i> ; over 39% of <i>Lepidosperma</i> and over 30% of eucalypt woodland "PSRN7". Successful long- term restoration of the species in this habitat is unproven and extremely unlikely. In line with previous EPA recommendations, the proposed mines on HAR must be rejected.	
107	ANON-TWYQ-WP2B-G ANON-TWYQ-WPBA-Y	The direct and indirect impacts of the proposal are poorly addressed in the PER. Few weeds occur in this (almost) pristine area the proposal would increase introgression by introduced species (weeds). This would impact upon the area's flora through direct clearance, changes to hydrogeology, increased competition, dust, altered fire regimes and changes to species' home ranges. These concerns have not been adequately addressed by the proponent, irrespective of the scale of any purported 'offsets'.	MRL does not agree that the impacts of the proposal have been "poorly addressed". The PER is a comprehensive review of the potential impacts with mitigation and management outlined for each identified impact. Specialists in their respective fields were used to compile the technical studies and peer reviews were conducted on key issues.
108	ANON-TWYQ-WP19-6	It is not clear from Table 5-8 (page 5-23) of the PER the difference between direct and indirect impacts. See the last point in 'Direct' impacts and compare it with the first point in 'Indirect' impacts. The left hand column heading also appears incorrect, as it uses the word 'potential'.	Direct impacts relate to the area of land that would need to be cleared to establish the mine and infrastructure. Clearing of this area will result in the direct impacts listed. Indirect impacts may or may not occur – management will seek to minimise or eliminate these impacts. The table is headed "Potential Impacts" as the Proposal is still in the assessment phase.
109	ANON-TWYQ-WP1E-J	The submitter supports the proposal based on it meeting the requirements of the <i>Environmental Protection Act</i> <i>1986</i> (EP Act). Furthermore, the proponent has	The submitter's support for the Proposal is acknowledged.

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		presented openly the predicted significant residual impact on flora and vegetation. Regard should be given to the extensive and documented work undertaken by the proponent and others to protect, transplant and regrow threatened species.	
110	ANON-TWYQ-WPBN-C Helena and Aurora Region Advocates Inc Wildflower Society of WA ANON-TYQ-WPBH-6	The statement in the PER (page 5-9) "There were no novel taxa – taxa demonstrating anomalous features that could indicate a potential new discovery – identified in the Study Area" is incorrect. At least three (possibly five to seven) new species not listed by ecologia or the proponent are known from the ranges. One of these is currently listed by Parks and Wildlife as a P1 species. The species in question are: <u>Eremophila sp McDermid Rock P1</u> Common and widespread on the foot slopes of the HAR, especially on the southern slopes within the proposed orebody and infrastructure areas. This species has probably been misidentified as <i>Eremophila rugosa</i> or <i>E.</i> <i>succinea</i> . Identification of <i>Eremophila</i> sp. McDermid Rock P1 was made by Andrew Brown on specimens taken from the proposal area in 2012. <u>Eremophila aff. Granitica – Lanceolate leaf</u> Soon to be phrased named, the proposed Type specimens have been taken from the summit of the Bungalbin East orebody area and the taxonomy of this species is being addressed by Andrew Brown, Parks and Wildlife and <i>Eremophila</i> expert. <u>Olearia sp.</u> Yilgarn BIF (currently being Phrase named) is a new	At the time when taxonomic identifications of collected specimens was conducted, information on these potentially new species was not available to ecologia, nor were the specimens that were identified considered to be anomalous based on comparison to herbarium reference material and current taxonomic descriptions. At the time of the survey these potentially new species were not known (or in some cases could not be known) to survey personnel. Note that phases of the survey collecting new material were completed by 2013. Subsequent phases were targeted searches for known threatened and Priority Flora. Some comments follow on particular taxa. <i>Eremophila</i> sp. McDermid Rock: specimens now considered to belong to <i>Eremophila hamulata</i> were initially collected during the field survey. These were identified at the time as <i>E. rugosa</i> , and keyed out well to this species using the current taxonomic key of Chinnock (2007) 'Eremophila and allied genera: a monograph of the Myoporaceae', which was the most up to date formal taxonomic information regarding this taxon and similar species (e.g. <i>E. drummondii, E. phillipsii, E. succinea</i> , and <i>E. labrosa</i>) at the time. Subsequent to this, field identifications were made in most instances.



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		species with the <i>Olearia stuartii/O. humilis</i> complex and has been confirmed at HAR, specimens previously collected by Neil Gibson and Mike Lyons (formerly DEC) have been verified as this new entity (S. Dillon pers. comm.). This species has been worked on by Steven Dillon for the past two years, under direction from Dr Kevin Thiele in his former role as Director of the WA Herbarium. <u>Conostylis argentea</u> On BIF is an anomalous record, within the northern Yilgarn region, only recorded on HAR and Koolyanobbing Range (the latter likely now mined). The majority of other collections of this species are on sand or gravely hills in the Mallee and Esperance Plains bioregions. This group needs taxonomic review. At minimum, the record on the HAR is at the north-eastern limit of the range of the genus <i>Conostylis</i> and as such is highly significant. <u>Melaleuca leiocarpa (BIF form)</u> Informal name, flowers a month earlier (September) and has smaller fruits that <i>M. leiocarpa</i> on the sandplains. Needs taxonomic review. Has been discussed with the late Lyn Craven (formerly with the Australian National Herbarium) and could readily be sorted out with a morphometric analysis of the specimens held at WA herbarium as well as a good habitat review. <u>Phebalium sp.</u> Further, there are possibly one to two new Phebalium species in the northern Yilgarn region, some of which likely occur within the Helena and Aurora Conservation	Material identified as <i>E. rugosa</i> was recorded from multiple quadrats (20+) over three separate survey phases (Spring 2012, Autumn 2013 and Spring 2013) undertaken by numerous, experienced botanists over the study area (see Attachment 5, Figure A5-2 for distribution). <i>E. rugosa</i> was restricted to the plains around the BIF ridges and the great majority of occurrences were outside of the Proposal footprint. MRL has mapped all instances of <i>E. rugosa</i> records (ecologia and DPaW). ecologia did not record many instances of <i>E. rugosa</i> within the proposal footprint. Most records within the proposed Bungalbin East pit originate from DPaW records. Burchell and Brown (2016) record E. hamulata as occurring on the "lower slopes of the Helena and Aurora Range" and "in brownish red, ironstone soils in creek lines and adjacent woodlands" "in scattered locations between McDermid Rock and Diemals Station. On this basis, it is very unlikely the Proposal will have a significant impact on <i>E. hamulata</i> . MRL recognises that <i>Conostylis argentea</i> at HAR is at the limit of its range and is therefore considered significant. However, note that no specimens of the taxon were lodged with the WAH as there are three representative specimens from the HAR already at the Western Australian Herbarium (PERTH 2011492, PERTH 5393191, PERTH 5363314). Therefore records from the surveys undertaken for this Proposal are not considered new populations, range extensions or otherwise anomalous.



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		Park and more specifically within the proposal study area. These require a significant amount of taxonomic review, a slow and onerous process as the group is complex and there has not been significant review of the group in recent decades.	
111	ANON-TWYQ-WPBN-C Wildflower Society of WA ANON-TWYQ-WPBH-6	 Table 5-4 of the PER (page 5-10) does not identify those species which are Lithophiles, reliant on fissures in massive BIF rock for suitable habitat. These are highly specialised plants with very restricted distribution reliant on the massive BIF rock outcrops for their habitat. The issue of Lithophiles has not even been mentioned by ecologia, a serious omission in habitat descriptions for the BIF endemic flora. Lithophiles of the HAR include the following: Lepidosperma bungalbin (P1); Tetratheca aphylla subsp. aphylla (Threatened); Leucopogon spectabilis (Threatened); Conostylis argenta; Melaleuca leicarpa BIF form (possibly an undescribed species); Banksia arborea (P3); and Dodonaea viscosa subsp. spatulata. Table 5-4 has omitted <i>Eremophila</i> sp. McDermid Rock P1 (not identified by ecologia). 	MRL understands the term 'lithophile' is not commonly applied to flowering plants. With one exception, the habitat preferences of the seven plants listed by the submitter are given in the PER (Appendix 5-A, Table 4.4). Only one of these (<i>L.</i> <i>spectabilis</i>) is known to be restricted to fissures in rock. The surveys did not record <i>Dodonaea viscosa</i> subsp. <i>spatulata.</i> Regarding <i>Eremophila</i> sp. McDermid Rock, see the response to Issue 110.
112	ANON-TWYQ-WPBN-C Wildflower Society of WA ANON-TWQ-WPBH-6	Section 5.2.3 of the PER (page 5-11) details the method of conducting vegetation mapping utilised by ecologia (establishing quadrats and then drawing a map linking similar quadrats within polygons) which is a poor (but cheap) method of implementing vegetation mapping. It is	Extrapolative mapping is commonly adopted approach to delineating vegetation units of large survey areas for Level 2 Flora and Vegetation survey, particularly where access may be limited. MRL and ecologia acknowledge that there are limitations and potential inaccuracies in





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		 unsuitable for vegetation mapping of the BIF ranges (and most other places) as it does not pick up smaller scale variability. The method used is prone to errors with the following being characteristic of the proposal vegetation maps and spatial data provided: Imprecise boundaries of vegetation units. Vegetation units do not match the reflectance of the underlying satellite imagery available. Many vegetation units at NVIS level 5 are enclosed within a given polygon. Clearly seen using Google Earth and the proponent's spatial data. Incorrect vegetation unit descriptions applied to large areas – the vegetation on the ground does not reflect the descriptions provided in the ecologia report. Taking any point at random within the proposal development envelope at Bungalbin East, at least 50% of the vegetation units are incorrectly described and the vegetation description within the report does not match what is observable out of the car window or further from easy access points. Statistical analysis outputs are complex and difficult to validate or critically analyse without specialist knowledge. The use of Vegetation Supergroups for impact analysis is not remotely useful to any discussion on the conservation values of the 	adopting this approach. Out of practicality, vegetation units are typically mapped at a broader scale using high resolution aerial photography (not satellite imagery), which enables finer changes in vegetation type to be more accurately delineated. Therefore, direct correlation with satellite imagery may not always occur. While acknowledging the limitations, MRL and ecologia do not agree that "at least 50% of the vegetation units are incorrectly described". The response to Issue 11 provides more detail in relation to vegetation mapping. The inclusion of vegetation supergroups in the PER was to provide an analogue for the PEC. It is provided for information and not in lieu of the mapping and analysis of vegetation units.
112		Vegetation units of the range.	Soveral guadrate representing vegetation unit MIDL1
113		 MIPL-1 has an odd combination of species that are not normally found growing together (<i>Eucalyptus</i> <i>ebbanoensis, Acacia resinimarginea, Hakea</i> 	were associated with that combination of flora species, and these quadrats were clustered together with other floristically similar quadrats in the floristic classification.





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		 <i>minyma, Olearia pimeleoides)</i> indicating unreliable vegetation descriptions. Vegetation polygons at an appropriate scale over the aerial imagery are not presented so that boundaries and uniformity of vegetation units cannot be reviewed by the reader. Many vegetation polygons within the study area are highly questionable and warrant a thorough on-ground re-assessment. 	This combination of species is therefore real and is not considered to represent "unreliable vegetation descriptions". Because the floristic analysis in this case weighs all species equally (out of necessity), the composition of some quadrats may not exactly match the vegetation description, although every effort was made to make the descriptions as encompassing as possible. This is a known drawback of defining vegetation units by this type of hierarchical cluster analysis. The response to Issue 11 provides more detail on vegetation mapping.
114	ANON-TWYQ-WPBN-C	 Flora and vegetation assessment Data presented on known conservation significant flora is comprehensive although has not been independently tested in the field (for example reported widespread distribution of <i>Acacia shapelleae</i> P1) Evidence of superficial treatment of some flora and especially of vegetation. No evidence provided of specimens having been vouchered with the WA Herbarium from the flora surveys other than the known conservation significant species, resulting in no checks on identity being able to be made. Five vegetation units support the conservation significant flora species PSRN0 (BIF Hill top), (lower colluvial foot slopes) PSRN21, PSRN22 and PSRN24, However, PSRN1 is found on the lower 	Regarding data being "independent tested", there is no requirement for this under the relevant environmental assessment guidelines. MRL also notes that ecologia is very experienced in biological survey. The botanists who participated in the flora and vegetation assessment are listed in the PER (Appendix 5-A p126). All have university qualifications with seven holding a PhD in botany. The work was also peer reviewed by Associate Professor Grant Wardell-Johnson from Curtin University. It is not clear what is meant by "superficial treatment". Regarding vouchering of specimens, several atypical specimens (that were deemed to be so based on comparison to reference material and current taxonomic keys and descriptions), in addition to representative specimens of all conservation significant taxa, were vouchered and submitted to the WA Herbarium for



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		annularis.	not general practice, nor is it a requirement of flora licences issued under the <i>Wildlife Conservation Act</i> <i>1950</i> , to submit representative specimens of all taxa collected during a survey. See also response to Issue 10 regarding identifications submitted to and undertaken by the Herbarium. The vegetation unit PSRN1 clustered with other PSRN units in the dendrogram analysis (PER Appendix 5-A Figure 4.2).
115	Helena and Aurora Region Advocates Inc.	Large impacts to plant species <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> (Threatened; impact 29.4% of population) and <i>Lepidosperma bungalbin</i> (P1, 39.7%) are not acceptable and carries a significant degree of risk for each of these species, particularly in these times of climate change with the likelihood of increasing frequency of periods of drought. The highest impacts on endemic flora to HAR are for <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> (29.4%) and <i>Lepidosperma bungalbin</i> (39.7%). Three of the five unique <i>Tetratheca</i> species endemic to five ranges have been or will be impacted by mining. While <i>Tetratheca harperi</i> has only been impacted slightly at Mount Jackson, two <i>Tetratheca</i> species, one at Windarling Range (<i>Tetratheca paynterae</i> subsp. <i>paynterae</i> , ~30% impacted) and one recently approved to be impacted by a new mine at Koolyanobbing Range (<i>Tetratheca erubescens</i> at F deposit) are being compromised. The submitter does not believe it is sound environmental practice to allow all or most of the endemic <i>Tetratheca</i> species on BIF ranges in the Regional study area to be impacted by mining,	MRL notes the submitter's concerns in relation to <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> and <i>Lepidosperma</i> <i>bungalbin</i> . MRL has reviewed its proposed footprint (the "Section 43A" footprint) and has reduced the proposed on both of these taxa. Under the revised footprint, direct and indirect impacts on <i>T. aphylla</i> subsp. <i>aphylla</i> will be 17,346 plants or 19.7 % of the known population, reduced from a proposed impact of 29.4 % outlined in the PER. Furthermore, MRL is proposing a staged approach by which only 7.5 % of plants can be taken (Stage 1) with the remainder (Stage 2) only available to MRL if the company meets criteria determined by the Minister for the Environment. Direct and indirect impacts on <i>L. bungalbin</i> will be reduced to 3,806 plants or 8.3 % of the known population. Under the staged approach, only 4.5 % of plants can be taken in Stage 1. Regarding the 20 m buffer, MRL notes the support in this submission for this approach to the assessment. For clarity, the assessment is based on removal or loss of all plants within an open pit footprint plus the pit surrounds (area between the pit edge and the abandonment bund) plus a 20 m buffer outside of the abandonment bund.



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		particularly in a time of climate change where the occurrence of droughts may occur more frequently. For such specialised species to survive times of drought it is most advantageous to have individuals in as many different BIF habitats as possible, where some plants have a greater chance of surviving or maintaining condition due to greater water availability and less exposure (e.g. to sun and winds), factors that relate to substrate and position on the landform. Removing whole sections of a population is likely to have some deleterious effects on survivorship and seedling recruitment – key factors in population dynamics of a population.	The distance between the pit edge and the abandonment bund will depend on the setback required when applying the DMP guidelines for abandonment bunds in the context of detailed geotechnical assessment but will be a minimum of 10 m at the pits full extent. The response to Issue 1 provides a full response to the issue of the buffer.
		Although the impacts are less than 50% of the population they are close to or greater than 30% of the respective populations. There is the possibility that following intensive exploration of Bungalbin East to define the ore deposit that the mine pit design could change significantly. These calculations for direct impacts on these two species must surely be a guide at best.	
		The submitter agrees with the 20 m buffer at the mine pit edge and the assumption that these plants will most likely not survive in the long term at the mine pit edges. While Cliffs Asia Pacific is correct, as cited in the PER, that rainfall is the main contributing factor to deaths in the <i>Tetratheca paynterae</i> subsp. <i>paynterae</i> population, at the mine pit edge within 20 m buffer areas the combination of drought, high dust loads and increased exposure contributes, in the submitters experience, to higher death rates and lower rates of recruitment, and	



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		these trends could continue for the life of the mine pit (active or inactive). The caution is that this effect, in some circumstances could be greater than a distance of 20 m from the mine pit edge. These risks are considered unacceptable for a BIF range, such as HAR, where the landform and conservation values are so high.	
116	Helena and Aurora Region Advocates Inc.	Accuracy of vegetation communities mapped within the PEC for HAR can lead to misconceptions of the real impact on habitat types. Defining vegetation boundaries based on dendrogram analysis of vegetation quadrats is clumsy and can lead to some inaccurate vegetation mapping. In the submitter's experience, dendrogram analysis is not reliable in defining vegetation types or communities when based on presence/absence of plant species from quadrat data, where the dominant species are not identified (a crucial character in defining vegetation communities). Identifying the different vegetation communities in the field is more accurate followed by collecting quadrat data within the defined polygons and then conducting a dendrogram analysis to determine how consistent the vegetation communities are. Both require extensive ground-truthing and an understanding of what makes up a vegetation community (an acquired skill). Regardless, it is assumed that these factors do not affect the defining of the PEC boundary nor the impacts calculated on the PEC.	MRL and ecologia understand the limitations of describing vegetation units based on hierarchical cluster analysis, especially with such a large regional dataset. However, delineation of vegetation units was conducted according to the recommend methodology for Level 2 surveys (both EPA Guidance Statement No. 51 (2004) and EPA/DPaW Technical Guide - Terrestrial Flora and Vegetation Surveys (2015)), that is by the use of floristic composition vegetation classification. The use of presence-absence data, and the exclusion of annual taxa, was necessary in this case as the dataset comprised quadrat data from numerous regional surveys that had been conducted during different seasons. Therefore, the estimated cover or dominance of species between quadrats and between surveys were not necessarily comparable, and could not be included in the analysis.
117	ANON-TWYQ-WPHW-U	While the proposal directly affects only part of the range,	MRL notes the submitter's concerns in relation to



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		the limited geographic footprint of the range, being only some seven km in length and narrower in width, means any loss of habitat jeopardises the integrity of the whole remaining section. This is especially the case since the declared rare, critically endangered and priority flora species are found primarily in only the elevated parts of the range which are quite limited in area and confined to the exposed BIF geology. Namely, <i>Tetratheca aphylla</i> , <i>Banksia (Dryandra) arboria, Leucopogon spectabilis</i> and others such as <i>Lepidosperma bungalbin</i> (Bungalbin Sword Sedge). Since these species are endemic to the HAR, their preservation must be of the highest priority. Given the confined geographic range of these plants, any loss of habitat reduces the genetic variability and increases risk of population collapse due to events such as disease, hot wildfire, extreme temperatures, and drying climate with global warming. Further to this, the distribution of plants is also affected by micro-climate variations across the HAR. This includes variations in aspect such as north/south facing slopes with concomitant differences in rainfall and evaporation, east (morning sun) and hotter west facing slopes as well as hill top locations. Added to this are subtle changes in surface geology resulting in diverse ecosystems. Mining will reduce the diversity of micro-climates and geology. While it can be argued that the mine will be confined to only one geographic location, this ignores the fact that the area chosen for the mine has been done on the basis of geological surveys identifying particular geologies higher in iron and lower in "impurities", meaning differing proportions of rock chemistry that	Tetratheca aphylla subsp. aphylla, Banksia arborea, Leucopogon spectabilis and Lepidosperma bungalbin. MRL has reviewed its proposed footprint (the "Section 43A" footprint) and has reduced the proposed on both of these taxa. Under the revised footprint, direct and indirect impacts on <i>T. aphylla</i> subsp. <i>aphylla</i> will be 17,346 plants or 19.7 % of the known population, reduced from a proposed impact of 29.4 % outlined in the PER. Furthermore, MRL is proposing a staged approach by which only 7.5 % of plants can be taken (Stage 1) with the remainder (Stage 2) only available to MRL if the company meets criteria determined by the Minister for the Environment. Direct and indirect impacts on <i>L. bungalbin</i> will be reduced to 3,806 plants or 8.3 % of the known population. Under the staged approach, only 4.5 % of plants can be taken in Stage 1. The impact on <i>L. spectabilis</i> will be reduced by avoiding a small sub-population at the northern extreme of its range and the impact on <i>B. arborea</i> will be reduced by over 2%. The comments in the submission micro-climates, soil types and related small scale variations are noted. It is important to remember that only a small section of the HAR, just over 5%, is proposed for mining.
		I layour mining but which also influence the distribution of	



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		flora, fauna and micro fauna species, i.e. the mine will reduce the number and variety of micro climates, soil types, and their associated ecosystems. Apart from the actual range, there are priority species in the lower slopes and surrounding region which would be impacted by any development associated with the mine operations.	
118	ANON-TWYQ-WPHW-U	There is the risk that even with mandatory wash-down, fungal diseases including various <i>Phytophthora</i> spp may be introduced by trucks utilising haul roads associated with the proposal.	MRL's Weed Hygiene and Management Procedure requires wash-down prior to arrival at site. Site wash down facilities will be used for maintenance of vehicles and earthmoving equipment and for removal of any soil or vegetative material prior to leaving site.
119	ANON-TWYQ-WP4W-7	The PER states "that the Proposal will have a significant residual impact on only one factor - flora and vegetation." This oversimplifies the situation. 'Flora and vegetation' is not a single factor. This single phrase includes so many components, including multiple species and their interactions; dynamic relationships between soil, water, plants and animals; resilience of an ecosystem to variability in the environment and climate; habitat requirements; generation times for plant and animal species. This complex reality has not been addressed in the PER.	Environmental impact assessments in Western Australia use factors determined by the Environmental Protection Authority (EPA 2015) ⁶² to ensure a common approach is used between different assessments. However, MRL accepts that impacts on flora and vegetation have implications for other aspects of the environment. The issue of 'interconnectedness' is discussed in the response to Issue 60.
120	ANON-TWYQ-WPBH-6 ANON-TWYQ-WP18-5 BHLF-TWYQ-WP1A-E	 The submitters object to the proposal based on: land clearing of up to 611 ha being a significant impact for a mine with a short life span; 	Objections noted. The impact assessment has attempted to put the potential impacts in context and has identified that there are significant residual impacts. MRL has made an initial offer of offsets to counter these



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		 Threatened flora, endemic flora and Priority taxa (PEC) would be lost; a total impact of 2,055 ha of native vegetation, including the removal of 208 ha of vegetation on BIF and 403 ha of other native vegetation communities in the HAR; and 3.8 km of BIF range in total would be removed. 	impacts. Note that the area of 2,055 ha is the size of the development envelope. This is the area in which the disturbance will occur but does not represent the extent of the disturbance, which is 575 ha.
121	ANON-TWYQ-WP18-5	The submitter considers that the complete removal of sections of BIF from the HAR is not acceptable from an ecological or evolutionary perspective. Research carried out at Kings Park has shown that populations of <i>Tetratheca</i> present on a BIF range are genetically different from those on other BIF ranges. Due to isolation, populations evolve separately on each fragment of BIF range. This evolutionary process has resulted in each BIF range retaining a unique set of plant species and subspecies each adapted to that specific range and genetically isolated from other ranges. BIF generally is thus known to produce plant evolutionary and endemism hotspots and retain high genetic diversity and disparity. Further detailed research on BIF in the HAR is thus expected to reveal additional endemic species and subspecies of flora, including cryptic endemism which is best detected by genetic methods.	MRL acknowledges that the <i>Tetratheca</i> species present at Bungalbin is different to those on other BIF ranges and that the submitter has correctly described the likely evolutionary process involved. The conservation values of the Proposal area are not contested. The assessment is seeking to determine whether the mine could proceed and, if so, the measures that can be adopted to reduce the impacts on conservation-significant taxa such that the objectives of the EPA can be met.
122	ANON-TWYQ-WP18-5	The submitter is concerned that in addition to direct impacts on the native vegetation that will be removed or substantially modified by the proposal, the proposal would result in the construction of a network of haul roads crossing the surrounding woodlands and	MRL acknowledges that roads can be a disruptive influence on the local ecology. In this instance, however, haul roads will be temporary and are not expected to have a long term material impact on fauna movement or disruption to pollinator activity and seed



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		sandplains. These would change movements of fauna, disrupt pollinator and seed disperser movements so affecting flora, and thus modify the ecological and evolutionary integrity of both flora and fauna across the ecosystem.	dispersal. All haul roads will be rehabilitated when mining is complete. Some access tracks may be retained for inspection and monitoring purposes. In the longer term, these tracks would also be rehabilitated unless their retention is required for future land uses such as visitor access.
123	Toodyay Naturalists Club	The submitter considers that the proposal, which is located within the highly intact HAR (99.6%), as described in Table 6-2, is supported by the following information presented in Section 3.2.1 of the PER: <i>"Within the published scientific literature on BIF ranges,</i> <i>there is recognition of two centres for endemic and BIF</i> <i>specialist taxa (otherwise called hotspots), with one of</i> <i>these hotspots being centred on the HAR (Gibson, et al.,</i> 2012). These hotspots broadly coincide with the <i>transitional area between the species-rich SWAFR</i> [South-western Floristic Region] and the more arid <i>interior</i> ". <i>"the highest priority area for conservation would be the</i> <i>two identified concentrations of ironstone specialists</i> [one of which is the HAR]" However, <i>"most of the existing and proposed mines</i> <i>occur within the identified hotspots and that conserving</i> <i>these unique ecosystems will present considerable</i> <i>challenges."</i>	The conservation values of the Proposal area are not contested. The assessment is seeking to determine whether the mine could proceed and, if so, the measures that can be adopted to reduce the impacts on conservation-significant taxa such that the objectives of the EPA can be met.
124	Toodyay Naturalists Club	The PER notes in Section 5.2.2 that the Species Distribution Model output indicates that species richness and local endemism were most strongly influenced by local-scale micro-topographic variability.	The proposed mine plan includes retention of the westernmost face of the ridge so the degree of solar radiation received by the western, central and southern faces should be unchanged.



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		The submitter notes that this influence was strongly positive on the western, central and southern slopes of the HAR but much less so on north-eastern summits, presumably because these surfaces afford less protection from solar radiation. The submitter is concerned that any increase in solar radiation as a result of the proposal may have a marked effect on the flora to the western, central and southern slopes of the HAR. There are seven BIF associated Priority flora that are endemic to the HAR and one other endemic to the HAR (not BIF associated).	
125	Toodyay Naturalists Club	The submitter is concerned that implementation of the proposal may eliminate Threatened or Priority-listed Flora that are not known to science. The use of surveys for the Jaurdi Uplands and the Jackson Range does not necessarily provide evidence of their presence in the HAR.	The possible existence of taxa within the Proposal area that have not yet been recorded cannot be dismissed. Nor can future changes in taxonomy which might result in new taxa not previously recognised. However, the area has been extensively surveyed by specialist botanists on behalf of MRL and by others, both contract and government botanists (see Appendix 5-A p8 for a summary). The surveys conducted on behalf of MRL meet the EPA's requirements for biological survey for impact assessment, in particular EPA (2004). ⁶³ The Proposal can only be considered on the available information at this time. See also response to Issue 110.
126	Toodyay Naturalists Club	The submitter is concerned about the extent of significant impacts to <i>Leucopogon spectabilis</i> as a result	MRL acknowledges that <i>Leucopogon spectabilis</i> is a highly restricted species which is very unlikely to occur

⁶³ EPA 2004. Terrestrial flora and vegetation surveys for environmental impact assessment in Western Australia. Guidance for the Assessment of Environmental Factors No. 51. Environmental Protection Authority, Western Australia.



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		 of the proposal. The concerns are increased because: this taxon is not known to occur beyond the HAR; the entire extent of <i>L. spectabilis</i> are one population and therefore any impact to this population is considered significant; and while all plants of this threatened flora are within conservation tenure, i.e. the MMHARCP, they are all also covered by mining tenure. 	outside of the known population. However, surveys conducted by MRL have identified a 14-fold increase in the population than was previously known. The direct impact on this taxon is estimated at less than 1%.
127	Toodyay Naturalists Club	 The submitter is concerned about the extent of significant impacts to <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> as a result of the proposal. The concerns are increased because: this taxon is not known to occur beyond the HAR; while all plants of this threatened flora are within conservation tenure, i.e. the MMHARCP, they are all also covered by mining tenure; and a residual impact will result to over 26,000 <i>T. aphylla</i> subsp. <i>aphylla</i> (29.4%). 	<i>Tetratheca aphylla</i> subsp. <i>aphylla</i> is indeed restricted to the HAR, although it is locally common. MRL has considered its potential impacts on this taxon and has proposed a reduced footprint (the "Section 43A" footprint) which will reduce the impact (from 29.4% to 19.7%).
128	Toodyay Naturalists Club	The submitter does not support comments in Section 5.3.1 (page 5-47) of the PER that the viability of plant communities and flora remaining after land clearing <u>may</u> be reduced by fragmentation. Four key taxa (two threatened and two priority) with the highest conservation significance would be directly impacted by the proposal, however Table 5-17 states there <u>may</u> be some potential impact.	Potential adverse impacts from fragmentation are by no means assured. The impact assessment assumed the loss of all conservation-significant plants occurring within the pit footprint and within a 20 m buffer outside of the footprint. In practice, many of these plants will remain. Even if all the plants were removed, the extent to which this will impact on the remaining plants is not clear, especially considering that the local populations are already 'fragmented' to some degree by their habitat preferences. PER Figures 5-12, 5-14, 5-16 and 5-19 all show that the four key taxa already occur in separate sub-populations as their preferred habitat is



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			discontinuous.
129	Wildflower Society of WA ANON-TWYQ-WPBH-6 Toodyay Naturalists Club	Table 3-2 of ecologia 2016 (page 25) of Appendix 5A of the PER identifies that the flora and vegetation surveys were completed in October which is too late for this area. The regional BIF dataset was collected in July, which was closer to the correct time to survey. The peer review (Appendix 5-B page 2) identified the seasonal anomaly, although it did seek to then downplay it. This is likely to be partly why the plots were substantially less species rich than the Helena and Aurora plots in the regional BIF dataset (the other common reason for low plot species richness is a lack of rigour in collecting data). Ecologia (2016) recorded an average of 15.8 species per plot, while the regional BIF survey for the HAR recorded 24.8 species per plot. This is a large anomaly. There is no point to completing plot-based surveys if the data is not comprehensive. It is effectively a Level 1 not a Level 2 Survey.	The seasonal anomaly identified in the peer review (PER Appendix 5-B page 2) <i>"is likely to be partly why</i> <i>the plots were substantially less species rich than the</i> <i>Helena and Aurora plots in the regional BIF dataset (the</i> <i>other common reason for low plot species richness is a</i> <i>lack of rigour in collecting data)"</i> . Additionally, the peer review states that while the survey was conducted fairly late in the season (and therefore was potentially sub- optimal) it was conducted during the appropriate season, and that <i>"annuals are strongly affected by</i> <i>seasonality in the region (i.e. whether there has been</i> <i>recent rain or not)"</i> (PER Appendix 5-B page 2). Fifty-five annual taxa were recorded in quadrats by ecologia (81 annual taxa were recorded across the entire study area), while Gibson <i>et al.</i> (1997) recorded approximately 104 annual taxa, suggesting slightly suboptimal seasonality for detecting annual taxa during the ecologia surveys.
			Regarding perennial taxa, Gibson <i>et al.</i> (1997) indicate that perennial species richness for their community type 1 was 14.7 taxa per plot, community type 2 was 13.6 taxa per plot, community type 3 was 10.5 taxa per plot, community type 4 was 7.6 taxa per plot, and community type 5 was 13.1 taxa per plot. Therefore, perennial species richness was higher, on average, in ecologia quadrats (14.7 perennial taxa per plot). The higher average perennial species richness in the ecologia quadrats indicates that annual taxa account for the differences in plot species richness between the



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			ecologia and Gibson et al. (1997) surveys, and suggests that slightly suboptimal seasonality, rather than lack of rigour, as the primary reason for these differences.
			The regional cluster analysis conducted by ecologia and that conducted by Gibson et al. (1997) included only perennial species, and perennial species richness within quadrats is comparable between the two surveys. The lower annual species richness present in the ecologia quadrats, therefore, does not impact on the analysis, interpretation, and mapping of vegetation units within the study area.
			According to both the EPA/DPAW Technical Guide (2015) and EPA Guidance Statement No. 51 (2004), the recommended timing for primary vegetation surveys in the South West and Interzone Botanical Province (where the Proposal Area is located) is during Spring (i.e. September -November). This corresponds with the timing of the October survey.
		Further to this it appears that the annual species were removed from the floristics analysis in ecologia (2016) due to the surveys being completed out of season. Floristics analyses weight all species equally which means that annual species are just as important as perennial species in quantifying what plant communities are present and what their distribution and conservation significance is. The peer reviewer did not point this out. The peer review also demonstrated a misunderstanding of what a floristic analysis is. Via such statements as; <i>"Floristics (i.e. species composition) rather than vegetation (i.e. structure) has been articulated as a</i>	The submission misunderstands the approach to the floristic analysis. Annual species were necessarily removed in the regional analysis because the data included was collected at different times of the year over multiple survey seasons and across a long time period. It is standard practice to only include perennial species in floristic analysis when surveys are undertaken at different times of the years as inclusion of annual species, which may or may not be present, will skew the results. This methodology accords with that recommended in the Technical Guide 2015 and is the reason the "peer reviewer did not point this out".


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		priority in vegetation mapping in all discussions that I have been party to" A floristics analysis is one of the primary tools that underpins vegetation science, it isn't about species it is entirely about vegetation.	
		"When vegetation units are defined at a higher level of resolution they are likely to be less broadly distributed and less well conserved" (ecologia, 2016 page 110). It is the sole purpose of a Level 2 Flora and Vegetation Survey to assess the vegetation at this higher 'level of resolution'. This lack of detail should trigger the precautionary principle, as it means that no one knows what vegetation is present in the survey area and what its true distributional and representational status actually is. Using Beard (1972) to demonstrate regional representation in this case is inappropriate as it is too broad. There was not the usual excuse for why this was not done, as a regional plot dataset was available for comparison, something that is not available for most areas of the state.	The assessment of regional significance of vegetation units of Beard (1972) at the study area (pp. 109-110) should only be interpreted in relation to the broader Beard (1972) units, and should not be interpreted as an assessment of regional significance of the vegetation of the HAR mapped as part of the current Flora and Vegetation Assessment (pp. 114-118). The Flora and Vegetation Assessment Report (PER Appendix 5-A) indicated that the vegetation units associated with the HAR are largely restricted to those ranges, and are not well-represented elsewhere. The proposed revised extent of the Helena and Aurora vegetation complexes (banded ironstone formation) PEC in the Flora and Vegetation Assessment report includes the entirety of the Helena and Aurora ranges (with the exception of low ranges immediately to the east) and also includes some hills outside of the study area immediately to the west (Fig. 9.50). In an assessment of regional vegetation significance based on available data, the consultant indicated that: <i>"The thirteen vegetation units considered to be components of the Helena and Aurora Range vegetation complexes PEC are likely to be restricted to the study area and adjacent ranges" (p. 114); and "Vegetation units PSRN1, PSRN6, PSRN7, PSRN20, PSRN23 and PSRN24 which were six of the units considered components of the Priority 1 Helena and Aurora Range vegetation</i>



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			complexes (banded ironstone formation) PEC were found to be the least widespread and least well represented outside the study area in a regional context. Vegetation unit PSRN23 is not present outside of the study area at all." (p. 122).
		Flora Report The flora report contained the following errors: • Simple errors and misidentification of common species including: • Casuarina pauper (saline, dry land) identified as Casuarina obesa (saline,	This is potentially a misidentification. Both taxa are widespread.
		 Eucalyptus vittata (mallet) identified as Eucalyptus sheathiana (mallee) 	<i>E. vittata</i> was not recorded in the surveys conducted by ecologia. <i>E. sheathiana</i> has been previously recorded at Helena and Aurora Ranges (e.g. see Gibson <i>et al.</i> 1997).
		 Acacia sp. Mount Jackson (B. Ryan 176), similarities to Acacia collegialis (Nuytsia 24, 149-152). 	<i>Acacia collegialis</i> was not recorded by ecologia from the study area, and is not on the species list.
		 Atriplex bunburyana is listed as Atriplex vesicaria throughout reporting. 	Surveys did not record <i>Atriplex bunburyana. A. vesicaria</i> has been recorded at Helena and Aurora Ranges (e.g. see Gibson <i>et al.</i> 1997)
		 Eremophilia rugosa listed, should be Eremophilia sp. McDermid Rock P1. 	Refer to the response to Issue 110.
		Anomalies	
		 A Jacksonia sp. is reported. There are no known Jacksonia spp. on the HAR. Only Jacksonia Jackson P1 on Central Jackson 	This may be a misidentification due to poor plant material – the specimen probably belongs to the Fabaceae family.

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		range. Which is this one?	
		 Acacia coolgardiensis subsp. effuasa and Acacia effusifolia are both listed however, they are the same taxon. 	This may be a data entry error. <i>Acacia effusifolia</i> is the current name, <i>Acacia coolgardiensis</i> subsp. <i>effusa</i> is a synonym.
		 Phebalium conaliculatum x filifolium is listed, however, Phebalium filifolium is not listed separately. 	The species list is based on specimens recorded and collected by staff within the study area. <i>P. filifolium</i> is not listed as it was not recorded or collected during the survey, although it may potentially occur.
		o Omissions	
		 Ecologia did not record Acacia shapelleae P1 within the Bungalbin East orebody area in their surveys, only report previous records within (Figure 9-20). This species shown as abundant outside the orebody areas requires verification. 	Numerous transects were traversed through the proposed impact areas to search for conservation significant species, including targeted searches for <i>A. shapelleae</i> . No individuals of this taxon were recorded.
		 Atriplex stipitata, Beyeria sulcata not included. 	<i>Beyeria sulcata</i> is included in the species list. Also, the species list is based on specimens seen and collected by botanical survey personnel within the study area. <i>Atriplex stipitata</i> is not listed as it was not recorded or collected during the survey.
		 No discussion on the significance or regional distribution of <i>Acacia aff.</i> <i>Jibberdingensis aff. Flat</i> phyllode form. This may be a new taxon. 	Specimen identified by WA Herbarium's Dr Bruce Maslin (taxonomic specialist for <i>Acacia</i>), who did not at the time communicate that this was a new taxon. This was only recorded in the northeastern-most hills within the study area, and well outside impact area. A specimen has been retained by ecologia and can be lodged as required.
		 No discussion of the anomalous habitat and presence of <i>Conostylis argentea</i> or 	MRL recognises that <i>Conostylis argentea</i> at HAR is at the limit of its range and is therefore considered

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	sue No. Submitter	that its presence represents a limit of range at HAR.	significant. However, note that no specimens of the taxa were lodged with the WAH as there are three representative specimens of this species from the HAR already at the Western Australian Herbarium (PERTH 2011492, PERTH 5393191, PERTH 5363314). Therefore records from the <i>ecologia</i> surveys are not considered new populations, range extensions or otherwise anomalous and as a consequence there was no requirement to lodge any collected specimens.
		 No discussion of <i>Melaleuca leiocarpa</i> on BIF and contrasting with that on the sandplains nearby. 	This is an informal name for a taxon that was not current at the time of the survey.
		 Caladenia sp. listed, no species name. 	Due to insufficient vegetative, flowering or fruiting material the identification of some specimens could not be unambiguously made.
		 Grevilia?eriostachya listed. A common enough species, why is it not identified fully. 	Due to insufficient vegetative, flowering or fruiting material the identification of some specimens could not be unambiguously made.
		 Hakea?preissii listed. 	Due to insufficient vegetative, flowering or fruiting material the identification of some specimens could not be unambiguously made.
		 Philotheca brucei subsp. brucei and subsp. brevifolia are listed. The former is more northerly distribution. It is unlikely that both occur here. 	This may be a data entry error.
		 Eremophilia granitica listed. No discussion of the anomalous features of the E.aff.granitica that is common on the BIF range. 	This is an informal name for a taxon that was not current at the time of the survey.

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		 Only 4 <i>Phebalium</i> species are listed. There are at least 5, perhaps as many as 7 species, present within the BE portion of the range. 	The species list is based on specimens recorded and collected by staff within the study area. P. <i>filifolium</i> is not listed as it was not recorded or collected during the survey, although it may potentially occur.
		In Table 4-12 (pages 95-96, ecologia 2016) it states that 84% of the flora has been sampled and recorded. This leaves 16% unaccounted for. In areas such as BIF ranges with the high known endemism, the 16% could contain any number of potentially conservation significant flora.	The species accumulation curve (SAC) analysis only includes floristic data collected from quadrats (see PER Appendix 5-A, Section 4.1.2), and does not consider records made opportunistically outside of them. Therefore, the proportion of plant species recorded is likely to be greater than that suggested by the SAC.
		Vegetation Condition Figure 9-47 (ecologia, 2016 p. 183), what was the basis was for downgrading the condition to 'Very Good' across large parts of the survey area. In the raw plot data, the condition was downgraded to 'Very Good' in numerous sites, where there was no disturbance noted apart from unspecified 'faeces' and no weeds were recorded. Where no disturbance was specified, the condition allocated was 'Excellent', when no disturbance equates to 'Pristine'. In some plots they were downgraded to 'Good' on the basis of low grazing and few weeds. 'Good' vegetation is supposed to be highly disturbed and modified. This scale was developed for the Swan Coastal Plain, its origin needs to be understood to be used properly. It was not used correctly here, thus substantially underestimating and misrepresenting the intactness of the vegetation present. This is a problem not only in terms of underestimating the conservation significance of the area but it also leaves a false record for posterity.	MRL accepts the consultant's interpretation of vegetation condition which recorded 149 quadrats assessed as in excellent condition (76%); 43 in very good condition (22%); and five in good condition (3%). There is general agreement that the area is largely undisturbed and that the native vegetation is intact or almost intact.



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		<i>Tetratheca aphylla</i> Comparisons of the Tetratheca species at Windarling and the HAR are problematical. Tetratheca paynterae subsp. paynterae has been more extensively studied and monitored than Tetratheca aphylla subsp. aphylla however the mining company has denied access to the Tetratheca paynterae subsp. paynterae for nearly a year so a full census has not been able to be undertaken to determine the long-term impact of mining on that species. The last full census was we believe done more than five years ago so current information on the longer term impacts of mining is not available. Until the next census is undertaken (shortly) no comparisons should be drawn to the success of this species at Windarling.	Cliffs provided a detailed review of <i>Tetratheca paynterae</i> subsp. <i>paynterae</i> in their F Deposit PER (Appendix 7) in 2015. The review includes over ten years of monitoring data up to 2014. In their response to submissions on the F Deposit proposal Cliffs stated that: <i>"the population remains healthy and viable after</i> >10 years of mine operations, with the key outcomes identified including the maintenance of <i>population health, flowering/fruiting continuing, and</i> <i>germination of new individuals within the</i> <i>population"</i> . In relation to the assessment of potential indirect impacts, more information has been provided on the approach taken (see the response to Issue 1).
130	ANON-TWYQ-WP4A-H Toodyay Naturalists Club 288 Wildflower Society of WA ANON-TWYQ-WPBH-6	 The submitters are concerned with the extent of residual impacts (both direct and indirect) from the proposal on Flora and Vegetation: 28.5% take of Tetratheca aphylla subsp aphylla (T); 39.7% take of Lepidosperma bungalbin (P1); 18.2% take of Banksia arborea (P4); 12.3% take of Acacia adinophylla (P1) (1,000 plants of this taxon not known outside HAR); 11.3% take of Stenanthemum newbeyi (P3); 51,490 plants of P3 and P4 flora as shown in Table 5.11 may be represented in reserves or proposed reserves, these may be years away or may never happen; 10% loss of the total population private allele representation in T. aphylla subsp aphylla from the 	MRL notes the submitters concerns. Each of the impacts listed in the submission is discussed within the PER. In response to the various submissions, MRL is proposing a modified footprint (the "Section 43A" footprint) to reduce the impacts on most species and vegetation communities. Under the revised footprint, <i>Lepidosperma bungalbin</i> does <u>not</u> meet the critieria required for classification as Vulnerable (see appendices for Bioscope report addressing revised footprint). Regarding rehabilitation, MRL acknowledges its inexperience at a corporate level in the rehabilitation and management of conservation-significant flora and vegetation. It is difficult to obtain this experience unless active in areas which feature such flora and vegetation. There is such experience, however, within academic, scientific and consulting organisations in Western





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		 pit alone; vegetation unit PSRN supergroup relative to other supergroups being 2.3% or 261.3ha (2.61 km²); 37.2% and 31.2% take of restricted BIF vegetation communities PSRN6 and PSRN7, constituents of the HAR PEC; Impacts to L. bungalbin result in a new listing as Vulnerable under IUCN criteria; L. bungalbin plants proposed to be removed belong to a distinct genetic cluster that would not be removed in its entirety but would be substantially reduced; removal of 18.8% of Dryandra arborea, most of these are extremely old as they occur in areas never burnt; over 611 ha (6.11 km²) including a reduction in extent of vegetation clearing for pits within the HAR PEC and on the landform. These impacts are unprecedented for a BIF proposal, or possibly for any mining proposal. With poor performance in rehabilitation demonstrated across the mining industry particularly in the BIF, a lack of rehabilitation/restoration experience of the proponent and considering the complex species and communities associated with this proposal, these residual impacts cannot be mitigated or offset. Therefore, the EPA's objective for Flora and Vegetation cannot be met. 	Australia and MRL would seek to draw on this experience. With regard to the wider industry performance, we don't believe "poor performance in rehabilitation demonstrated across the mining industry particularly in the BIF" is accurate. While current infomration has proven difficicult to obtain, there are some examples of successful re-establishment of conservation-significant species (see Attachment 5, Table A5-5). The most recent vegetation monitoring report from MRL's Carina Project is also included (Appendix K). There is enough evidence to demonstrate rehabilitation can be successful and MRL would be happy to be receive conditonal approval in this regard. To provide more confidence, MRL's modified footprint (the "Section 43A" footprint) also offers a staged approach whereby the northern portion of the Bungalbin ore body can only be accessed subject to MRL meeting criteria determined by the Minister for the Environment. There is no part of the Proposal that suggests any species would need to be preserved at Kings Park because it is lost in the wild.



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		endangered species and the resultant need to preserve these species in Kings Park as ironic.	
131	ANON-TWYQ-WPFS-N	 In relation to PER section 'Conclusion Residual Impacts' the submitter comments that they could not find the management plans in relation to the residual impacts on: the Helena and Aurora Range Vegetation Complexes (Banded Ironstone Formation) PEC; and the PSRN Vegetation Supergroup and two individual PSRN vegetation units. Similarly, the submitter queries why recovery plans to manage the direct and indirect impacts on <i>Lepidosperma bungalbin</i> and <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> have not been prepared. 	A draft Conservation Significant Species & Communities Management Plan was included in the PER (Appendix 5-H). A revised plan (Appendix C) is attached to this document. The revised plan has been amended in response to submissions. Recovery Plans are normally prepared by the Department of Parks and Wildlife although external funding and specialists may be used. MRL (PER p13-5) has offered funding to prepare and implement: An Interim Recovery Plan for <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> , and A Research Plan and an Interim Recovery Plan for <i>Lepidosperma bungalbin</i> . With the revised footprint, the requirement for plans for L. <i>bungalbin</i> has been reduced and MRL has proposed alternative offsets.
132	Toodyay Naturalists Club	The submitter notes that many of the vegetation units support Threatened or Priority-listed Flora and there is a large range of representation of conservation significant flora in the vegetation units as shown in Table 5-5 of the PER. These taxa are most strongly represented within the PSRN ["Plains, BIF slopes and BIF ridgetops with <i>Neurachne annularis</i> "] vegetation units.	Noted, the data supports this observation.
133	Toodyay Naturalists Club	Table 5-7 of the PER in relation to the fire history of the vegetation in the study area it is noted that 62% has no evidence of fire, 36% not burnt within the past five year (only 2% burnt between 2 and 5 years ago).	MRL does not propose to conduct burning at any stage of the operation. Indeed MRL has in the past provided fire fighting and mitigation capability into the region.



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		The PER states "The presence of the mining operations introduces further potential sources of fire. As the response to fire in many of the taxa recorded in surveys is unclear, maintenance of a 'natural', infrequent fire regime will be the aim of management measures". The submitter is concerned that 'infrequent fire regime' that 'maintenance' will entail deliberate burning.	
134	ANON-TWYQ-WPFH-A	Submitter was unable to find the vegetation mapping report by the consultant that was done as part of the proponent's proposal. The submitter (a botanist) would like to compare the vegetation map with the six plant communities identified by Gibson <i>et al</i> (1997).	Vegetation mapping was included in the PER (Appendix 5-A, Figures 9.36-9.46; also Figures 5-3 to 5.9 within Section 5 of the PER).
135	WA Native Orchid Study and Conservation Group Inc. ANON-TWYQ-WPB3-H	 The WA Native Orchid Study and Conservation Group (WANOSCG) have confirmed the presence of a number of orchid species that occur throughout the area. "Orchids recorded in 2016 at the HAR (either in bud or flowering that could be identified) included: Caladenia saxicola; Caladenia incrassate; Caladenia sigmoidea; Cyanicula amplexans; Pterostylis sp 'inland'; Pterostylis sp 'greasy'; Pterostylis sp sp 'straight tops'; and Thelymitra aff petrophylla. None of these are DRF or priority orchids, but one would have to list <i>Caladenia saxicola</i> as significant given this 	Three of the orchid species referred to in the submission were recorded by ecologia. Other species listed in the submission may not have been identified during the surveys due to poor seasonal conditions for orchids or local scarcity of those species. While every effort was made to record all species present within the study area, it is acknowledged that some species may not have been recorded as a result of the aforementioned reasons. If the Proposal is approved, approximately 95% of the BIF habitat at the HAR will remain.



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		orchid usually grows on banded ironstone hills which are the target of iron ore mining so their habitat is being destroyed. Also, these <i>Caladenia's</i> are the only Spider Orchids at the extreme end of their usual range and some of the habitat needs to be conserved for the future of the orchid.	
		The WANOSCG field trip only covered a very small portion of the Range. However, there are likely to be many more different orchids in the area. For example, there may be at least a few more <i>Pterostylis rufa</i> varieties that might be found there.	
136	ANON-TWYQ-WPBX-P	The genetic history of species found on the range including a Banksia ⁶⁴ and a Grevillea ⁶⁵ point to long periods of population isolation and divergence across these sites, a feature likely to be representative of species occurring on this isolated feature today. It is vital to be able to preserve the genetic diversity and divergence that characterises species of this range, particularly in view of the destruction occurring as a result of mining on nearby features including Mount Jackson and the already impacted Windarling range.	The occurrence of divergence was noted in the genetics assessment (PER Appendix 5-E) which stated (with MRL's emphasis): "If the impact of local mining on dispersal vectors of A. adinophylla, L. bungalbin and T. aphylla subsp. aphylla is minimal beyond the 20 m buffer zone, any genetic effects on increasingly fragmented sites or sites with reduced individuals may be limited because isolation and small genetic neighbourhoods appear to be a feature of many, short range, <u>BIF endemics"</u> (e.g. Butcher et al. 2011). MRL interprets this to mean that it is important to retain isolated populations because they are likely to be

⁶⁴ Nistelberger, H. M., Byrne, M., Coates, D., & Roberts, J. D. (2015). Phylogeography and population differentiation in terrestrial island populations of Banksia arborea (Proteaceae). Biological Journal of the Linnean Society, 114(4), 860-872.

⁶⁵ Nistelberger, H. M., Byrne, M., Coates, D. and Roberts, J. D. (2015), Genetic drift drives evolution in the bird-pollinated, terrestrial island endemic Grevillea georgeana (Proteaceae). Bot J Linn Soc, 178: 155–168. doi:10.1111/boj.12270



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			genetically distinct from populations elsewhere. The Proposal does not involve the removal of any distinct populations of any species. See also response to Issue 9.
137	BirdLife WA Toodyay Naturalists Club ANON-TWYQ-WPZS-9 ANON-TWYQ-WPFU-Q ANON-TWYQ-WPFR-M ANON-TWYQ-WPF6-R ANON-TWYQ-WP2D-J ANON-TWYQ-WP2C-H	 The mining proposal cannot maintain representation, diversity, viability and ecological function of flora and vegetation on the HAR at the species, population and community level as it involves the removal of landform and habitat. Given that the HAR lies within a conservation park, with the purpose of "the proper maintenance and restoration of the natural environment [and] the protection of indigenous flora", this proposal is environmentally unacceptable. The proponent inadvertently supported this by acknowledging that their mining proposal would cause: 1. "Land clearing of up to 611 ha of flora and vegetation" (PER, Table 5-8, page 5-23) and "disturbance area of 611 ha" (PER, page 5-23). 2. "Land clearing associated with this Proposal will have a localised but significant impact on elements of the flora and vegetation at the HAR" (PER, page 5-61). 3. Removal of 0.9 and 29.4% of individual plants from two species of Threatened flora; 1.2, 12.3, and 39.7% of three species of P1 Priority flora; and 0.3-18.8% of nine species of P3 and P4 Priority flora (PER, Tables 5-20, 5-21, and 5-22, pages 5-22 and 23). 4. Permoval of 36.3 and 37.2% of two vegetation units 	MRL is aware of the purposes of a conservation park. The reserve type permits co-existence with mining tenure. This is a decision made by sucessive Western Australian governments. MRL disagree that the PER "downplayed the impact" of the Proposal. Indeed, it is impossible to do so due to the requirements of the Environmental Scoping Document (PER Appendix 1-B), the use of independent consultants and the requirement for peer reviews of key aspects of the impact assessment. MRL's view is that the impacts are very clearly presented in the PER. Regarding indirect impacts, the submission incorrectly states that these impacts were not quantified. MRL has based its assessment on removal of all plants within an open pit footprint (direct impacts) plus the pit surrounds (area between the pit edge and the abandonment bund) plus a 20 m buffer outside of the abandonment bund. MRL maintains the view that the main impact of the Proposal relates to the areas directly disturbed but has made allowance for the loss of plants outside of this area. In all other respects, the requirements of the Environmental Scoping Document have been met - a prerequisite for public release of the PER. This includes an assessment of the genetic diversity occurring within key plant taxa and the likely effect of the removal of





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		(PER, Table 5-23, page 5-53).	some of those sub-populations (PER Appendix 5-E).
		 Indirect impacts on flora and vegetation (PER, pages 5-45 to 52, PER). 	MRL agrees that weed introduction and spread has the potential to reduce the conservation values of the
		Despite these acknowledgements, the proponent still concluded that " <i>the EPA</i> 's objective for flora and fauna can be met" (PER, page 5-61), claiming that:	procedures to prevention weed introduction and to control any instances of local weed occurrence as detailed in MRL's week bygiene and control procedure
		 "Representation and diversity will be unaltered as there are no taxa, vegetation units or supergroups that will be removed" (page 5-61, PER). 	MRL-EN-PRO-0007 (PER Appendix 2-A). The PER describes how dust will be managed.
		2. "Although the Proposal will permanently remove a portion of habitat, the viability of taxa and vegetation within adjacent areas can be maintained through careful implementation of the Proposal and application of management measures to protect or enhance remaining populations" (page 5-61, PER).	
		 "Ecological function can be maintained within intact vegetation which will remain unaltered" (page 5-61, PER). 	
		 "While some plants will be removed directly to enable establishment of the operations, adjacent vegetation should remain intact with little or no disturbance, allowing ecosystem processes to continue" (page 5-47, PER). 	
		The proponent made these claims while providing little, if any, evidence to support them.	
		 "While the Proposal involves removal of individuals of threatened and Priority taxa, and of a small 	



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		proportion of a PEC, it also offers the opportunity to gain a better understanding of their ecology through research and monitoring" (page 5-61, PER).	
		2. "Through an offsets program, the Proposal offers an opportunity to achieve on-ground improvements elsewhere within the MMHARCP" (page 5-61, PER).	
		The proponent downplayed the impact of their proposal on the flora, vegetation, and ecological functioning at HAR by making subjective assessments of risk that are based solely on the number/proportion of plants and proportion of vegetation that will be directly removed by the proposal. The proponent did not quantify indirect effects, ignored enigmatic ecological impacts, and did not carry out formal risk analyses. This relates to <i>"Required work: 4. Predict the residual</i> <i>impacts from the proposal on flora and vegetation, both</i> <i>direct and indirect "</i> of the EPA's ESD for the proposal (EPA 2015)	
		 The proponent made subjective assessments of risk to flora, vegetation, and ecological functioning based on the number/proportion of plants and proportion of vegetation that will be removed by the mining proposal 	
		For example:	
		a) "As the impact on known plants [of Leucopogon spectabilis] is less than 1% and that the remaining habitat will be unaltered, the impact on this taxon is not significant" (page 5-24, PER).	
		 b) "The risk to the conservation of T. aphylla subsp. aphylla [by removing 29.4% of individual plants] is 	



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		considered manageable and of less significance" (page 5-29, PER).	
		 c) "The impact on A. adinophylla of 12.3 % of all known plants is not likely to change the conservation status of the taxon due to the number of plants remaining" and "will not have a significant impact on A. adinophylla" (page 5-30, PER). 	
		The risk to flora, vegetation, and ecological functioning at HAR is not a simple linear function of the number/proportion of plants and proportion of vegetation removed because it brings into play genetic and environmental impacts that can be detrimental as populations become smaller:	
		a) Genetic. Increased susceptibility to genetic drift, loss of genetic variation, inbreeding depression, and loss of evolutionary potential.	
		 b) Environmental. Increased susceptibility to environmental shifts, including human activities and climate change, and random environmental events, such as drought, fire, and disease. 	
		2. The proponent did not predict the magnitude of the indirect impacts of their proposal on the flora, vegetation, and ecological functioning at HAR	
		The proponent acknowledged that indirect impacts would exist but downplay them: " <i>indirect impacts … may</i> <i>also occur but, given the conservative approach to the</i> <i>assessment, actual indirect impacts are likely to be less</i> <i>than that predicted</i> " (page 5-45, PER).	
		Indirect impacts would probably be larger than the proponent are proposing. For example, the proponent highlighted the potential risk and consequences of weed	



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		incursion (page 5-50, PER), but then claimed that " <i>the</i> risk can be readily reduced through the application of	
		routine weed monitoring and hygiene/treatment	
		procedures applied to vehicle and equipment	
		movement" (page 5-51, PER).	
		The submitter is concerned about the introduction of	
		weeds as a result of the proposal. Surveys identified a	
		low inherent weed cover as described in Section 5.3.1	
		(page 5-50) of the PER. The risk of weed introduction	
		primarily lies with the inadvertent introduction of weed	
		seed to the site. Additionally, increases in weed cover	
		may occur through disturbance of soils which promote	
		germination of existing weed seed banks allowing local	
		increases in weed populations. The proponent has not	
		considered that HAR is particularly susceptible to weed	
		infestations for two reasons:	
		a) HAR retains moisture. Cracks, crevices, and fissures in the banded ironstone catch and hold the water, providing pockets of moist habitat (Mosblech <i>et al.</i> 2011, Schut <i>et al.</i> 2014).	
		 b) HAR has a geology and soil type that is susceptible to weed infestation. Gosper <i>et al.</i> (2015) showed that ironstone and ironstone soils in the GWW had "43% invasion" of weeds after human disturbance. 	
		These reasons imply that, once established, weeds will probably be much more expensive and difficult to	
		remove from the HAR than the proponent are proposing.	
		The proponent also supports a recommendation by	
		Gosper et al. (2015) to minimise "new settlement	
		creation in locations currently remote from towns" to stop	
		the spread of weeds. Minimising the spread of weeds is	



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		a crucial component of land management for biodiversity conservation (Pyšek <i>et al.</i> 2012).	
		The proponent has a Weed Hygiene and Control Procedure (MRL-EN-PRO-0007) which would need to be enforced.	
		3. The proponent overlooked enigmatic impacts of their mining proposal on the flora, vegetation, and ecological functioning at HAR	
		These are impacts that are easily and often overlooked in impact evaluations, but can be large and far-reaching (Raiter <i>et al.</i> 2014). We outline these impacts Section E- 2: Terrestrial Fauna.	
		 A formal risk analysis carried out by Yates et al. (2008) does not support the proponent's assessment of risk 	
		The plethora of genetic and environmental impacts on populations, and interactions between these impacts, does not allow population risk to be assessed by mere reasoning or population size. It requires analytical and modelling approaches, such as population viability analyses, that project the future course of populations by integrating demography and genetics of a population with environmental viability (Menges 2000, Beissinger and McCullough 2002, McCarthy and Possingham 2012).	
		Yates <i>et al.</i> (2008) carried out a population viability analysis for <i>Tetratheca paynterae paynterae</i> at Windarling Range. They predicted that the <i>T. paynterae</i> <i>paynterae</i> population is likely to decline substantially	



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		over the next 50 years.	
		The striking feature of this analysis is that it does not support the proponent's risk assessment for the <i>Tetratheca paynterae paynterae</i> population at Windarling Range: " <i>After more than ten years of mining</i> <i>at Windarling the population comprises approximately</i> <i>5,400 plants</i> " (page 5-29, PER). The proponent used their assessment to imply that the <i>T. paynterae</i> <i>paynterae</i> population at Windarling was viable and to downplay the risk of their mining proposal to <i>Tetratheca</i> <i>aphylla</i> subsp. <i>aphylla</i> : " <i>based on the Windarling</i> <i>experience, the risk to the conservation of T. aphylla</i> subsp. <i>aphylla</i> is considered manageable and of less <i>significance</i> " (page 5-29, PER)	
		Of at least 380 flora species present, at least five of these are vulnerable or threatened and endemic to the range. The claim that the "vegetation, representation and diversity will be unaltered" is misguided and understated because it is guided by three speculative assumptions.	
		 The assessment assumes that the area is a discrete habitat that does not interact with other habitats on the range 	
		2. The assessment assumes the indirect impacts on the remainder of the range will be minimal. Raiter <i>et al.</i> (2014) ⁶⁶ showed that this is not necessarily the case. Many types of ecological impacts 'slip under the radar' of conventional impact evaluations and	

⁶⁶ Raiter, Possingham, Prober and Hobbs, Under the radar: mitigating enigmatic ecological impacts, *Trends in Ecology & Evolution* 2014, 29(11): 635-644.

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		 undermine the potential for successful impact mitigation. 3. The assessment assumes there will be no further mining on the HAR. The submitters are concerned about the potential dust 	
		impacts to the five endemic plants to the range and the surrounding vegetation, not just the immediate mining tenement but on any road installed for transportation of mined product.	
138	ANON-TWYQ-WPBC-1	The risk of detriments to threatened and other listed species is under-represented, and is unacceptable. The submitter does not support the proponent's statement that " <i>There is no evidence that any species of flora or fauna will be lost</i> ". It is impossible to provide evidence of a future occurrence, but when the proponent proposes to remove 30% of all existing <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> individuals, currently listed as vulnerable, it is clear that the proposal will have a significant detrimental impact on the remaining population, particularly its genetic diversity and distribution, and therefore its ability to continue to evolve and survive climate and environmental change. Similarly, directly removing 40% of <i>Lepidosperma bungalbin</i> , a P1 flora taxon which does not occur	MRL accepts that the impact on <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> is significant. In responses to the submissions on the PER, MRL is proposing a revised footprint (the Section 43A" footprint which will reduce the both direct and indirect impacts on <i>Tetratheca aphylla</i> subsp. <i>aphylla, Lepidosperma bungalbin, Leucopogon</i> <i>spectabilis</i> and other taxa (see Attachment 1). Regarding <i>L spectabilis</i> , the independent assessment undertaken for MRL concluded the taxon best fitted the IUCN classification of Vulnerable rather than its current classification of Critically Endangered. This is probably a function of the large increase in the known number of plants identified in surveys conducted for this Proposal. With regard to indirect impacts generally, MRL has based its assessment on removal of all plants within an open pit footprint (direct impacts) plus the pit surrounds
		threaten the ongoing sustainability of the species, even if not immediately by direct reduction of individual numbers, then by population fragmentation, inbreeding depression, and/or indirect impacts on the remaining populations. This is particularly concerning given that the	(area between the pit edge and the abandonment bund) plus a 20 m buffer outside of the abandonment bund. In practice, it is very unlikely all of these plants will be lost, as has been the experience of Cliffs at Windarling. MRL has provided additional information on the



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		proposed area to be directly disturbed is the area where	approach to assessment of indirect impacts in this
		the species is most common – thus likely to be its best	document (see response to Issue 1).
		habitat, and possibly a source population for the	
		species.	
		Further, the impacts on Leucopogon spectabilis are	
		likely to be greater than stated. While only ~1% is stated	
		to occur within the direct mining footprint, is it clear that	
		all of the remaining population exists within several	
		kilometres of the mining footprint, given the single, small	
		distribution of its single population. The proponent has	
		not taken in to account the high likelihood of indirect off-	
		site and cryptic impacts that may affect the remaining	
		population. Please refer to Raiter et al. (2014) for a more	
		comprehensive discussion of this issue. Such impacts,	
		though yet untested, could include dust and vibration	
		effects, indirect impacts on their bee pollinators,	
		overgrazing if rabbits or other herbivores are introduced	
		or are bolstered in the region as a result of the mining	
		activities (as has been found elsewhere), and	
		competition from any plants that may become invasive in	
		the area as a direct or indirect result of the mining	
		operations. The PER states that the current category of	
		threat for <i>L. spectabilis</i> of "Critically Endangered" should	
		not change if the proposal is implemented; this does not	
		necessarily mean that the population won't be	
		detrimented, but is simply a reflection of the fact that the	
		status of the species cannot get any worse: Critically	
		Endangered is the most extreme risk category there is.	
		I his unfortunate tautology highlights that any detriment	
		to <i>L. spectabilis</i> individuals or habitat is unacceptable.	
		The submitter stipulates that the factor has been	



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		specifically addressed for three species of flora, but reiterates that the general message applies to all: the full suite of impacts on affected species will likely be larger than stated (Raiter <i>et al.</i> 2014), and it is unacceptable to further detriment populations that are already at risk, particularly when the full extent of risk is poorly understood.	
139	Toodyay Naturalists Club	 The submitter is concerned that there is no evidence to support the seed and pollination vectors described in the PER as listed below: Table 5-18 states that the likely pollination vectors for <i>Leucopogon spectabilis</i> are bees when there is little known of the biology of the species. Table 5-19 states that the likely seed dispersal vectors for key taxa (<i>L. spectabilis</i>). The submitter notes that this is based on limited information at the genus level and questions the use of eastern states observations at a family level being used as an assumption that the same may apply to this species. Table 5-19 states that the likely seed dispersal vectors for key taxa (<i>Tetratheca aphylla</i> subsp. <i>aphylla</i>) are by ants although this process has not been directly observed for this species. 	MRL accepts that, at this stage, it is not possible to provide definitive information about the biology of all taxa. For the purposes of impact assessment, however, there is sufficient information on the likely mechanisms of pollination and seed dispersal on which to undertake the assessment.
140	ANON-TWYQ-WPJS-S	The history of the HAR and any proposal to mine any part of it should use the absolute best of scientists experienced in that region to catalog the flora there. The range has notoriously poor access and has been	The surveys conducted meet the requirements of the EPA ⁶⁷ . The surveys commissioned by MRL were conducted over four phases between October 2012 and July 2016. In total, 162 person days were spent

⁶⁷ EPA 2004. Terrestrial flora and vegetation surveys for environmental impact assessment in Western Australia. Guidance for the Assessment of Environmental Factors No. 51. Environmental Protection Authority, Western Australia.



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		regularly turning up new species over the past couple of decades of botanical exploration. After reading the accompanying flora report there is no confidence that the species richness within the study area has been sufficiently identified. With the amount of effort that has gone into surveying the area, the numbers of perennial species appear approximately 10-20% below what would be expected, and the ephemerals probably more so. It is easy to miss the true complexity of an area, particularly one as diverse as the HAR. The lack of a detailed list of study team members involved in each phase of survey and their relevant experience is an oversight. This would bring into question the conservation significant flora not recorded in the study area and the possibility of new species being overlooked, both serious omissions.	surveying the flora and vegetation. The results of other surveys were also considered in the overall assessment. The botanists who participated in the flora and vegetation assessment are listed in the PER (Appendix 5-A p126). All have university qualifications with seven holding a PhD in botany. Other submissions raised the possibility of unidentified taxa – see responses to Issues 110 and 129.
3. Landfo	rms		
141	DMP	The risk of encountering hostile material during mining requires verification through further geochemical analysis. The potential for slope failures and other related landform stability issues also requires further investigation in order to adequately assess potential impacts on landform stability and integrity.	The available data to support Part IV EP Act assessment of the Proposal is included in Appendices 12-A,B,C, and D of the PER and the revised Rehabilitation and Mine Closure Plan (Appendix H of this document). MRL is committed to collecting further waste characterisation and geotechnical data to inform risk- based approvals under the Mining Act. MRL has proposed a staged approach to EP Act and Mining Act Approvals as detailed in Attachment 1 and has discussed this approach in detail with DMP on 29 July 2016 (C Grosser and J De Lange) 20 September 2016 (C Grosser and K Anderson) 22 September 2016 (K



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			Anderson and S Danti) and 14 February 2017 (K Anderson and S Danti).
			The concept of a risk based Stage 1A approval for a starter pit to ensure continuous operations is consistent with the Mining Proposal Guidelines, however any Mining Proposal will be assessed on its merits and specific risks at the time it is submitted.
			Any Mining Proposal for the Stage 1B and Stage 2 pits will be supported by the full suite of waste characterisation and geotechnical data and analysis commensuration with the risks.
			It must be noted that the Stage 1A approach is not essential to the Proposal. It is only required to sustain continuous employment and economic benefits associated with MRL's existing operations. If the Mining Proposal for Stage 1A is not approved by DMP without additional data, MRL will incur a hiatus to its operations which would not in any way diminish the business case for the Proposal or the validity of any Part IV EP Act approval.
142	DMP	The DMP notes that the proposal would cause permanent alterations to the contour of ridge lines and	The Proposal will permanently alter a small proportion of the HAR landforms (5.4%).
		crests as the result of mine pit development over a total area of 207.5 ha. Open pit voids would remain and would have walls that may be subject to slope failures and would not be conducive to revegetation. New WRLs are proposed to be developed adjacent to the HAR over a total area of 185 ha. However, the proponent considers it can meet the EPA's objective in relation to landforms for the Potentially Affected Landforms (PAL) and Local Assessment Unit (LAU), due to the impacted	Open pit voids are typical of mining proposals in Western Australia and are not unique to this Proposal. The remaining open pit voids will be managed no differently to any other open pit voids in WA. Management measures will include the construction of abandonment bunds outside of any potential zones of instability (and inside any Part IV EP Act approval conditions) to prevent inadvertent public access.



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		 values being represented outside the disturbance area. Further discussion is required as the PER does not adequately discuss the measures to minimise permanent damage to the structure of the affected landforms. Specific information relating to the site including the identification of key risks, specific management and mitigation measures, specific monitoring and contingency measures is required. Key risks should include but not be limited to poor rehabilitation and the creation of unsafe, unstable or polluting landforms. 	Attachment 1 discusses a staged approach such that Mining Act approvals will only be sought and issued in a manner that satisfies DMP that the long term stability of the open pit voids is ensured. Key risks are considered in the RMCP (Appendix H), appropriate for a preliminary closure plan and Part IV approval. A detailed risk assessment associated with rehabilitation and closure will be provided in the <i>Mining</i> <i>Act 1972</i> approval applications for the Proposal.
143	Parks and Wildlife	The assessment of the landforms factor in the PER appears to underestimate the significance of the HAR landform in providing ecological niches for species, associations and communities that are endemic to the range or BIF habitat, possibly due to individual or combined effects of soil type, microclimate, moisture availability, growing substrate, etc. The PER also underplays the attractiveness and distinctiveness of the landform, and particular features such as outcrops, to current and future users of the MMHARCP (e.g. as a recreational tourism focal point). In providing advice on landforms, Parks and Wildlife is also considering the importance of the landform as an integrating factor related to biodiversity, amenity, recreational tourism, heritage and the representativeness of this landform in a formal reserve. The HAR has high value as a landform, recreational tourism focal point and is also important in terms of maintaining ecological function for conservation of rare,	The PER does not underestimate the significance of the HAR landform in providing ecological niches for species, associations and communities that are endemic to the range or BIF habitat. It should come as no surprise that any range or BIF endemic species in its natural environment has adapted to the particular environment in which it is found. The PER documents the distribution of species, associations and communities and provides information and discussion on landform characteristics that provide insight into these distributions e.g. slope, elevation, aspect etc. Notions of attractiveness and distinctiveness are inherently subjective. The PER has endeavoured to be objective in its assessment of landforms and has addressed subjective considerations such as attractiveness and distinctiveness as part of the amenity factor.



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		restricted and conservation significant biodiversity values. The highly distinct aggregation of landscape and ecological values of the HAR in the Yilgarn Craton and MMHARCP needs to be recognised in the assessment of this proposal. By examining the different attributes of the HAR landform individually and compared to those found in the surrounding area, the PER concludes that "the affected landform values are represented elsewhere" (PER, page 6-53) and the HAR is not rare or unique. When the aggregated values were analysed in a multivariate and regional context, a different conclusion can be drawn from the same data. In particular, the PER underrepresents the ecological importance of the Helena-Aurora Range. Appendix 6-A states the HAR " <i>is considered to be regionally</i> <i>significant as it provides habitat that supports a</i> <i>concentration of ironstone specialist flora species. It is</i> <i>suspected that the range acted as a refuge during late</i> <i>Tertiary – Quaternary climate oscillations. Further, it has</i> <i>been suggested that this concentration may be due to</i> <i>the diversity of microclimates and habitats. Within this</i> <i>context, the HAR</i> [Helena-Aurora Range] was found to <i>have areas of greater variance and therefore more</i> <i>microclimates in the central and southwestern summits</i> (where the Proposal <i>is located</i>)" (Appendix 6-A, page iii), although this sentiment is not discussed in the PER. Rather, the proponent's conclusions about the "Residual <i>impacts to landforms are not significant as ecological</i> <i>function can be maintained elsewhere, and returned to</i> <i>the majority of the disturbed area following rehabilitation</i> <i>and mine closure</i> " (PER, page vii) is a very limited	as per the EPA (2013) 'Environmental Assessment Guideline for Environmental factors and objectives' (EAG8). EAG8 lists two integrating factors for the purpose of EIA, these being 'Rehabilitation and decommissioning' and 'Offsets'. The PER has been prepared in accordance with the 'Guidelines for Preparing a Public Environment Review' (EPA, 2012) and contains sufficient and objective information to support EIA in relation to the Proposal. In respect to the Landforms factor, the PER concludes that the HAR is not rare or one of a few of its type in either a local or regional context. It therefore follows that the residual impacts of the Proposal on landforms will not be significant. With regard to consideration of the ecological importance of the landform, please refer to the response to Issue 14.



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		assessment of the landform factor. Parks and Wildlife considers that the removal of rare and highly distinct and specialised habitats supporting significant biodiversity conservation values on the range through the proposed mining would have a significant detrimental impact on the long term maintenance of ecological function of the landform. No other BIF range in the region has the same level of aggregated values or significance as the HAR; and comments in the PER that the HAR has similarities with other landforms in the region overlook the unique suite of biodiversity (and other) conservation values that are not replicated on other ranges.	
144	Parks and Wildlife	Landform assessments should include identification, classification and evaluation of particular geological features (caves, monoliths, outcrops, cliffs etc.) as this provides information on complexity and texture of the landform, which can relate to rarity and variety of its features, ecological function and aesthetics. Appendix 6-A states that <i>"The data provided in this</i> <i>report indicate that there is broad variability in the</i> <i>landforms within the Proposal's area of disturbance and</i> <i>the wider HAR</i> [Helena-Aurora Range]. <i>The landform</i> <i>includes a range of cliffs, tors and fractured rock</i> <i>surfaces with variable slopes and aspects that have</i> <i>formed through the processes of faulting, weathering</i> <i>and exfoliation, and which provide micro-habitats or</i> <i>niches that are important for the establishment of plants</i> " (Appendix 6-A, page 6-1). However the landform assessment in the PER does not appear to have included an in-depth study of the various geological	MRL notes the findings of ecologia (2002) that the Helena-Aurora Range comprised "more large outcrops and monoliths than any other range in the region". MRL advises that ecologia (2002) should not be relied upon as comprehensive landform assessment as it is solely concerned with identification of significant rock features "to obtain an insight into the visual impacts that proposed mining developments at Windarling may have at the local scale as well as in the wider region." The report does not provide any insight into the visual impacts of proposed mining at Windarling, nor can it be interpreted as concluding that the Helena-Aurora Range is a significant landform. The results of ecologia (2002) should be interpreted cautiously, particularly with regard to the total number of outcrops and stated proportions attributed to each of the





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		features of the HAR (nor a comparative analysis of representation of these geological features on other BIF ranges in the local and regional assessment units). A report for the Koolyanobbing Expansion Project (ecologia, 2002) ⁶⁸ documented the location of outcrops at Windarling Range and the wider region. This included an assessment of the Die Hardy, Helena-Aurora, Mount Jackson, Koolyanobbing, Mount Manning and Windarling ranges. A key findings from that assessment was that the HAR comprised " <i>…more large outcrops and monoliths than any other range in the region</i> " (ecologia, 2012, page 14). It is also noted that there are caves at Bungalbin East that may also have heritage value (they require additional investigation), and these caves add to the textural quality and variety of the range. Further discussion on the textural features of the HAR, and the J5 and Bungalbin East areas, compared to other BIF ranges in the Mount Manning area would assist in understanding the proportion and representation of landform features in the proposal area, range and within the conservation park.	assessed ranges (Table 3.1 from ecologia, 2002). According to the report, each range was assessed visually from access tracks, and then investigated more intensively on foot if the presence of rocky outcrops was evident. Whilst this may have been the case, it is apparent that outcrops have not been documented comprehensively across each range. The Helena-Aurora Range is reported as having 49.1% of all outcrops documented, but this might reasonably be expected given its size advantage relative to the other ranges that were assessed by ecologia (2002). The more interesting statistic (from a landform and visual amenity perspective) is outcrop density, where Windarling was reported as having a density of 6.7 outcrops per km ² compared to 1.8 outcrops per km ² for the Helena-Aurora Range. This statistic reflects the distinctive 'razorback' feature of the crest of the Windarling Range, a feature that is notably absent in the Helena-Aurora Range. In assessing <i>"significant rock features</i> " Ecologia (2002) appears to use the terms <i>"monolith"</i> and <i>"rocky</i> outcrop" interchangeably. It is not apparent from the data presented which outcrops are monoliths or <i>vice versa</i> . This aspect has been brought into question more recently by Gray's (2008) geological and landscape field survey of the Windarling W1 deposit, which concluded that the W1 deposit contained no monoliths nor any unique features of professional geological interest.

⁶⁸ Ecologia Environment (2002) Koolyanobbing Expansion Project Rocky Outcrop and Monolith Landscape Impact Assessment. Perth, Western Australia.



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			Gray (2008) noted the definition of a monolith as "an outcrop of <i>unfractured</i> bedrock on a scale of more than a few metres (and generally considerably more). In Australia, the term monolith is most commonly applied to geological features such as Ayres Rock or Wave Rock, which are large bodies of bedrock having relatively few fractures.
			The landform study and analysis provided in the PER is a comprehensive, objective and reliable assessment of the significance/importance of the HAR conducted and peer-reviewed by suitably qualified experts. It is sufficient to inform EIA of this Proposal.
			If MRL were to further document the textural features of the HAR at finer spatial scale and compare it to other BIF ranges in the Mount Manning area.
			it would not change the fact that in terms of geomorphology-landform expression the Helena-Aurora Range is not unique.
			The heritage value of the caves at Bungalbin East is being investigated. This issue is discussed further in response to Issues 29-31 and Issue 326.
145	The Wilderness Society	Images below show that the landforms of the proposed mining impact zone are incredibly complex and varied, and totally unique. This complexity and variability in turn gives rise to important niches and micro-habitats with their own composition and dynamics. There is only one mention of caves in the PER – "" <i>Rocky</i> <i>outcrops are common within the central and eastern</i> <i>portions of the HAR (L4-L6) and caves and small cliff</i> <i>faces are also present in some areas.</i> "	MRL notes the submitter's opinion in regard to landforms and consideration of this factor in the PER. The PER has concluded that the HAR is not rare or one of a few of its type in a local or regional context from a Landform perspective, and that the residual impacts of the Proposal on landforms is not significant.



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		The J5 proposed site has evidence of complex and varied formations and ecological niches.	



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146	CPC	The submitter notes the proponent's efforts to reference important scientific literature on the biodiversity values of the HAR. Although the proponent states on page 6-49 of the PER that " <i>BIF landforms are common throughout the Mount Manning area</i> " each banded iron formation range tends to be biologically distinct, supporting different plant assemblages and often endemic species (Yates <i>et al.</i> 2008 ⁶⁹).	Please refer to the response to Issue 14.
		The PER provides contradictions in regards to the uniqueness of the landforms. On page 6-48 the PER describes the HAR as being one of a number of examples of BIF ranges and no claim of uniqueness can be made. However in the following section on page 6- 49 the proponent acknowledges the EPA's findings in regards to the outstanding features of the HAR.	

⁶⁹ Yates, Pettit, Gibson, Dillon and Palmer (2008) The population ecology of <u>Tetratheca (Eleaocarpaceae)</u> on the banded iron formation ranges of the Yilgarn: an integrated research program focussed on practical outcomes for the exsitu and in situ conservation, restoration and translocation of the DRF <u>Tetratheca paynterae subsp. paynterae</u>: final report to Portman Iron Ore Limited, March 2008. Department of Environment and Conservation, Kensington, WA.



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147	CSIRO	<u>Amenity values in a landform context</u> The EPA aims to ' <i>maintain the variety, integrity,</i> <i>ecological functions and environmental values of</i> <i>landforms</i> '. There are few places in temperate Australia where a relatively intact landscape dominated by temperate eucalypt woodland plains can be viewed. One of these few places is from the HAR and furthermore the types of woodland in the area have substantial scenic value, for example the orange and golden trunks of trees such as Salmon gum, Gimlet, and York gum. Not only is the woodland itself not recoverable within multi- generational timeframes, the landscape values of the extensive plains would be permanently marred by WRL, scarred hillsides and abandonment bunds.	The PER assesses both amenity and landform as preliminary key environmental factors. The Great Western Woodlands (GWW) covers an area of almost 16 million hectares and is "the largest remaining area of intact Mediterranean climate woodland left on Earth (DEC, 2012). Over such a large area, it is expected that there would more than a few places where this intact landscape dominated by temperate eucalypt woodland plains can be viewed. The scenic value associated with the woodland is noted. The impact of the proposal on corresponding vegetation types are quantified in the PER. Refer to Table 5-13 in the PER for further details. The assessment of amenity clearly recognises the contribution of the landform in providing visual amenity. Refer section 10.2.2 of the PER.
148	CSIRO	Scientific value in a landform context With further regard to the landform and amenity values of the woodland plain is its relevance to the question posed in the ESD for the proposal 'Are the landforms of recognised scientific interest as a reference site or an example where important natural processes are operating?' (PER, page 6-29). The intact temperate eucalypt woodland plains of the GWW are recognised elsewhere as highly significant reference sites for the	The CSIRO considers temperate eucalypt woodlands to include PCS 1,2,4,6,7 and PNC 3,5,6,7 as well as PSRN7,9 (see page 9 of the submission) As noted by CSIRO, PSRN 7 occurs on the range itself, not on the plains surrounding the range. Excluding PSRN 7, and with the exception of PNC 3, the impact of the Proposal on the vegetation units listed above are less than 2% of the total mapped extent in



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		ecological functioning of woodland landscapes (e.g. Prober & Hobbs 2014 ⁷⁰). Although some roads already pass through the area, the woodland plains around HAR are of particular significance in this regard, owing to lesser influence of human activities that have more heavily impacted other parts of the GWW. These include absence of substantial woodline clearing or logging during the early 20th Century, and large areas of crown land with no history of pastoral enterprises that can have significant impacts on soil and hydrological processes. The proposed development would likely impact on these overall values of the plains for understanding soil, hydrological and other landscape processes in otherwise widely degraded temperate eucalypt woodlands; and hence such impacts need to be accounted for.	each case. The impact of the Proposal on PNC 3 is 4.2% of the total mapped extent. Given that 95% or more of each of these vegetation units will remain undisturbed by the Proposal, and that the majority of these vegetation units occur away from the landform, it is difficult to conclude that scientific value of the area would be diminished. MRL also expects that there would many other locations in the GWW that have experienced similar levels of human influence, particularly given the generally intact nature of the GWW.
149	ANON-TWYQ-WPH1-N ANON-TWYQ-WP2N-V ANON-TWYQ-WP2U-3 ANON-TWYQ-WP2A-F BHLF-TWYQ-WPP8-4 ANON-TWYQ-WPP8-4 ANON-TWYQ-WPPX-4 ANON-TWYQ-WP1Y-6 ANON-TWYQ-WP1S-Z ANON-TWYQ-WP1U-2	The submitters object to the proposal and do not believe that the EPA's objective for Landforms can be achieved if mining is permitted in the area based on: the HAR being unique, pristine and billions of years old; the HAR provides habitat for rare, locally endemic flora and fauna; the HAR being a unique, invaluable and irreplaceable part of WA's natural, geological and cultural heritage; the HAR performs an important ecological function within the landscape and provides a multiplier effect to conservation through its connectedness with the	MRL notes the submitters' objections and opinions on the HAR. The PER seeks to provide an objective assessment on the significance of the HAR, supported by a landforms study conducted and peer-reviewed by suitably qualified experts. While it is the EPA who will determine whether or not the Proposal meets its objectives for landforms, MRL has concluded in the PER that the Proposal can meet the EPA's objective in relation to landforms to maintain the variety, integrity, ecological functions and environmental values of landforms

⁷⁰ Prober, Hobbs (2014) *Temperate Eucalypt Woodlands*. In: D Lindenmayer and S Morton (eds) Ten Commitments Revisited: Securing Australia's Future Environment. CSIRO Publishing, Melbourne, pp. 21-30.



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	SubmitterANON-TWYQ-WPZD-TANON-TWYQ-WPHG-BANON-TWYQ-WPBZ-RTrack Care WAANON-TWYQ-WP42-2Gondwana LinkANON-TWYQ-WP42-2Gondwana LinkANON-TWYQ-WP42-2Gondwana LinkANON-TWYQ-WP42-2Gondwana LinkANON-TWYQ-WP42-2Gondwana LinkANON-TWYQ-WP49-QANON-TWYQ-WP40-P20;ANON-TWYQ-WP27-DThe Subaru 4WD Clubof Western Australia IncANON-TWYQ-WP2Y-FANON-TWYQ-WP2R-8ANON-TWYQ-WP2R-8ANON-TWYQ-WP4E-NANON-TWYQ-WP4E-NANON-TWYQ-WP4M-WANON-TWYQ-WP4M-WANON-TWYQ-WP4M-XANON-TWYQ-WPBA-YANON-TWYQ-WPBA-YANON-TWYQ-WPBK-9Pew Charitable TrustsWA Native Orchid Studyand Conservation GroupInc	Submission and/or issue surrounding landscape; the HAR's overall intactness, its condition and immediate contextual setting, inclusive of the still largely unmodified (i.e. natural) peneplain landform that surrounds it; it is the tallest and largest BIF in the Coolgardie Bioregion, being up to 704 m above sea level (200 m above the flat woodlands); the area being cleared is equivalent to 975 football fields and this would significantly impact the variety, integrity, ecological values and sensitive natural area; the proposal would permanently alter the ranges unique landform, related ecological, aesthetic/scenic and visitation values; and these are ancient lands. Three billion years of erosion resulted in relatively flat topography with no 200-metre deep holes and mesa-like waste dumps. Table 2 of the PER states " <i>The pit voids at J5 and Bungalbin East will be a permanent feature of the landscape. This will be partially <u>mitigated</u> at Bungalbin East,". In addition, BIF hills do not look like flat-top waste dumps. No amount of contouring can remedy the impacts from the mine. There will be species lost if we continue to chip away at these fragile areas and in the process destroy the connectivity between the variety of features present within the GWW on which so many fauna and flora species rely.</i>	Response to comment The HAR is not pristine. Existing exploration tracks provide public access. Weeds and feral animals are present in low abundance. Western Australia's landmass is dominated by Archaean grantite-greenstone terrains in the Yilgarn and Northern Pilbara regions and Palaeoproterozoic to Archaean banded iron formations in the Hamersley Province. All of these rocks are billions of years old and the geological age of the HAR is not in any way unique. There is no evidence that any species will be lost or put at risk of loss as a result of the Proposal.
	ANON-TWYQ-WPZX-E		



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	ANON-TWYQ-WPZS-9		
	ANON-TWYQ-WP47-7		
	ANON-TWYQ-WP4U-5		
	ANON-TWYQ-WPZJ-Z		
	ANON-TWYQ-WP2D-J		
	ANON-TWYQ-WPF5-Q		
	ANON-TWYQ-WP18-5		
	ANON-TWYQ-WPFW-S		
	ANON-TWYQ-WP1Q-X		
	ANON-TWYQ-WP2D-J		
	ANON-TWYQ-WP29-7		
150	ANON-TWYQ-WP2E-K	The submitters object to the proposal based on the HAR	MRL notes the submitters' opinions on the HAR. The
	ANON-TWYQ-WP2B-G	being the "jewel in the crown" of the GWW and one of	PER seeks to provide an objective assessment on the
	ANON-TWYQ-WP2Y-7	only nine BIF ranges in the GWW that form terrestrial	significance of the HAR, supported by a landforms study
	ANON-TWYQ-WP2S-1	by mining tenements and have either been mined	experts The PER concludes that the HAR is not rare of
	BHLF-TWYQ-WPP8-4	approved for mining or under mining exploration, none	one of a few of its kind at either a local or regional level
	ANON-TWYQ-WPPF-J	are protected in secure 'Class A' conservation reserves.	from a Landform perspective, and that the residual
	ANON-TWYQ-WPPR-X	BIF ranges provide niche habitats not found in the	impacts on landforms will not be significant.
	ANON-TWYQ-WPPP-V	surrounding landscape. They contain high levels of	Table 6-2 of the PER identifies 7 BIF Ranges in the LAU
	ANON-TWYQ-WPP5-1	fauna endemic to individual BIF ranges and some flora	
	ANON-TWYQ-WPPH-M	and fauna that are dependent on BIF habitats.	that are >99% Intact; Die Hardy, Dryandra, Finnerty,
	ANON-TWYQ-WPPK-Q	The HAR is the only BIF in the Yilgarn region that has	Ranges.
	ANON-TWYQ-WP17-4	not been severely impacted by mining or mining	
	ANON-TWYQ-WP1B-F	exploration.	
	ANON-TWYQ-WPBT-J		
	ANON-TWYQ-WPH9-W		



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	Birdlife WA		
	Track Care WA		
	ANON-TWYQ-WP45-5		
	ANON-TWYQ-WPB9-Q		
	ANON-TWYQ-WP4W-7		
	BHLF-TWYQ-WPJK-H		
	355; 358; 359; 360; 361; 362; 363; 364		
	ANON-TWYQ-WP4J-T		
	ANON-TWYQ-P22-Z		
	ANON-TWYQ-WP2K-S		
	ANON-TWYQ-WPPC-F		
	ANON-TWYQ-WPPD-G		
	ANON-TWYQ-WP2Q-Y		
	ANON-TWYQ-WP2W-5		
	ANON-TWYQ-WP46-6		
	ANON-TWYQ-WP2K-S		
	ANON-TWYQ-WPBE-3		
	ANON-TWYQ-WPZJ-Z		
	ANON-TWYQ-WP2D-J		
	ANON-TWYQ-WPF5-Q		
	ANON-TWYQ-WP18-5		
	ANON-TWYQ-WPFW-S		
	ANON-TWYQ-WP1Q-X		
	ANON-TWYQ-WP2D-J		
	ANON-TWYQ-WP29-7		



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151	ANON-TWYQ-WP19-6 Wildflower Society of WA ANON-TWYQ-WPBH-6	The PER sets up a very basic framework for the landform description and lists six factors that can be quantified for ecological function. The PER does not elaborate on how this framework links to the range of macro-, meso-, and micro-habitats that are present on the range. The PER also does not attempt to define or describe these habitats. Bungalbin is a classic palimpsest (a landform that has the imprint of two or more geomorphological processes) and should be set aside from development and preserved as a bio-geological monument. The rationale is that the HAR (East): is an exhumed relict landform; contains landforms with unknown relaxation times (time taken by a system to become adjusted to a sustained change in the nature and/or intensity of external (geomorphological) processes), which may range from 130,000 years, the estimated duration of the current interglacial, or may have already been achieved since the last glacial maxima 18,000 years ago; demonstrates preservation of landform response to climate change; demonstrates preservation of the evidence of past geomorphic processes; provides education and training opportunities in physical geography and geomorphology; provides research opportunities into vegetation/geomorphic relationships; presents opportunities for research into the adaptation,	The six landform analysis criteria were not identified for the purpose of quantifying ecological function, rather to objectively describe the landforms of the Local Assessment Unit (LAU). The rationale for this approach is discussed further as part of the response to Issue 14. The PER and supporting documentation identifies and maps habitat to the requirements of relevant EPA guidance statements for flora and fauna, and in consultation with the Office of the EPA and the DPaW. The PER goes beyond the standard habitat identification requirements to map habitat suitability in detail for threatened and priority flora associated with the Helena- Aurora Range. Regarding the linkage between landform and ecological function, additional information has been provided in Appendix D – "Topographic determinants of habitat suitability for rare ironstone plants in semi-arid Western Australia (DiVirgilio et al, 2016). This report explores the link between the landforms physical characteristics and other environmental variables with preferred habitats for the conservation significant flora species. MRL notes the submitters' opinions that Bungalbin should be set aside from development and preserved as a bio-geological monument.


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		and relictual status, of flora and fauna; and Bungalbin East summital convexity, at least, contains the remnants of a palaeo-drainage system, or is it the vestige of an inverted landscape?	
152	ANON-TWYQ-WP19-6	The PER states (page 6-52) "However, MRL has adopted conservative design criteria in its closure planning for the Proposal, so additional allowance for climate change is not required." The proponent should provide some basis for the design to justify this statement. For example there is no 'design storm' set up for the proposal. Such a rainfall event should then become the basis for all the relevant aspects of the proposal and would include such components as drainage design, WRL design, storm water diversion design and road induced rain shadow effects.	The Surface Water Assessment included as Appendix 9A to the PER comprehensively addresses why the adoption of conservative design criteria in closure planning for the Proposal is justifiable. The conservative design criteria allows for all reasonably known and unknown impacts including climate change.
153	ANON-TWYQ-WP19-6	The proponent undertook a detailed landform impact assessment which included a site assessment and a desktop analysis. The desktop analysis provides for an interpretation of existing and quantifiable factors. However, it does not provide an analysis of the significance, nor importance, of the morphological elements at macro, meso, and micro scales, and the systems that exist linking them. The site assessment was carried out over three days and the submitter contends that given the complexity of landform elements this amount of time in the field is inadequate.	The 3 day site assessment relates to only a small part of MRL's efforts in the landform impact assessment. For example, 4 qualified geologists highly experienced in Archaen BIF terrain spent 6 months field mapping the Helena Aurora Ranges in detail. The results of this work are presented on pages 6-11 to 6-16 of the PER and inform MRL's understanding of the environmental values associated with the Proposal. For example, troglofauna habitat is directly linked to the mapped geology in Appendix E. Also, MRL sponsored a \$100,000 post-doctoral research fellowship to understand the links between topography and other environmental variables with plant richness and endemism.



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			with the requirements of the ESD. An expert peer-review of the landforms study concluded that a sufficient outline of the landform and its geomorphological function was provided to allow conclusions to be drawn that allow the assessment criteria to be evaluated (see section 6.2.2 of the PER).
154	ANON-TWYQ-WP19-6	Section 6.2.6 (page 6-12) of the PER states that the "current surface of the HAR is a mixture of weathered BIF partly covered by laterite derived from the underlying weathered BIF." This sentence is incorrect as the Bungalbin East ridge has not undergone a period of lateralisation and there is no evidence of lateritic profiles having been present on the range, including the characteristic deep pallid zone dominated by kaolinitic clays. Instead the surface of the Bungalbin East are comprises weathered BIF sequences that have been ferruginised, and then again gone through a weathering process. In Table 6.3 of the PER (page 6-12) the proponent refers to a lithological unit as a colluvium scree, this is incorrect. There are no true scree slopes at Bungalbin East. Minor occurrences of rock fall debris may have accumulated at the base of free faces, and these can be mistaken for scree. However, the majority of slopes at Bungalbin are debris slopes, that is, they contain weathered rock material from upslope, soils of varying texture, and organic matter. It is normal that the rock debris is sitting in a soil matrix. The term 'colluvial slope' can be applied to such slopes, but the term debris slope is more accurate. In Table 6.3 of the PER (page 6-13) under the	Chen and Wyche (2003) state "Lateritic or ferruginous, duricrust commonly forms an apron around ridges of banded iron-formation, but is most widely developed over areas of mafic rock. Lateritic duricrust is locally preserved as ironstone over ridge-forming units (Rfc)"



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		Lithological Unit heading, Chert is defined as " <i>Fine grain, silica rich sedimentary unit</i> ". This definition is incorrect as Chert is the chalcedonic variety of cryptocrystalline quartz, Si0 ₂ .	Ac 55 RADIO RA
			Figure – extract from Chen and Whyche's 2003 1:100,000 DMP geological map. Chen and Wyche (2003) map the slopes surrounding
		1	onen and wyone (2000) map the slopes surrounding

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			the HAR as "Flanks of ridges that are dominated by chert and banded iron-formation scree (Clci) [that] grade downslope into areas with abundant finer ferruginous colluvium (Cf)."
			colluvium (Cf)." Colluvium is defined as "a general term applied to any loose, heterogeneous, and incoherent mass of soil material and/or rock fragments deposited by rainwash, sheetwash, or slow continuous downslope creep, usually collecting at the base of gentle slopes or hillsides."(Jackson, 1997) ⁷¹ and Scree is defined as "a term commonly used is Great Britain as a loose equivalents of talus in each of its senses: broken rock fragments, a heap of such fragments; and the steep slope containing such fragments. Some authorities regard scree as the material that makes up the sloping land feature known as talus; others consider scree as a sheet of any loose, fragmental material lying on or mantling a slope (c.f. Block field) and talus as that material accumulating specifically at the base of, and obviously derived from, a cliff or other projecting mass. MRL's description of the Lithological Unit Colluvium Scree is entirely consistent with Jackson's broad definitions.
			The submission is contradictory with a general statement that the use of the term colluvium scree is "incorrect" and then goes on to state that this term "can be used". MRL's definition of chert is not "incorrect" and is

⁷¹ Jackson, Glossary of Geology 4th ed, 1997, American Geological Institute, 769pp.



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			consistent with the submitter's definition. The geological terms used in the PER are correct and the intended meaning is plain. These geological semantics have no bearing whatsoever on the environmental impact assessment of the Proposal.
155	ANON-TWYQ-WP19-6	The PER states (page 6-25) "The main earth-surface process resulting in changes to the geomorphological features of the HAR are hill-slope processes where the forces of gravity moves soil, regolith, or rock eroded from upslope to downslope areas". This statement is incorrect as soils, and eroded rock, are part of the regolith. Errors, such as this, raises the question of the accuracy and scientific integrity of this document. Regolith is the mantle of <i>transported</i> and <i>in situ</i> weathered material that covers landscapes across the world, and includes all lithospheric materials above fresh bedrock.	These geological semantics are not accepted and have no bearing whatsoever on the environmental impact assessment of the Proposal.
156	ANON-TWYQ-WP19-6 Helena and Aurora Range Advocates Inc.	Table 6-4 of the PER (page 6-27) comprises of a range of data and advises that for certain mineral compositions, weathering characteristics will be either resistant or non- resistant to the presence of certain minerals. Under the heading of Resistant, a low quartz content is regarded as contributing to resistance to physical weathering. However, it is then listed in the next column that a high quartz content makes a rock non-resistant to weathering. Quartz, Si0 ₂ , is the fourth hardest, and the least soluble, of the rock forming minerals, and hardness is surpassed only by topaz, corundum, and diamond. It is not correct	The resistance of a rock type to weathering is not so much determined by is hardness, but rather the relative strength of the rock compared to neighbouring rocks. For example an iron ore deposit surrounded by weaker granite may weather to a topographic high and an iron ore deposit surrounded by stronger unmineralised BIF may weather to a topographic low. Table 6-4 illustrates that there are many factors that determine the resistance of rock types to weathering. Quartz is not the "fourth hardest" rock forming mineral. The submitter is confusing the fact that Quartz is simply





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		to document that a high quartz content makes a rock non-resistant to physical weathering. Table 6-4 should provide reference to where this information has come from. If the information has been derived from in-field experience, the data should be presented. The bottom of the Table 6-4 has a reference <i>"Information on mineral composition, texture, porosity, bulk properties and structure is from Lindsey et al.</i> (1982) in Chorley et al. (1984)". This reference is not clear. Table 6-4 is also not logically presented. There is little consistency between the cell contents. For instance, is the reader supposed to conclude that 'fine grained textures' are 'gneissic'? Where the Table is decipherable information/contents is questionable. In the submitter's experience, depending on climate, and water availability, and on microbiota, the rock resistance to physical and chemical is quite variable and different in different settings. An important part of the weathering story if the effect of biota as microbiota and as plants.	the reference mineral for a hardness of 7 on Moh's hardness scale of 1812. Topaz, Corrundum and Diamond are the reference minerals for hardnesses of 8, 9, and 10 respectively. There are many common minerals with hardnesses greater than 7 – e.g. Andalusite, Beryl, Tourmaline and some Garnets.
157	ANON-TWYQ-WP19-6	Page 6-32 of the PER under the sub-heading Important Natural Processes the PER states "Like many other semi-arid areas, the Mt Manning area is characterised by an infertile and well- sorted landscape". The terms "infertile landscape" and "well-sorted landscape" should be defined. Furthermore "The soils in the HAR and LAU are derived from highly weathered parent materials, and are well sorted and nutrient poor". The soils at Bungalbin are not well sorted, they are poorly sorted as noted in Appendix	MRL refers the submitter to Morton et al (2011 – as referenced in the PER) for explanation of the terms 'infertile landscape" and "well-sorted landscape" and more generally for an understanding of the context in which these terms are applied. The comment in the PER regarding the sorting of the soils is a general one. The reader is referred to Appendix 12-A for full technical analysis of the soils present which is consistent with and supports the findings of the main body of the PER.



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		12-A (Soil Characterisation).	
158	ANON-TWYQ-WP19-6	The PER states (page 6-47) that " <i>Pit development may</i> <i>result in a minor reduction in the amount of surface</i> <i>runoff reporting to areas immediately downstream of the</i> <i>Bungalbin East pits</i> ". There is a well-developed, south flowing drainage network at Bungalbin East. The total run-off from the south face of the ridge should be quantified (this would require the proponent developing a design storm for the project). The term " <i>minor</i> <i>reduction</i> " should also be defined. Would a <i>minor</i> <i>reduction</i> be a percentage of any given run-off event, or would it be an 'annual' value for a standardised rainfall year or would it be a percentage of run-off generated by a decaying cyclone? The proponent is expected to provide evidence as part of their impact assessment.	Appendix 9 A of the PER comprehensively addresses the hydrology of the Proposal. This includes a qualitative and quantitative assessment of the effects of a changed landform on the hydrology including during a "Peak Maximum Potential Flood" event. The assessment undertaken and supporting evidence provided is consistent with the requirements of the ESD.
159	ANON-TWYQ-WP19-6	The statement in the PER (page 6-47) " <i>Runoff from the</i> <i>WRLs may result in erosion and sedimentation</i> " requires further information to clarify where the erosion and sedimentation would occur, would it be on the WRL itself or next to the WRL? Furthermore the PER states (page 6-47) " given the concave slope design for WRL closure, there will not be a significant long term change in surface drainage direction, rate and quality" Further information is required to explain how a "concave slope design" is significant to long-term change in surface drainage patterns.	The second half to the sentence that the submitter has quoted goes on to say "but with appropriate management and sediment controls in place (see Section 6.4.2) and given the concave slope design for WRL closure (see Section 6.4.3), there will not be a significant long term change in surface drainage direction, rate and quality as a result of WRL development." The concave slope design has been selected as it presents a landform more aesthetically similar to a natural landform and does not present a significantly higher risk of erosion as detailed in the PER and Appendices.
160	ANON-TWYQ-WP19-6	Further information is required to justify how a concave slope design reduces the size of the disturbance area	Appendices 12-A, 12-B, 12-C, and 12-D provide extensive analysis and discussion on the merits of a



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		and achieves 'erosional stability' as per the statement on page 6-50 of the PER "A concave slope design is proposed for these WRLs to achieve a balance between constructability, size of the disturbance area, and erosional stability."	concave slope design. MRL has identified this as the best overall solution. If the regulator (DMP) would prefer a traditional batter and berm waste dump design, it has the capacity to mandate this through the Mining Proposal review and approval.
161	ANON-TWYQ-WP19-6	The proponent has not provided any design criteria for the WRL, other than to give a variable out slope geometry, a dump surface with a back-gradient of 5 degrees towards the centre of the dump, to drain internally, and rock armouring to prevent erosion where required. The basic design requirement for WRLs is to decide if the structure will be water harvesting or water shedding. Once this decision has been made then all other aspects of design automatically follow. It is assumed that the strategy adopted for the proposal is one of water harvesting, as all the dump surface water will be directed to a central drainage point. From the limited design data presented in the PER it appears that the dump outslopes and the internal drainage system would not be successful. The proponent should provide the rationale for the 5 degree surface slope. This is important in terms of the materials proposed for the surface of the dump, as a 5 degree slope is 8.8% (natural gradient ratio of approximately 1:11) and this gradient then requires examination of such factors as detachment thresholds and maximum non-scour velocities of the soils on the surface. The proponent should provide design details for the	MRL acknowledge that the WRL design criteria in the PER was preliminary in nature, but commensurate with the risk, and that a more detailed design criteria, addressing many of the respondents comments, will be developed in the Mining Proposal and Mine Closure Plan, in consultation with and approved by the DMP and DER. In essence the WRL was to be internally draining, as water shedding designs rarely work as it is difficult to control water movement and flows. As rightly pointed out by the Submitter, the inclusion of concave slope is counterintuitive for an internally draining WRL as water flows are allowed to flow down the slope, with the change in slope angle with distance resulting in a progressive decrease in flow velocity, facilitating vertical infiltration into the soil surface and minimising erosion and sediment loss. Although a concave slope design was selected for the PER, the final landform will be determined based on Landform Evolution Modelling (LEM), under a range of climatic conditions, to establish the optimal landform shape based on the materials available. The submitter is correct in saying that, for a 5° back- slope, erosion can become an issue and that the erodibility of the surface materials need to be considered. Although this is the case, it was not planned to extend the 5° back-sloping top surface to the centre of



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		central drainage system of the WRL. Including how it will work, how long it is expected to work and contingency measures in the event it does not work. Furthermore, the proponent should address the issues	the WRL (i.e. over distances of up to >50m), and instead it was only to apply around the perimeter of the top surface for a distance of around 10m (i.e. created using a 2-3 passes of a grader). Its primary function is to
		sedimentation of the internal drainage conduit, the te of water retained in the dump. Is it expected to ercolate down to the basal layers of the dump and then filtrate through the underlying sediments of the plain ecause the data presented in Appendix 12-A indicates is will not happen? Interpretation of particle size stribution data (page 4-29 of Appendix 12-A) indicate at the fines content, <i>ie</i> silt + clay content, of soil apping units 3 soils is high, averaging 25.2% over the p 50 centimetres of the soil profile. Further, the resence of Emerson Class 3 soils indicates that spersion is probable.	prevent surface water from flowing over the crest and instead direct water back towards the centre of the WRL. At a 10m horizontal distance and a 5° back-slope the resulting land surface is 13.3m long. Given the limited catchment area and slope length the flow velocity that will be generated on this slope will be negligible and will not require erosion protection. Any sediment that is generating will simply deposit out at the base of the slope. The upper surface of the WRLs, inside of the perimeter back-sloping surface will be flat to facilitate water infiltration and negate any erosional issues. Given the arid climate of the region, the movement of water
		million years, it is still there. The components holding the range together are competent rock types with low rates of physical weathering. Unless these attributes can be incorporated into the design of the WRL, then outslope failure of this structure can be anticipated.	permeability of the material at or below field capacity, as determined by the hydraulic conductivity. Consequently, the potential for surface infiltrated rainfall leaching through the 30m high WRL into the underlying <i>in situ</i> soils is thus considered a very low risk, and thus the
		A useful, but indeed normal, exercise is to impose some rainfall events onto the WRL design as proposed, and to see what happens. As the proponent has not given a design storm for the project, let's assume that a rainfall event with a return period of 100 years is the design storm, <i>i.e.</i> the ARI (average recurrence interval) is 1:100	potential for AMD to impact on the surrounding environment is also considered low. If DMP require this risk to be further quantified, MRL will undertake unsaturated (vadose) zone modelling through the WRL profile to confirm that basal seepage of potential metalliferous drainage is negligible and can be negated.
		years. The key issue to understand with storm rainfall is that the shorter the duration of the event, the greater the	the J5 or BE WRLs still remaining intact are very low





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		intensity, and hence the greater the kinetic energy of raindrop impact, <i>i.e.</i> the greater the rainfall erosivity. The longer the rainfall event, the lower the intensity and less kinetic energy from raindrop impact. Using a set of IFD (intensity, frequency, duration) curves generated for Bungalbin East, the 1:100 year return period curve shows that a 15' storm will rain at the rate of 110 mm/h (millimetres per hour), yielding 27.5 mm of rain in the 15 minutes, and a 72-hour event will rain at the rate of 2.6 mm/h. These two events will yield very different volumes of water for a given area. The surface area of the waste rock dump is assumed to be 78 ha (page 3-11, Appendix 9) for the following calculations. The 15' storm will result in 21,450 m ³ of water falling, and accumulating on the dump surface. The 72-hour rainfall event will result in 146,016 m ³ of water falling on the dump surface. The 15' storm will cause extensive damage, and erosion, because of the higher intensity (27.5 mm of rain falling in 15'). The proponent notes that rock armouring will be used to minimise erosion. Rocks are impermeable and therefore simply convert rainfall to surface runoff. If rock armouring, as a layer, is thick, comprises competent lithologies, and is polymodal (has multiple rock sizes), it can provide a very useful surface treatment for the management of meteoric input. It is noted that the proponent does not provide the infiltration rate of surface soils at Bungalbin East. This is a major omission in terms of revegetation, rehabilitation design, and mine closure planning for dump outslope	and that peneplanation of all landscapes will occur over this time period, irrespective of rock amouring. It is unrealistic to expect a constructed landform to last 60 million years. MRL will however commit to Landform Evolution Modelling (LEM), using SIBERIA or equivalent, under varying climatic conditions and storm events to determine how the WRL will evolve over time periods of >1,000 years. MRL agree with the submitter that a 15min storm event represents a higher risk to erosion than a 72hr event, given the intensity of rainfall. Under arid climatic conditions the surface soils generally exist in a 'dry' condition, with matric potentials typically approaching permanent wilting point (or 1,500kPa). The hydraulic conductivity function for these materials indicates that at these matric potentials the permeability is in the order of 10 ⁻¹³ to 10 ⁻¹⁷ m/s and thus infiltration excess overland flow occurs. During more prolonged rainfall events (i.e. 72hrs) the surface soils wet-up, increasing their permeability to values that are comparable to the rainfall intensity and thus surface runoff is significantly reduced as vertical infiltration of rainfall is favoured. MRL do not agree that rock armouring increases surface runoff due to the rocks being impermeable. The role of rock armouring is to interrupt surface water flows (i.e. reduce the flow length) and reduce the flow velocity, so that erosion is minimised. The challenge with rock armouring is finding the balance between erosion protection and revegetation sustainability, which are in effective mutually exclusive. For example, no erosion or surface water runoff can occur on a slope composed



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		specific design requirements to provide confidence that in the stability of the WRL structure. Further clarification is required regarding the upper surface of the dump. See for example Appendix 12-D, page 29, it is noted, on this page, as being both a level	ensure that industry best-practice is applied to PAF management to minimise any potential risks from AMD. A detailed waste dump design in line with these design principles and criteria will be included in the Mining Proposal submitted to DMP for approval under the
		surface (twice), at the third and sixth bullet points, but in the diagram at the top of the page, the dump surface is shown as having a gradient of 5 degrees (8.8%). When comparing, the data provided in Figure 8.2 on page 29 of Appendix 12-D. The reader is led to believe	WINING ACT 1978.



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		that the top left photo is indicative of what the final	
		outslope will look like on the Bungalbin East dump.	
		However, it would be normal for a large size crawler	
		tractor, such as a D9, to be used for the ripping	
		operation. The accuracy of the ripping operation is	
		dependent on three things, the weight of the bulldozer,	
		the particle size distribution of the soils, and the angle of	
		the slope. Under reasonably 'normal' outslope materials,	
		on an 18 degree slope (as proposed), a 'dozer will have	
		difficulty keeping a straight line along a surveyed contour	
		because of sown-slope slippage. Further, the finer the	
		material, the greater is the degree of slippage.	
		Consideration of the left hand photo in this figure	
		suggests that the slope is, at most, about 12 degrees or	
		21.3%, and the quality (evenness of ridge/trough	
		morphology) of the ripping suggests that a 'winged tyne'	
		was used. Use of a winged tyne at Bungalbin East has	
		not been discussed in the text, and the proponent needs	
		to provide more detail on the actual design proposed.	
		It is appropriate to look at the proposed surface	
		configuration of the WRL. The conceptual design of the	
		WRL (Figure 8.2) shows a surface with a gradient of 5	
		degrees, or a natural slope of 1:11. If we apply the dump	
		surface of 78 ha, and take off a 100 m segment to	
		accommodate outslopes, we end up with a dump surface	
		length of about 1500 m. The proposal is to have surface	
		water draining to a central disposal drain, which assumes	
		that it is half way along the dump. This means that the	
		central drainage point is half the long axis distance of the	
		dump, or 750 m.	
		Now the proposed surface gradient is 5 degrees, or	



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		about 8% or 1:11, which means that by the time the surface gets to the point of the drain, it will have fallen some 68 m which is more than twice the height of the dump, or the dump surface will be 38 m underground. Even at a surface gradient of 1 degree (1:57) the surface	
		will have fallen over 13 m which is about a third the height of the dump.	
		The proponent needs to revisit its strategy for dump management, and present a competent design that ensures long-term stability.	
		A comparison also needs to be made between ripping 12 degrees (21.3%), 18 degrees (32.5%), and 20 degrees (36.4%) slopes, in terms of outslope materials.	
162	ANON-TWYQ-WP19-6	The PER concludes that there is nothing unique, nor special about the HAR and that similar BIF formations occur throughout the local and regional areas. In terms of lithology, and generalised elevated ridge topography, this is correct. However, such a statement is incorrect in terms of the HAR landscape pattern. The HAR is unique. To fully appreciate this landscape pattern, view this area from space, using Google Earth, at an eye altitude of approximately 100 km. Then drop down to an eye altitude of about 14,500 m. At this eye altitude, the topographic complexity of the eastern section of the range (11 km in straight-line length) can start to be appreciated. The surface pattern of the eastern half of the HAR is not repeated anywhere else in	Western Australia's landmass is dominated by Archaean grantite-greenstone terrains in the Yilgarn and Northern Pilbara regions and Palaeoproterozoic to Archaean banded iron formations in the Hamersley Province. All of these rocks are billions of years old and the geological age of the HAR is not in any way unique. Similarly, the geological history of multiple deformation events is not unique. Rocks this old inevitably enjoy multiple tectonic events and the greenstone/BIF belts of the Yilgarn and Northern Pillbara are also pushed and pulled every time adjacent granite batholiths float up and down due to isostacy. Convoluted landforms commonly result, for example at the nearby Diehardy and Mt Manning ranges in the LAU. Any suggestion that the tortuous meandering
		 the Yilgarn. The reasons for this are: deposition of BIF in the Meso-Archaean: 	morphology of the] Bungalbin East ridge-line represents a paleo-channel is incorrect.



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		 early thrusting about 2.7 billion years ago, with granite emplacement; development of a tensional regime, accompanied by 	The PER concludes that the HAR is not rare or one of a few of its kind at either a local or regional level from a Landform perspective, and that the residual impacts on
		 granite emplacement; development of a compressional regime resulting in fault activation and shearing; 	andiornis will not be significant.
		 north-south compression, reactivating thrusts, and creating the box-like folds present at Bungalbin; 	
		 partial structural rotation, with dip reversal, at both ends of Bungalbin East; 	
		granite intrusion in the Yendilberin shear; and	
		• exhumation, subsequent supergene enrichment, and ferruginisation.	
		The presence of BIF geology is not unique. What is unique is the preservation of a structurally controlled landscape pattern, the genesis of which, can be traced back three billion years.	
		In addition, Bungalbin is a classic palimpsest, that is, it is a regional landform that has the imprint of two or more, geomorphological processes. Further, sediments along the summital convexity of the Bungalbin East ridge-line present compelling evidence that it was once a zone of deposition in a palaeo drainage system, and may be the vestige of an inverted landscape.	
		In addition to the points noted above, the HAR (East):	
		 contains landforms with unknown relaxation times, which may range from 130,000 years, the estimated duration of the current interglacial, or may have 	
	<u> </u>	already been achieved since the last glacial maxima	



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		 18,000 years ago; demonstrates preservation of landform response to climate change; demonstrates preservation of the evidence of past geomorphic processes; provides education and training opportunities in physical geography and geomorphology; provides research opportunities into vegetation/geomorphic relationships; and presents opportunities for research into the adaptation, and relict status, of flora and fauna. Such a record of landscape evolution in the arid zone of the Yilgarn, in a single 'BIF Range', should not go unacknowledged, and is worthy of protection and preservation in its entirety for all the reasons stated above. 	
163	The Wilderness Society	Throughout the PER, the proponent attempts to downplay the significance of HAR landforms and associated habitats. This contradicts previous advice from reports such as: as the 2007 'Strategic Review of the Conservation and Resource Values of the Banded Iron Formation of the Yilgarn Craton' which identified the HAR as "intact and protectable; high priority for conservation". One of the key recommendations in the 2007 BIF Strategic Review was that" <i>Examples of the most outstanding BIF ranges</i> <i>should be protected in their entirety where development</i> <i>has not significantly progressed, e.g. Mt Karara/Mungada</i> <i>Ridge (Blue Hills) and the Helena-Aurora Range</i> ". The proponent has made no attempt to adequately	The 2007 Strategic Review is appropriately acknowledged and put into context in Section 1.1.3 of the PER. The current Government policy of 2010 is detailed in Section 1.1.4 of the PER. Refer to MRL responses to submissions to the WA Family Bushwalkers Club submission number 285 in the Amenity section. The PER seeks to provide an objective assessment on the significance of the HAR, supported by a landforms study conducted and peer-reviewed by suitably qualified experts, that is consistent with the requirements of the ESD. The PER concludes that the HAR is not rare or one of a few of its kind at either a local or regional level from a Landform perspective, and that the residual





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		investigate, document or explain HAR landforms - their structural complexity and diversity, ecological significance, or the impacts of its proposed mines on these. This failure is clearly non-compliant with the requirements set out in the ESD for this project and renders the PER unacceptable as an environmental impact assessment report.	impacts on landforms will not be significant.
		The HAR landform is a unique and exceptional part of our natural heritage. The highest point of the range (704 m) represents the highest land for hundreds of km in any direction. The closest place that is higher is around 430 km away to the north-west. Whilst the current mining proposal would not remove this high point it would permanently destroy the views from it and to it. There are a number of BIF ranges in the Goldfield and Midwest, but very few have any land exceeding 600 m above sea level; in fact only three other than HAR:	
		 Mount Jackson has already been devastated by mining; part of the Die Hardy Range is a proposed Class A Reserve but the rest is available for mining; 	
		 Mount Manning Range, currently intact, is all available for mining (being categorised, like HAR, as "Other than Class A Conservation Park"). 	
		The highest point of any of these ranges is over 50 m lower than the 704 m summit of HAR.	
		No other range in the region is comparable in height, complexity or topographical prominence to HAR, which are critical parameters when assessing the aesthetic value of a range.	



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		The nature and scale of impacts to the unique and exceptional landforms of the HAR are in direct contravention of the EPAs landform objective (" <i>To</i> <i>maintain the variety, integrity, ecological functions and</i> <i>environmental values of landforms</i> "), and cannot be managed or mitigated to avoid this serious contravention.	
164	ANON-TWYQ-WP1E-J	Submitter acknowledges that the HAR is unique and an ancient part of the State's natural, geological and cultural heritage but argues that the entire state of WA is unique and ancient and therefore the HAR should not be treated differently to other parts of WA. Suggestions made that the HAR is " <i>the jewel in the crown</i> " of the GWW ignores the fact that the 160,000 km ² GWW has many " <i>jewels in the crown</i> ".	This submission is acknowledged.
165	West Australian Family Bushwalking Club Inc. (WAFBC)	 The submitter has provided a detailed submission in the form of a slideshow. This full submission is included at Attachment 3. The submitter contends that the proponent's assessments are misleading and do not provide a fair assessment of the landform and visual impacts. In particular: misleading landform comparisons with other ranges; misleading and irrelevant statistical assessments of the impacted areas; misleading photographic records of landform and visual impact; and non-existent consideration of aesthetic values in considering landform and visual impact. 	Refer to MRL responses to submissions to the WA Family Bushwalkers Club submission number 285 in the Amenity section.



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		 A quantitative evaluation of the landform of HAR relative to other BIF ranges using a range of measures that can be sensibly correlated with aesthetic values: 	
		 Absolute elevation – i.e. height of the range above sea level. 	
		 d) Topographical Prominence – i.e. how "peaky" the range is in terms of altitude changes between adjacent peaks. 	
		 e) Tortuosity – i.e. how the range "twists and turns" when viewed from above. 	
		The submitter contends that its work confirms that HAR is unquestionably the "jewel in the crown" of all the BIF ranges from a landform perspective being proven significantly superior to any other range on all the measures outlined above.	
		6. Evaluation of the visual impact of the proposed mines, through GIS based viewshed analysis and scientifically precise photo montages from key view points throughout the range. In any range of hills, most of the significant viewpoints will be from the hills and ridges. Such locations are conspicuously absent from the proponent's submission and hence cannot be considered a representative or fair assessment. Our submission conclusively illustrates the devastating impact that the proposed mines will have on the significant views from the range and the total destruction of the wilderness experience.	
		 A "walkthrough" over half the East Bungalbin open pit, which through a series of 90 georeferenced 	



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		photos, we have documented the myriad of amazing rock features that will be destroyed forever (including caves, cliffs, buttresses, overhangs, towers and tunnels). This is in stark contrast to the proponent's assessment where there is a general downplaying of the steepness of the terrain and only occasional mention of any such features and minimal (and only poor quality) photographic evidence thereof.	
		Please note that any identifying photos (people included) have been removed from Attachment 3.	
		The submitter states that based on its submission it is considered that sufficient information is provided to aid the EPA in concluding that a strong rejection of the proponent's mining proposals at J5 and East Bungalbin is appropriate, based on landform values and visual impact. In addition, the WAFBC requests that the EPA should recommend that HAR be provided permanent protection through being declared as a Class A Reserve – National Park. The submitter contends that the information contained in its submission confirms that from a landform perspective such a status is completely appropriate.	
		Please have regard to the detailed submission at Attachment 3 and provide a full and reasoned response to the issues presented. The submission relates to the landforms and amenity factors.	
166	Helena and Aurora Region Advocates Inc.	While it may be accurate that in terms of integrity " … the HAR has similar levels of intactness (>99%) as the Die Hardy Range, Dryandra Range, Hunt Range,	The submitter's opinions regarding the environmental acceptability of the proposal are noted. The PER seeks to provide an objective assessment on the significance





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		Johnston Range, Lake Giles Range, and Mt Manning Range" these ranges do not have a similar significance. The submitter considers that three of these ranges are significant (Die Hardy Range, Mount Manning Range and HAR). However, none of them are secure or protected from mining. It is not unlikely that proposals have or are likely to be put forward in the near future by the mining industry. The proponent refers to the percentage impacts from the proposal on the HAR as small, however the impacts to the integrity and intactness of the range is not considered small. The proposal would irreversibly destroy two of the six identified landforms on HAR, including what we refer to as the main range (Landform 4), which supports the two Threatened Flora species and provides the greatest variety of habitats for flora and fauna. This would be a significant loss to the community, a loss to our Heritage (our natural heritage, geoheritage, Aboriginal Heritage and European Heritage). The proposal is considered to be environmentally unacceptable. A more accurate representation of the proposed impacts on HAR (including mine pits, WRL and associated infrastructure) would be to calculate the impact on the	of the HAR, supported by a landforms study conducted and peer-reviewed by suitably qualified experts, that is consistent with the requirements of the ESD. The PER concludes that the HAR is not rare or one of a few of its kind at either a local or regional level from a Landform perspective, and that the residual impacts on landforms will not be significant. Table 6-6 of the PER reports the disturbance to the landform in exactly the form the submitter requests. The actual impacts to L3 is calculated as 16.4% and to L4 as 7.6%. Note that this is significantly lower than the submitter's estimate of 25-30%.
		individual landform unit it occurs on. Thus, Bungalbin East mine would be calculated as area of impact on Landform 4 and given as a percentage (possibly an impact closer to 25% or 30%), and J5 would be the percentage area impacted on Landform 3.	
167	Helena and Aurora Region Advocates Inc.	The ESD for J5 and Bungalbin East required a comparison of HAR with other BIF ranges within the Regional study area (defined by the OEPA). However,	The influence of the geology on the topography and in turn on the botany at a local scale is recognised. However the differences in botany of the different BIF



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		 while the Landforms for HAR were defined they were not defined for the regional BIF landforms. While the rationale behind how the regional BIF ranges were defined (and HAR re-defined for the comparative analysis) is probably more than sound, the effect was for the lower hills of some of the ranges not to be included in the analysis (refer to Figure 3.1 in Appendix 6A and Figure 6.3 in the PER). The HAR and regional BIF landforms have not been assessed at a sufficiently detailed enough scale, to determine the significance of HAR. It is acknowledged that the HAR was investigated in more detail than the regional BIF ranges, however, the lack of detail collected for the regional BIF regions meant that a full comparison could not be made between HAR. The similarities rather than the differences between the BIF ranges were the focus by both Geoscope and the main PER document (e.g. they are all BIF ranges, they are all elevated landforms with a similar range of heights (AHD), and all have a range of gentle to steep slopes). While the Landforms key environmental factor does not specify geoheritage there are many overlaps in the criteria that are used to assess geoheritage and landform. In particular, scientific importance, which relates to geological importance and therefore 	ranges are more likely to be due the geographic isolation of the BIF ranges over time. The high biodiversity of the HAR is accepted as being due to its southerly location putting it in a zone of higher rainfall than more northerly BIFs (Gibson et al 2012), rather than any differences in geology or landform. This is discussed in detail in Appendix 6-A. The submitter is referred to the work of Gole and Klien (1981) ⁷² for a global comparison that notes the remarkable similarities of coeval BIFs, including Yilgarn BIFs and to Klien (2005) ⁷³ for further global similarities and the correlation between the abundance of similarly aged BIFs and the global increase in O2 levels. A petrographic (i.e. microscopic) analysis of the BIFs of the region is beyond the scope of the ESD. Geoheritage is addressed at issue number 15 in the table of responses to OEPA's issues.

 ⁷² Gole M and Klein C, 1981, Banded Iron Formations Through Much of Precambrian Time, The Journal of Geology, Vol 89, No 2, pp 169-183
 ⁷³ Klein C, 2005, Some Precambrian BIFs from around the world: Their age, geologic setting, mineralogy, metamorphism, geochemistry and origins, American Mineralogist 90 (10)

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		geoheritage. Geoscope states that flora and vegetation are significantly different between the BIF ranges (determined from botanical surveys on the regional BIF ranges by Gibson, Lyons and several other botanists), yet indicates that these differences are independent of the geology of the landforms or even the landforms themselves.	
		In the absence of a detailed comparative geological study, Geoscope did not have the information available to determine if habitats provided by the BIF landform influenced the flora present.	
		An independent assessment by Geoheritage Australia Inc. recognises that there is complexity and variation in ironstone rocks and ironstone ranges such that " in WA there are micro-compositional difference, micro- structural difference and metamorphic differences that will affect the microhabitats of ironstones for microbiota and hence macrobiota such as plants." "Proper comparative analysis would require a petrographic and textural and micro-structural study"	
		The BIF ranges have many different climatic conditions that occur, including scorching heat to downpours. It is considered that a desktop analysis for wetness index is limited, particularly if it is based on slope aspect and elevation alone. Substrate is very important. While a wetness index could be extremely useful in describing the different habitats available on the range and their respective water availability it would require onsite visits to map the different substrate types. Water availability would be very dependent on the type	



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		of rocks present as well as position in the landform. BIF rocks with high iron content (absence of jaspilite or quartz) absorb and hold water – a benefit to BIF dependent plants. Observations of rainfall falling on BIF debri slopes do not have a high run-off, rather the water is absorbed in to the soil or between crevices in the rocks. Cryptogram cover on the surface of shallow soils also enhance water infiltration.	
		Under heavy rainfall conditions run-off must occur as many small creeks are evident on the HAR slopes. By contrast, on disturbed ground, such as vehicle tracks the amount of water run-off is high, even under light rain conditions. <i>Neurachne annularis</i> (a very soft bunch grass that grows like spinifex) grown on the debri slopes of HAR and on the upper slope side of plants collects soil that is washed downslope by water run-off. This is a very significant ecological relationship between this grass species and the natural erosion process involving water and soil movement as well as water infiltration on the slopes of the range.	
		It is therefore likely that at least some of the differences seen between BIF ranges in flora and vegetation communities is a reflection of differences in the geology and geomorphology of the different BIF ranges (also a suggestion suggested by Gibson in the PER to explain the different chemistry in the BIF soils thought to influence plant species distribution).	
168	Helena and Aurora Region Advocates Inc.	 The HAR is the only BIF range in the region that: Supports tall stands of <i>Eucalyptus capillosa</i> subsp. <i>capillosa</i> (Inland Wandoo or White Gums) high on its hill slopes - in addition to stands situated low on 	The submitter restates some floristic values of the HAR that are comprehensively documented in Chapter 5 of the PER. The link between landform and these values is





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		debri slopes near duricrust outcropping, as occasionally seen at other BIF ranges (e.g. Mount	discussed including reference to the appropriate scientific literature in Appendix 6-A.
		 Jackson Range). Has two rather than just one <i>Lepidosperma</i> species (sedge) present (<i>Lepidosperma bungalbin</i> (P1), <i>Lepidosperma ferricola</i> (P3)), which grows in distinctly different BIF habitat. Sedges are uncommon in this region compared to vegetation in the south west of WA. 	The assessment undertaken for the PER is consistent with the requirements of the ESD. An expert peer-review of the landforms study concluded that a sufficient outline of the landform and its geomorphological function was provided to allow conclusions to be drawn that allow the assessment criteria to be evaluated (see section 6.2.2 of the PER).
		 Has two not just one rare plant species that grows out of fissures in the BIF rocks and outcropping (<i>Tetratheca aphylla</i> subsp. <i>aphylla</i> (T), <i>Leucopogon spectabilis</i> (T)). Supports 13 priority plant species (wherever you) 	Notwithstanding the above, additional information has been provided in Appendix D – Topographic determinants of habitat suitability for rare ironstone plants in semi-arid Western Australia (DiVirgilio et al, 2016). This report explores the link between the
		stand on the range you are surrounded by three to five Priority plant species – this is exceptional).	landforms physical characteristics and other environmental variables with preferred habitats for the
		 Supports five plant species endemic to the range (<i>Tetratheca aphylla</i> subsp. <i>aphylla</i> (T), <i>L. spectabilis</i> (T), <i>L. bungalbin</i> (P1), <i>Acacia adinophylla</i>, <i>Acacia</i> <i>shapelleae</i> (P1)) 	conservation significant flora species.
		 Supports 10 BIF dependent plant species (<i>Banksia</i> arborea (P4), Grevillea georgeana (P3), <i>L. bungalbin</i> (P1), <i>L. ferricola</i> (P3)), <i>Tetratheca aphylla</i> subsp. aphylla (T), <i>Leucopogon spectabilis</i> (T), <i>L. bungalbin</i> (P1), <i>A. adinophylla</i>, <i>A. shapelleae</i> (P1)) 	
		All of these observations indicate that there must be a much higher variety of 'BIF habitat' being provided by HAR than other BIF ranges in the region - to support so many plant species with very specific habitat requirements (a reflection of why they are rare). This is	



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		most likely to be a combination of the size of HAR, twists and turns in the hills, variety of BIF outcropping including caves, combination of very steep to gentle slopes and the geology of the range. Gibson <i>et al.</i> 2010 suggests that soil chemistry is important on BIF ranges in determining distribution of BIF specialists (BIF dependent species) and that we do not currently understand the role and importance of the geology and geomorphology in determining plant species distribution and changes in habitats provided by a BIF range. A desktop review would be insufficient to determine	
		these differences. Indeed, several site visits would be needed to make a valid assessment, including site visits to all of the BIF ranges, which does not appear to have occurred, other than a brief three day visit to HAR. While the submitter believes that the landform assessment 'fell well short of the mark', it is acknowledged that the EPA did not specify the methodology for assessing the landforms, and that the assessment of landforms is relatively new in the assessment process. However, in WA, there are people with the level of expertise required.	
		The submitter does not believe that the proponent, based on the information provided, is able to determine the significance or uniqueness of the HAR landforms. Geoheritage was unable to make a geoheritage assessment based on the information available in the PER and associated Appendices. This is a significant gap in the PER. It is fundamentally about scale and detail, we all know that it is a BIF range and that there are several BIF ranges in the area. This area is	



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		inadequately studied from a geological and geomorphology perspective.	
169	Helena and Aurora Region Advocates Inc.	The treatment of haematite-rich laminated and banded ironstones in the HAR as described in the PER does not address the complexity and variation, as a result valid regional and State-wide comparisons cannot be rationally made. Proper comparative analysis would require a petrographic and textural and micro-structural study to define the State-wide variation in ironstones to legitimately conclude that they are the normative of ironstones in WA. The EPA also stipulated requirement that the significance of the potentially affected landforms should be characterised in a local and regional context, having regard to variety, integrity, ecological importance, scientific importance and rarity. In particular, 'scientific importance', this can be related to geological importance (and by extension geoheritage significance). As such, coarse specular haematite as at Koolyanobbing would be scientifically significant and have needed to be addressed in an assessment. This would have required some detailed comparative geological studies. The PER did not do this. Ecologically, this regional geological variation in laminated and banded ironstones will determine	Refer to response 167 above and to Appendix 6-A.
		variation in microhabitat characteristics for plants in a given biogeographic region and within a single	
		biogeographic region (<i>cf.</i> , discussion of this microhabitat	
		vegetation such as mangroves the microhabitat control	
		in Semeniuk 1985 and Cresswell & Semeniuk 2011). In	
		this regard, the comparative treatment of laminated and	



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		banded ironstones in the PER, even from the point of	
		view of a literature review, is inadequate to show how	
		regionally similar, or unique, or different the ironstones	
		of the HAR are to other ironstones in WA.	
		Given that there is a regional variation in rock types	
		which the PER did not address, there is also an extant	
		regional variation in climate from tropical humid in the	
		Kimberley region to tropical arid in the Pilbara region, to	
		subtropical arid to semiarid in (various parts of) the	
		Yilgarn region. This climatic difference will have differing	
		effects on how the ironstone will weather and create	
		landforms. This has not been addressed in the PER	
		such that statements on how regionally similar, or	
		unique, or different the ironstones of the HAR are to	
		other ironstones in WA cannot be made.	
		Different parts of WA have experienced a distinct	
		Cainozoic climate history. Given that rocks (and	
		ironstones) experience specific types of weathering and	
		erosion depending on their climate setting (Hunt 1972;	
		Buol et al. 1973; Arnold 1983; FitzPatrick 1983; Leeper	
		& Uren 1993), this means that the Cainozoic climate	
		history will be reflected in differing landforms, differing	
		geochemical and soil responses, and development of	
		different but evolving microhabitats. Considering the	
		microhabitat control of plants as discussed in Semeniuk	
		& Cresswell (2013), the Cainozoic climate history will	
		have had an effect in plant response. This means that to	
		compare landscape and vegetation in a robust manner	
		from a regional and State-wide, the complex issue of	
		Cainozoic climate history and its effect on developing	
		habitats and microhabitats needs to have been	



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		addressed. This was not carried out in the PER.	
170	Helena and Aurora Region Advocates Inc.	The detailed geomorphic study of the HAR using slope, wetness index, and aspect, solar radiation, <i>etc.</i> , initially appears to be systematic and thorough, however, there is no supporting data presented, and no empirical calibration of the models used. Quoting from Appendix 6-2: " <i>A three-day site visit (including travel) was</i> <i>conducted Field observations and data were</i> <i>recorded at Sites 1-26 (Figure 2-2) in relation to the</i> <i>following landscape character units and features:</i> <i>Landform; Waterform; Vegetation; Disturbance; Land</i> <i>use features</i> ". This seems insufficient time to collect quality data to calibrate the desk-top analyses undertaken in the PER. The PER used a method of six landform analysis criteria (elevation, slope, aspect, Topographic Position Index	The 3 day site assessment relates to only a small part of MRL's efforts in the landform impact assessment. For example, 4 company geologists spent 6 months field mapping the Helena Aurora Ranges in detail. The results of this work are presented on pages 6-11 to 6-16 of the PER and inform MRL's understanding of the environmental values of the proposal. For example, troglofauna habitat is directly linked to the mapped geology in Appendix E. In addition, MRL sponsored a \$100,000 post-doctoral research fellowship with Curtin University to understand the links between topography and other environmental variables with plant richness and endemism. The manuscript of the work is included on the CD provided with every hard copy of the PER.
		(TPI), Wetness Index, and solar radiation, but calibration of some of the models does not seem to be have been carried out. While the various parameters for landscape analysis should be and have been addressed at a level, there is a need for empirical data and calibration. The original studies dealing with the application of these principles and concepts by various original authors cannot be applied indiscriminately anywhere in the World without some degree of calibration by field data, <i>i.e.</i> , model validation. The matter of the Wetness Index (which in the literature is termed 'topographic wetness index', or TPI) and water availability can serve as examples. The Wetness Index is more complicated to apply than just assessing/determining slope (<i>cf.</i> Sørensen <i>et al.</i> 2006).	Additional information has been provided in Appendix D – Topographic determinants of habitat suitability for rare ironstone plants in semi-arid Western Australia (DiVirgilio et al 2016). This report explores the link between the landforms physical characteristics and other environmental variables with preferred habitats for the conservation significant flora species. The landform assessment was peer reviewed by Dr Karl-Heinz Wyrwoll for The University of Western Australia's School of Earth and Environment (Appendix 6-B) who concluded "The report outlines the general landform attributes of the HAR and goes some way towards providing a conceptual overview of the geomorphological function of the landform. In this, a sufficient outline of the landform and its



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		The Wetness Index and water availability were determined in the PER mainly by elevation and slope. This Wetness Index was developed over the HAR to show the accumulation of flow relative to the landform slope and catchment areas to show the hydrological process at work in the region and identify areas of flow accumulation relative to the range and proposed disturbance areas. According to the PER, the HAR, J5 pit and Bungalbin East pit all rated low on the Wetness Index due to the high level of runoff from these areas. The lowest rankings are recorded in areas with steep slopes such as the tops of ridges, breakaways and cliff faces on the more south-facing components of the HAR. However, there are problems with such desk-top analyses as carried out in the PER - after rainfall, how much of the water will be involved in run-off and how much will infiltrate will depend on the intensity of rainfall and on the nature of the substrates that intercept the rainfall and any run-off. Ironstones notoriously are fractured and act as fractured rock aquifers, and scree slopes can act as sheet-like and lensoid 'sponges' to rainfall and sheet flow. Without mapping the nature of the terrain (fractured rock outcrops and subcrops, versus porous scree, versus impermeable shales) and simply using elevation and slope as the major components/determinants for assessing the Wetness Index is not valid (<i>cf.</i> , Sørensen et al. 2006). The same problems of lack of calibration and the indiscriminate application of a model to the HAR apply to	geomorphological function is provided to allow conclusions to be drawn that allow the assessment criteria to be evaluated." Dr Wyrwoll's comments were used to improve the landform assessment as detailed in Appendix 6-B to the PER. The detail that the submitter is suggesting was not a level of detail that the EPA required in the ESD, or in the recent assessment of the Landform factor on recent 2016 BIF Proposal assessments at Koolyanobbing F Deposit, Mt Gibson, or Blue Hills.



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		(Rich 1990; Rich <i>et al.</i> 1994) but each approach essentially is just modelling. For the HAR, without cloud cover estimates and dust flowing high-wind periods, for instance, there will be variations and, as such, this method does not appear to have been calibrated empirically.	
		So, the major criticism of the approach using Wetness Index and Solar radiation is that, as models, they do not seem to have been calibrated/validated with empirical field data. Further the Wetness Index is meaningless without a framework of the distribution of substrate types in the area that would intercept rainfall to result in differential run-off and differential infiltration.	
		In the matter of scree slopes that act as 'water sponges' to rainfall, and fractured rocks that structurally can have subcrop expression further down slope, there can be seepage zones that become ecologically important area (<i>cf.</i> , Semeniuk 1983; Mathews <i>et al.</i> 2011). This matter has not been address in the PER.	
		For what purposes have the analyses of land units for elevation, slope, wetness index, solar radiation been carried out? It appears to have been an objective, firstly, to attempt to characterise the landscape rigorously so that comparisons can be made from a geomorphic point of view and, secondly, so the combination of physical attributes of landform will result in a (perhaps mathematically) definable habitat for vegetation.	
		The issue here is that even if the landscape assessment and characterisation using elevation, slope, wetness index, and solar radiation were valid, there has been no mapping of vegetation communities at a subregional to	



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		local scale in Chapter 5 to correlate with the landscape units (<i>cf.</i> Cresswell <i>et al.</i> 2011 for Kimberley region vegetation; Semeniuk 1993 in the Stirling ranges; and C A Semeniuk 2007 for the Becher wetlands).	
		If the objective was to attempt to characterise the landscape rigorously, without any ecological implications, so that comparisons can be made regionally and perhaps WA wide, then it has been unsuccessful. Without calibration of the wetness index and solar radiation models, the map results could be artefacts. Further, and importantly, there needs to be a comparison of other lithologically similar ranges in the region, to the same level of analytical detail, to make comparative conclusions, but this was not carried out.	
		There is a lack of definitive method for comparative assessment for landscapes in the PER. Some form of systematic (semi-quantitative or quantitative) and rigorous method should have been applied.	
		The use of (topographic) water index and solar radiation to characterise the landscape at HAR should be discounted as they have not been calibrated with field information. This particularly applies to the wetness index, as the variety of rock types, sediments, and soils that will influence water run-off, water retention, infiltration, and seepage have not been addressed and these latter factors will have profound influence on the 'topographic wetness index' and on plant communities.	
171	Helena and Aurora Region Advocates Inc.	Table 6-3 of the PER (page 6-12) appears to be inconsistent with terminology issues or concept issues. Some examples include (not an exhausted list):	The lithological descriptions in Table 6-3 are accurate and should be read as a legend to the geological map in Figure 6-5 where the scale of observation and



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		 Depending on the concept of scale utilised, 'banded iron formation' can and should be applied to the Formation scale or to sample scale. An example is the Dales Gorge Member is a 'banded iron formation'. The term is also applied to the sample scale, that is, a sample of laminated rock of alternating Fe-oxide and silica laminate is referred to as 'banded iron formation'. The lithology of alternating Fe-oxide and silica laminate is referred to as 'banded iron formation'. This duality of application has created confusion amongst geologist 	geological continuity is clear.
		 The PER confuses use of the terms jasper, chalcedony, chert, and quartz. For instance, "Jasperlite rich BIF" is defined as an "iron-rich, prominently red chalcedonic quartz which occurs in the BIF and banded chert horizons". Is the rock 'jasperlite', 'chalcedony', or 'quartz'. 	
		 In its description of BIF (siliceous BIF), Table 6-3 describes it as mm to m scale beds of alternating silica and ironstone (magnetite, hematite, and commonly goethite) – this is describing the 'banded iron formation' at a formational scale describing it as "Millimetre to metre scale beds of alternating silica and ironstone", but goethite is not part of the definition of a BIF. Goethite is the weathering product of the haematite and magnetite that comprise the laminate of laminated ironstones (the 'BIF' of the PER). Further, in Table 6-3, the PER states that "Many variations of BIF are found across the range including abundant red jaspilite, pale cherts and enriched bodies of goethite and 	



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		 sometimes hematite." Red jaspilite, pale cherts and enriched bodies of goethite are not variations of 'BIF' they are separate rock types and, as mentioned above, goethite is a weathering product of ironstones. Finally for the entry of "<i>Millimetre to metre scale beds of alternating silica and ironstone</i>", there are alternating millimetre-sized laminate of silica and haematite (or magnetite), not ironstone. At the lamination level there is not lithology, but minerals. It is the totality of the laminated rock that makes it an 'ironstone'. There is no such rock as 'banded iron goethite'; rather there is goethetised banded iron formation (in the terms of the PER), or goethetised laminated 	
		ironstone (in my terms).	
172	Helena and Aurora Region Advocates Inc.	While Figure 3-5 in Appendix 6-A shows dipping strata, does the lithological contacts shown in Figure 3-4 imply that the strata are vertically dipping?	Yes. The strata at Bungalbin East dip moderately to the north-west and the strata at J5 are vertical.
173	Helena and Aurora Region Advocates Inc. Wildflower Society of WA ANON-TWYQ-WPBH-6	<u>Variety</u> This was not adequately addressed in the PER in that while the HAR was described in some detail (and therefore it may be said that they are a good or important example of their type of landform), the equivalent landforms in the region were not described to the same level and, as such, it cannot be ascertained whether HAR is adequately represented as landforms in the region. <u>Integrity</u>	The PER contains an adequate assessment of the landform factor consistent with the ESD and to a similar level of detail (if not more detailed) than recent PERs on BIF Proposals deemed to be acceptable by the EPA. Please also refer to the response to Issue 14 in this regard.
		For the HAR itself, this matter appears to have been adequately addressed in the PER. However, if the issue	



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		of integrity is extended to beyond the HAR (i.e., to the adjoining ranges), then equivalent landforms in the region do not necessarily satisfy this requirement.	
		Ecological importance	
		This was not adequately addressed in the PER.	
		Scientific importance	
		To a large extent, this was not adequately addressed in the PER; in particular the importance of the geology was not covered at all. Evidence of past ecological or biological processes would be particularly difficult if not impossible to determine, but the importance of the area geomorphologically and geologically either was not adequately addressed or was not addressed at all in some aspects of geology. <u>Rarity</u>	
		Given the lack of a similar study to the same level of detail for ranges elsewhere in the region, this was not adequately addressed in the PER.	
174	ANON-TWYQ-WP4P-Z	The PER (page 6-53) indicates that the mine and associated works would have a relatively minor overall landscape impact.	The visual impact of the proposal is clearly considered in Appendix 10-B of the PER.
		"No landforms have been removed from the HAR, but surface disturbance is present within these landforms. This means that the HAR is largely complete and in relatively good condition, but is not pristine. The additional disturbance as a result of the Proposal is small relative to the extent of the landforms within the LAU. The Proposal will increase the disturbance area by 6.01 % to 6.48 %. This does not represent a significant impact on the integrity of the landforms".	

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		However, the submitter contends that the visual integrity of the HAR, during and following mining would be manifest, prominent and permanent. The PER downplays the impacts from the proposal. To the contrary, impacts to the Ecological Values of BIF formations, and HAR in particular, will be profound.	
175	BHLF-TWYQ-WPJV-V ANON-TWYQ-WPBH-6	The PER does not recognise or properly assess the outstanding geomorphological values of the site, and the fact that this BIF is a remnant of one of the oldest landforms on Earth. The geology of the site is approximately 2.6 billion years old. This age factor alone is reason for total protection of the area as a window into past landscapes. Mining will impact the landform which cannot be replaced. It is unacceptable to attempt to justify that only a portion of the site will be impacted. There is not much of this ancient BIF landscape remaining and this BIF must remain untouched. The ecosystems and vegetation assemblages on BIFs are completely different from those on surrounding landscapes and each BIF has unique species. These evolutionary remnants from ancient BIF landscapes are exceptionally precious assets of environmental, social, and Aboriginal heritage value. The ecological functions of the HAR would be implace. Therefore the above EPA objective would not be met. The environmental values of this ancient landscape would not be maintained.	The relevance of the geological age of the HAR is discussed in the response to issue number 162. The submitter's view on the environmental acceptability of the Proposal is noted.
		Therefore it is environmentally unacceptable and on	



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		these grounds alone the proposal for all mineral exploration, all disturbance, and mining should not be approved on any of the J5 and Bungalbin East BIF.	
176	ANON-TWYQ-WP4A-H	The HAR is 99.6% intact representing a pristine and relatively undisturbed landform (albeit a few access tracks). The section of landform within the Bungalbin East pit area is the most interesting and diverse featured (geology, caves, overhangs, unique vegetation, gullies, cliff faces, outcrops, monoliths) section of the entire HAR and these features are not displayed to this scale elsewhere on the Range. Because these diverse features are represented over such a small area and extent with good public access, it is the most visited section of the Range. Removing this area of landform will have a significant residual impact on the variety and integrity of the landform features of the HAR that cannot be mitigated or offset, therefore the EPA's objective for Landforms cannot be met.	The submitter's view on the environmental acceptability of the Proposal is noted.
177	33; 81; 109; 318 The Subaru 4WD Club of Western Australia Inc ANON-TWYQ-WPP9-5 ANON-TWYQ-WPPG-K ANON-TWYQ-WPPQ-W ANON-TWYQ-WPPQ-W ANON-TWYQ-WPF1-K ANON-TWYQ-WPF1-K ANON-TWYQ-WPF9-U ANON-TWYQ-WPF7-S	 Submitters raised concerns about the impacts of the proposal on the Helena Aurora Range landforms such as: The complex and varied landforms of this unique BIF range are ecologically crucial, scenically beautiful and a major attraction for visitors. The mining proposal at Helena and Aurora Range will remove 3.8 km of the Range and will mean that there will no longer be a banded-ironstone range (BIF range) in the GWW that remains intact highlighting the urgency and importance of protecting it. 	The major attraction to visitors is presently limited to 340 vehicles per annum. Through the infrastructure and funding that only mining can potentially bring, the HAR could attract more visitors in the future. The submitter's state that "there will no longer be a BIF range in the GWW that remains intact" and then go on to contradict this with "the HAR is one of only 9 BIF ranges in the GWW". The more accurate and relevant comparative analysis (including intactness) of BIF Ranges in the OEPA regional study area is presented in Table 6-2 of the PER.


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	Bird Life Australia	The Helena and Aurora Range is one of only nine	
	ANON-TWYQ-WPFV-R	BIF ranges in the Great Western Woodlands. These	
	ANON-TWYQ-WPFU-Q	ancient rock outcrops form terrestrial islands within	
	ANON-TWYQ-WPF6-R	sandplains and granite outcropping BIF ranges are	
	ANON-TWYQ-WP4E-N	ecologically important for three reasons:	
	ANON-TWYQ-WP4M-W	a) They provide niche habitats not found in the	
	ANON-TWYQ-WP4S-3	surrounding landscape. These habitats were	
	ANON-TWYQ-WP4U-5	Created by the topography of the ranges. They include rock fissures, crevices, and	
	ANON-TWYQ-WP4V-6	caves, which retain moisture.	
	ANON-TWYQ-WP4N-X	b) They are reservoirs of genetic diversity with high	
	ANON-TWYQ-WPBA-Y	levels of species endemism and richness. This genetic diversity evolved with increased aridity in	
	ANON-TWYQ-WPFD-6	this landscape, a process which 'marooned' species	
	ANON-TWYQ-WP47-7	on BIF ranges and enabled them to persist in the rock fissures, crevices, and caves. It has led to flora	
	ANON-TWYQ-WP4T-4	and fauna species that are dependent on BIF	
	ANON-TWYQ-WPZ9-F	habitats. Some of these flora and fauna are endemic to individual BIE ranges	
	ANON-TWYQ-WPZZ-G	c) They act as areas of refuge for fauna because they	
	ANON-TWYQ-WPZS-9	retain moisture and provide shelter in a semi-arid	
	ANON-TWYQ-WPZ6-C	environment.	
	ANON-TWYQ-WPFG-9	All of the BIF ranges in the GWW are covered by	
	ANON-TWYQ-WPFF-8	mining tenements and have either been mined,	
	WA Native Orchid Study	approved for mining, or are under mining	
	and Conservation Group	'Class A' conservation reserves.	
	Inc.	Approving this mining proposal will seriously and	
	ANON-TWYQ-WPJE-B	irreversibly damage the unique natural values of the	
	ANON-TWYQ-WPBP-E	"jewel in the crown" of the GWW, the BIF range in	
	ANON-TWYQ-WPJ7-W	the GWW with the most unique natural values, and	
		"one of the more significant biodiversity assets in	



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	ANON-TWYQ-WPJB-8 BirdLife WA ANON-TWYQ-WPJN-M ANON-TWYQ-WPJU-U ANON-TWYQ-WPBJ-8 ANON-TWYQ-WPBK-9 Pew Charitable Trusts ANON-TWYQ-WPBQ-F ANON-TWYQ-WPJC-9	 WA" (EPA Bulletin 1256 2007). Its natural values include scenically-beautiful landforms containing: Wilderness views from all points of the range. Most spectacular BIF outcropping, caves, and rock faces in the GWW. Most convoluted series of hills of all the BIF ranges in the GWW. Largest, highest, most topographically prominent BIF range in the GWW/Coolgardie Bioregion (704 m above sea level, 200 m above landscape). Surrounded by vast Salmon Gum and Gimlet woodlands and sandplains. The direct and indirect impacts of this proposal, including mine pits, waste rock dumps, mining infrastructure and haul roads would permanently alter and devastate the range's unique landform-related ecological, aesthetic/scenic and visitation values. 	
178	ANON-TWYQ-WPZ3-9	The proponent's documentation shows in exhaustive detail both that landforms are essentially intact and that the two mines will irrevocably and permanently destroy the landform as it is. The PER shows in even closer detail that the landform will be lost should a compromise be sought.	MRL acknowledges the submitters statement.
179	ANON-TWYQ-WPB8-P	PER Section 6.2.2 - The defined LAU must be challenged. The PER defines the LAU to make the impact of the proposal appear as small as possible. To	The LAU and regional study areas were defined by the EPA in the ESD. MRL considers that the boundaries are appropriate.



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		achieve this the proponent have avoided stating the impact of the proposal on more highly elevated parts of the HAR. The claimed 6.48% disturbance is across the whole of the HAR, not relative to land found at significant elevation.	An analysis of the physical characteristics of the affected landforms compared to the overall HAR was included in the Landform Impact Assessment (Appendix 6-A to the PER). This includes % impacts per elevation, slope, aspect, topographic position, wetness and solar radiation variables in Tables 3-3 to 3-8.
		The proponent should be required to base their calculations on percentage of area of land that will be destroyed relative to significant elevation. The landform study should be redone so that disturbance/destruction percentages are relative to land at elevation. For example: For J5, what percentage of all land located above 450 m would be disturbed/destroyed? For Bungalbin East, what percentage of all land located above 600 m would be disturbed/destroyed? A thorough study should be done so that percentages of disturbed/destroyed land is calculated relative to a series of elevations.	 To answer the submitter's specific questions, by restating the data in Table 3-3 in a cumulative manner:, J5 affects 60.4 ha above 460mRL compared to 3,400ha meeting this criterion across the landforms of the HAR (1.8%) Bungalbin East affects 48.4ha above 600mRL compared to 376 ha meeting this criterion across the landforms of the HAR (12.9%) MRL notes that the Bungalbin East deposit is located on a relative low part of the HAR as the iron ore is more susceptible to erosion than the unmineralised BIFs. There are eight high points on the HAR greater than 660mRL, all of which are outside of the disturbance area. One of these was recently excluded from the northern end of the Bungalbin East disturbance area by the S43A change to the Proposal (refer Attachment 1 for details).
180	ANON-TWYQ-WPB8-P	PER Section 6.5 - the proponent claims the current level of landform disturbance is 0.47% and that the proposal would increase disturbance to 6.48%. This claim must be challenged. Much of the J5 and Bungalbin East proposal is for land that is currently elevated higher than 450 m for J5 and 600 m for Bungalbin East. The claimed 6.48% disturbance of the LAU is highly	The calculations of landform impact presented in the PER are accurate and meet the requirements of the ESD. MRL notes that the Bungalbin East deposit is located on a relative low part of the HAR as the iron ore is more susceptible to erosion that the unmineralised BIFs.



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		misleading. If allowed to proceed this mining will destroy a very high percentage of the highest parts of the HAR. This destruction will significantly damage the environmental and tourism asset that HAR currently presents.	
181	BirdLife WA	 The mining proposal cannot maintain variety, integrity, ecological functioning, and environmental values of landforms at HAR because it will irreversibly impact on its landform and landform values. Given that HAR lies within a conservation park with the purpose of "the proper maintenance and restoration of the natural environment", this proposal is environmentally unacceptable. HAR has unique and beautiful landform values. HAR has the most significant landform values of all the BIF ranges in the GWW and the Yilgarn region, making it the most prominent and spectacular BIF range: 1. HAR is the largest BIF range. At 2913 ha, it is 11% larger than Die Hardy, the second largest range (Table 6-2, PER). 2. HAR is the highest BIF range. At 692 mAHD, HAR is 48 m higher than Die Hardy, the second highest range (Table 6-2, PER). It is also the range with the largest area higher than 600 mAHD (Carl Erbrich, pers. com.) and the range with the most and greatest concentration of elevated landforms (Figure 6-3, PER). 3. HAR has the highest topographic prominence. HAR is the only range with a prominence greater than 200 m: it has more peaks with prominence greater than 	The conservation tenure over the HAR does not precluded mining. The relationship between different types of tenure and MRL's right to <i>Mining Act</i> 1978 tenure over the area is detailed in Section 1.2 of the PER. For responses to the issues of topographical prominence, refer to MRL responses to submissions to the WA Family Bushwalkers Club submission number 285 in the Amenity section.



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		60 and 120 m than any other range (Carl Erbrich, pers. com.). Topographic prominence is the height of peaks in relation to the surrounding landscape.	
		 HAR has some of the steepest slopes. These occur on the range's ridge line, where many spectacular ironstone formations exist. 	
		5. HAR is the range with the most convoluted series of hills ("twists and turns"). With north, north-east, east, south-east, south, south-west, west, and north-west aspects (Table 3-5, Appendix 6-A), it has more aspects than any other range.	
		6. HAR provides the most spectacular views.	
		 HAR has beautiful ironstone formations, including rock features, outcropping, caves, buttresses, pillars, fractured rock surfaces, and cliffs. These formations are different to most of the other ranges. 	
		8. HAR is one of only four ranges in the Great Western Woodlands and one of only seven ranges in the Regional Study Area that is intact. However, four of the intact ranges in the Regional Study Area are small (under 804 ha): Hunt, Johnston, Lake Giles, and Mount Manning Ranges; four of them have low topographical prominence: Dryandra, Hunt, Johnston, and Lake Giles Ranges. The remaining range, Die Hardy, has landform features that differ from those of HAR. It has sheer rock-faces.	
		The proponent has downplayed the unique and beautiful landform values of HAR.	



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182	32 Birdlife WA The proponent concluded that "HAR provides an example of a BIF landform within a region in which these types of landforms are well represented at a local and the PER and Table 3-4 of A explained in footnote 2 of Tab explained in footnote 2 of Tab use of a higher resolution topy local assessment compared to the Mount Manning area" (Page 6-52, PER) and " it is considered that the HAR is not rare or one of a few of its type" (Page 6-53, PER). The proponent arrived at this conclusion by using comparisons that downplayed the unique and beautiful landform values of HAR, excluding key measures, and misinterpreting data collected by Bioscope Environmental Consulting Pty Ltd: The proponent only provided measures of topographical position index, wetness index, and solar radiation and distributions of height, slope, and aspect for HAR. These measures and distributions are not provided for the other ranges. The proponent failed to acknowledge that HAR is the highest BIF range went though the areas of each range are presented in Table 6-2 (PER). 3. The proponent interpreted the heights of the different ranges as " the HAR has a similar range of elevations compared to the Mount Manning, Mount Jackson and Die Hardy ranges (Figure 6-3)" (Page 6-6, PER)	The proponent concluded that "HAR provides an example of a BIF landform within a region in which these types of landforms are well represented at a local and regional scale. BIF landforms are common throughout the Mount Manning area" (Page 6-52, PER) and " it is considered that the HAR is not rare or one of a few of its type" (Page 6-53, PER). The proponent arrived at this conclusion by using comparisons that downplayed the unique and beautiful landform values of HAR, excluding key measures, and misinterpreting data collected by Bioscope Environmental Consulting Pty Ltd:	The differences the submitters note between Table 6 of the PER and Table 3-4 of Appendix 6-A are clearly explained in footnote 2 of Table 6-2 as being due to t use of a higher resolution topographic dataset for the local assessment compared to that available for the regional comparison. This difference in the quality of topographic datasets would also reduce the utility of a more detailed comparison between the regional landforms.
		 The proponent only provided measures of topographical position index, wetness index, and solar radiation and distributions of height, slope, and aspect for HAR. These measures and distributions are not provided for the other ranges. They do not enable HAR to be compared with the other ranges. 	
		3. The proponent failed to recognise that HAR is the highest BIF range (48 m higher than the second highest range) and the range with the largest area higher than 600 mAHD.	
		 a) The proponent interpreted the heights of the different ranges as " the HAR has a similar range of elevations compared to the Mount Manning, Mount Jackson and Die Hardy ranges (Figure 6-3)" (Page 6-6, PER) and "a similar range of elevations occurs at 	



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		a number of the regional landforms listed in Table 6-2 including the Mount Manning, Mount Jackson, Finnerty Range/Mount Dimer/Yendilberin Hills, and Die Hardy ranges" (Pages 6-52 and 53, PER).	
		 b) By using the term "a similar range of elevations", The proponent have overlooked that Figure 6-3 (PER) shows HAR is the range with the most and greatest concentration of elevated landforms. 	
		 The proponent did not present topographic prominence. Topographic prominence is important because it would have highlighted that HAR is the most prominent or striking range in the surrounding landscape. 	
		 5. The proponent misinterpreted their measures of slope a) The proponent presented the maximum slope of HAR as 26° (Table 6-2, page 6-7, PER) and stated that "nearly 51% of the HAR has a slope of up to 10°, 28.7% has a slope of 10-20° and 15.3% has a slope of 	
		20-30° "(Page 6-17, PER). This is despite Figure 6-9 (PER) and Table 3-4 (Appendix 6-A, PER) clearly showing slopes categorised as 30-35°, 35-40°, and greater than 40°.	
		 b) The proponent did not differentiate between slopes greater than 40°. Steep slopes, well in excess of 40°, occur on the range's ridge line, where many of the spectacular ironstone formations exist. 	
		c) The proponent underestimated the area of HAR with slopes greater than 40 degrees by using planar area instead of surface area to distribute range into slope categories (Figure 6-9, PER; Table 3-4, Appendix 6-	



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		A, PER). Table 3-4 (Appendix 6-A, PER) shows that only 19.09 ha (0.55%) of HAR by planar area has slopes greater than 40°, while the proposed Bungalbin East and J5 mining sites have 4.03 ha (2.75%) and 0.18 ha (2.75%). Steep slopes have smaller planar areas than gentle slopes; a 90 degree slope has no planar area, but it has surface area.	
		 d) The proponent used maximum slopes only to conclude that "based on available data (Table 6-2), the HAR has similar maximum slopes to the Mount Jackson Range, Die Hardy, Mount Manning Range, Koolyanobbing Range and Highclere Hills (Figure 6-3)" (Page 6-6, PER) and "there are other similarities within the regional landforms. Based on available data (Table 6-2), the HAR has similar maximum slopes to the Mount Jackson Range, Koolyanobbing Range, Koolyanobbing Range, Koolyanobbing Range, Die Hardy, Mount Manning Range, Koolyanobbing Range and Highclere Hills" (Page 6-53, PER). 	
		The proponent failed to recognise that HAR is the most convoluted BIF range	
		 a) HAR was allocated a majority aspect of 180° (Table 6-2, PER). Yet, Table 3-5 (Appendix 6-A) clearly shows that HAR has north (14.73%), north-east (10.80%), east (8.51%), south-east (12.17%), south (17.45%), south-west (12.71%), west (11.30%), and north-west (12.33%) aspects. Allocating an aspect of 180° to HAR equates to fitting a linear regression to a non-linear function. 	
		b) The proponent used only majority aspect, overlooking the aspects presented in Table 3-5 (Appendix 6-A), to conclude that "the HAR has a majority aspect similar to the Mount Jackson Range, Evanston and Highclere Hills (Table 6-2)" (Page 6-6, PER) and "the HAR has a majority aspect to that of	



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		the Mount Jackson Range, Evanston and Highclere Hills which are generally south-facing landforms" (Pages 6-53, PER). However, Figure 6-3 (PER) shows that HAR has different aspects to Mount Jackson Range, Evanston, and Highclere Hills.	
		7. The proponent overlooked the beautiful ironstone formations. The proponent merely mentioned of these formations in Chapter 6 "Landforms" that "rocky outcrops are common within the central and eastern portions of the HAR (L4-L6) and caves and small cliff faces are also present in some areas" (Page 6-9, PER). The proponent also failed to mention that these landforms differ from most of the other ranges.	
		8. The proponent overlooked that the six other intact ranges in the Regional Study Area are either small, have low topographical prominence, or have different landform features. The proponent merely stated that "HAR has similar levels of intactness (>99%) as the Die Hardy Range, Dryandra Range, Hunt Range, Johnston Range, Lake Giles Range and Mt Manning Range" (Page 6-6, PER).	
183	Birdlife WA	 Approving this mining proposal will impact on the variety, integrity, ecological functioning, and environmental values of landforms at HAR. 1. The two mine sites and waste-rock dumps will form vastly altered landforms; rehabilitation cannot reconstruct BIF ranges. 2. At least 3.8 km of rock features, outcropping, caves, 	The PER accurately quantifies the impact to landform utilising the methods mandated in the ESD. MRL agrees that there are many different ways to attempt to quantitatively measure what is inherently a subjective concept. In any event, all of the reasonable ways of measuring the impacts of the Proposal to landform seem to converge around 5-10%. In terms of evidence supporting the statement that " <i>the</i>
		buttresses, pillars, fractured rock surfaces, and cliffs	residual impact is not considered to be significant as



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		 will be destroyed. Removing 3.8 km of landform at HAR can only impact on its ecological functioning. Mining impacts on ecological functioning (Read et al. 2000a, 2015, Jax 2010, Raiter et al. 2014)⁷⁴. At least 10.3% of the range will be directly impacted (length of directly-impact range/total length of HAR = 3.8 km/36.9 km) with impacts felt in the area of disturbance, across the whole range, and the surrounding landscape. The proponent used misleading measures to downplay the impact of its mining proposal on the variety, integrity, ecological functioning, and environmental values of landforms at HAR. The proponent concluded that: <i>"It is concluded that the residual impact due to the small area of additional disturbance within the landforms of the LAU (which will increase from 0.47 % to 6.48%) is not considered to be significant as ecological function can be maintained in adjacent areas" (Page 6-52, PER).</i> 	 ecological function can be maintained in adjacent areas", the submitter is referred to the PER in its entirety. The PER (and Attachment 1 for the S43A change to the Proposal) quantifies the impact to every quantifyable environmental variable. It is no coincidence that these impacts typically also come in around 5-10%, with a few notable exceptions such as the PSRN6 and PSRN7 vegetaion units, where the impact is as high as one- third. The PER concludes for each preliminary key environmental factor that the objectives of the EPA can be met and by extension ecological function can be maintained.
		2. "The additional disturbance as a result of the Proposal is small relative to the extent of the landforms within the LAU. The Proposal will increase the disturbance area by 6.01 % to 6.48 %. This does	

⁷⁴ Jax, K (2010). Ecosystem Functioning. Cambridge University Press.

Raiter, KG, Possingham HP, Prober SM, Hobbs RJ. (2014). Under the radar: mitigating enigmatic ecological impacts. Trends Ecol. Evol. 29, 11.

Read JL, Reid N, Venables WN (2000a). Which bird species are useful bioindicators of mining and grazing impacts in arid South Australia? Envir. Manag. 26, 215-232. Read JL, Benjamin AC, Parkhurst B, Delean S (2015). Can Australian bush birds be used as canaries? Detection of pervasive environmental impacts at an arid Australian mine site. Emu 115, 117-125.



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		not represent a significant impact on the integrity of the landforms." (Page 6-53, PER).	
		The proponent drew these conclusions after acknowledging that:	
		 "The PEC is more or less fully intact with the only disturbance comprising mineral exploration and access tracks, and drill pads" (Page 5-21, PER). 	
		2. "No landforms have been removed from the HAR, but surface disturbance is present within these landforms. This means that the HAR is largely complete and in relatively good condition, but is not pristine" (Page 6-53, PER).	
		Their conclusions are concerning for two reasons:	
		 The proponent downplayed the impact of their mining proposal by using "area of the landforms of the LAU" to measure disturbance: 	
		 a) Measuring disturbance as a proportion of LAU downplays the impact of the mining proposal on the BIF range itself. The BIF range is, after all, the main focal point of the MMHARCP, the area of highest biodiversity, the main purpose for visiting the conservation park, and the reason for establishing the conservation park. 	
		 b) Disturbance was measured as planar area, not surface area, which underestimates the area of BIF range directly impacted by mining. 	
		The proponent provided no evidence to support their	
		claim that the area of disturbance "is not considered to	
		be significant as ecological function can be maintained	



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		in adjacent areas".	
184	ANON-TWYQ-WPJG-D ANON-TWYQ-WPJU-U	The HAR is an ancient range of hills rich in complex and unique landforms formed over billions of years. They are highly fragile and feature unique geological systems and highly complex interconnected eco-systems that are not properly understood. The proponent's large-scale mining operations at J5 and Bungalbin East would irreversibly change these spectacular ancient landforms on a massive scale; this is unacceptable. To illustrate the point of compromising HARs unique natural values, caves at HAR feature 'amber-rat', layers of black tar-like substance left behind by ancient colonies of the Greater Sticknest Rat (Wopilkari). The submitter has seen amber-rat deposits very close to the proponent's proposed mining area at Bungalbin East, and these could be severely impacted if not lost forever by mining. Such losses would probably never be known to the WA public.	The Greater Stick-nest Rat was formerly distributed through southern, semi-arid Australia from the west coast of Western Australia (Shark Bay) to western New South Wales, including the Nullarbor Plain, the Flinders Ranges, the southern margins of Lake Eyre and the Murray-Darling Plains. It is now Threatened and restricted to a few isolated populations on islands in South Australia.(DPaW 2016) ⁷⁵ Remnant nests are known to occur on BIF ranges throughout the Yilgarn.
185	357	Submitter acknowledges that BIF ranges such as the HAR are accepted as landforms having important environmental values. However states that the Helena – Aurora Range is often described as 'one of the last' remaining unspoilt BIF ranges. Mapping in the PER shows although the HAR is indeed more than 99% intact there are six other nearby ranges similarly intact (>99%) eg Die Hardy, Dryandra, Hunt, Johnston, Lake Giles,	The submitter's support of the Proposal is acknowledged.

⁷⁵DPAW 2016, information sheet accessed 8/12/16 at *https://www.dpaw.wa.gov.au/images/documents/plants-animals/animals/animal_profiles/greater-stick-nest-rat_2012.pdf*



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		and Mount Manning Range. The proponent's proposed mining disturbance represents a small fraction of the landforms comprising the HAR and more broadly the Mount Manning area.	
186	BHLF-TWYQ-WP1A-E	The submitter questions the conclusion on page 6.53 of the PER "that ecological function within the HAR and LAU can be maintained where vegetation and fauna habitats remain unaltered." This conclusion simply says that the ecology in the unmined portion of the HAR will be unchanged, without drawing any conclusion about the portion proposed to be mined.	The Proposal will remove part of the landform. The statement that the submitter references in the PER draws the conclusion that this part of the landform does not host any peculiar ecological function that is not adequately represented elsewhere along the HAR.
187	ANON-TWYQ-WPZJ-Z ANON-TWYQ-WPBC-1	The submitters do not agree with the statement in the PER that less than 2% of the total landform of the HAR would be impacted. This is due to BIF ranges in a large surrounding area have been included in the calculation, some of which are not contiguous and are over 50 kilometres away.	Table 6-6 quantifies the impact to the HAR landforms (L1-L6) as 6.6%. The landforms L1-L6 were specified by the EPA in the ESD.
		Furthermore, the calculation appears to be based on an inaccurate representation of what is included as 'landform', or otherwise misrepresents the significance of the proposed disturbance: the map provided in the PER indicates that approximately 20% of the HAR ridgeline and adjacent slopes will be removed. This represents an order of magnitude difference. Indirect and offsite impacts also don't appear to be included in this calculation.	
188	ANON-TWYQ-WP29-7	The submittor objects to the impacts of the proposal on the landform as the area is a reservoir of genetic diversity with high levels of species endemism and	The impact to each of these environmental values has been quantified in the PER.



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		richness. This genetic diversity evolved with increased aridity in this landscape, a process which 'marooned' species on ranges and enabled them to persist in the rock fissures, crevices, and caves. It has led to flora and fauna species that are dependent on BIF habitats. Some of these flora and fauna are endemic to individual BIF ranges.	
189	ANON-TWYQ-WP1C-G	The submitter does not support the claims in the PER that the HAR is one of many BIF and is therefore not unique. Each range is located in different place and therefore undergoing a different journey of evolution, under different conditions as a result of their respective geographic locations. The ranges are islands of unique biodiversity in terms of species composition, contribution to the landscape and as part of ancient song lines which should be kept intact. Any removal of the range will irrevesibly degrade the landform.	If uniqueness of BIF ranges is determined by each range being in different places, then all BIF ranges are unique from each other in this respect. In terms of "ancient song lines", MRL has comprehensively addressed the anthropological (and archaeological) Aboriginal heritage aspects and impacts of the Proposal in Section 11 of the PER and in the relevant responses to submissions for that environmental factor.
190	BHLF-TWYQ-WP1A-E	The conclusion in the PER that the HAR landform is not unique in the region conflicts with the following statements in the PER: <i>"In the HAR, the hard siliceous, moderately-dipping unmineralised BIFs have resulted in steep-sided ranges"</i> (PER p6.26); and <i>"It is noted that the HAR and Koolyanobbing Range are the most visually prominent features in the areas,with the HAR being the most visually prominent feature in the LAU." (PER p.6.9)</i>	The conflict referred to by the submitter is not evident based on the statements provided.
191	BHLF-TWYQ-WP1A-E	The submitter does not support the claims in the PER that the HAR is flat and unremarkable as described	The reframing of the data in the PER by the submitter appears to be accurate. MRL does not agree with the



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	Submitter	 below. "Although the highest point of the HAR is 702 mAHD, only a very small portion of the range (0.3 %) occurs within the highest band of elevation (680702 mAHD)." (PER p. 6.17). 	conclusion drawn. Table 6-2 of the PER is the like-for-like comparison of the slopes (using the same resolution of topography) of the different ranges in the region. Steeper slopes (>20
		 By their nature, mountains have high points. A more realistic interpretation would be to compare the heights of the landforms listed in PER Table 6.2, and the total elevation over the surrounding plains. The data in PER Table 6.2 show that the HAR is 58m taller than the nearest other range (Die Hardy) using the height of 702m stated on p. 6.17. The HAR elevation of 255m is equivalent to the Highclere Hills, and more than 50m larger than the other landforms in the region. "The Bungalbin East pit area is also characterised by slopes in these categories with 24.4 % of the 	degrees) are evident at the Die Hardy, HAR, Highclere Hills, Koolyanobbing, Mt Jackson and Mt Manning Ranges.
		area having a slope of up to 10°, nearly 35.0 % having a slope of 1020° and 29.1 % having 20 -30° slopes." (PER p. 6.17) These figures also show that 11.5% of the Bungalbin East area is > 30° in slope. When viewed from above (in	
		plan view) steep slopes will seem to have less area, despite their extent. From personal observation, the south-eastern flank of the proposed Bungalbin East minesite is very steep, with many cliffs and caves. This is evident from Fig. 6.9 on PER p. 6.19, where the cliffs are shown in red.	
		• "that the HAR is not rare or one of a few of its type"; and that "the affected landform values are represented elsewhere across the HAR and wider	



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		MMHARCP" (PER p. 6.53). While some of the BIF landforms in the region may share some similarities with the HAR, the range's elevation and size and other characteristics set it apart from the others. The submitter considers that the proponent's own evidence in the PER suggests that the landform is unique and impressive.	
192	BHLF-TWYQ-WP1A-E	The submitter seeks clarification as to whether the closed Carina mine and the proposed Carina extension which both lie in the Finnerty Range/Mt Dimer/Y. Hills region have been included in the 12.7ha of landform disturbance presented in Table 6-2 of the PER.	 Table 6-2 of the PER has been updated and included in Attachment 1 to include: impacts at Koolyanobbing F Deposit, which was approved in January 17, after the publication of the PER Macarthur Minerals Ullaring project which was not known to MRL at the time of publication of the PER. MRL confirms that impacts at other projects approved, but not yet implemented, were included in the impact calculations of the PER including MRL's Carina Extended project and Cliff's Deception project.
193	BHLF-TWYQ-WP1A-E	The submitter seeks clarification of the information presented in the PER in relation to existing mining activity in the region. Table 2 below, derived from publically available information shows that, of the 14 landforms listed in PER Table 6-2: five have been mined, four have mining tenements on them, and the remainder are unprotected and available for mining. Table 2. Mining and exploration status* of landforms in the region around the HAR.	A large proportion of the State is covered by <i>Mining Act</i> tenure including most BIF Ranges. A proportion of the State is covered by Conservation Tenure. In many instances multiple layers of tenure coexist – e.g. Mining, Conservation, Pastoral, and Native Title. All project proponents are subject to obligations under the laws of Australia and Western Australia. Section 1.5 of the PER outlines the Environmental Regulatory Framework that this Proposal must work within. Anybody can refer a proposal that is likely to have a



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		Landforms Die Hardy Dryandra Range Evanston Einnerty: Range/Mt Dimer/Y.Hills† HelenaAurora Range Highclere-Hills Hunt Range Johnston Range Koolyanobbing: Range Lake Giles Range Mount Jackaon Range Mount Jackaon Range Mount Jackaon Range Windarling Peak Windarling Peak Windarling Peak Windarling Peak	Status Extensive exploration. Part available for mining. Part proposed Class A Nature Reserve. Unprotected, available for mining CALM Act Section 5 Reserve ("for conservation and mining"): available formining Includes closed Carina iron ore mine and approved Carina Extended mine, CALM Act Section 5 Reserve ("for conservation and mining"): Mining Proposal Conservation Park - able to be mined Mineral exploration and mining have had significant local impacts MR Mineral exploration and mining have had significant local impacts MR Mineral exploration and mining have had significant local impacts MR Mineral exploration and mining have had significant local impacts MR Mineral exploration and mining have had significant local impacts MR Mineral exploration and mining have had significant local impacts MR Mined Available for mining. (has two potential mines – Altair and Deception) Mined Available for mining. Some exploration. CALM Act Section 5 Reserve ("for conservation and mining"): available for mining. Mined ersonal searches and information from others. PER whether the Carina mines are included in this row. See in — t	significant effect on the environment to the EPA. The EPA will then decide if and how to assess the proposal and will assess it on its merits including an assessment of the cumulative impacts.
194	BHLF-TWYQ-WP1A-E	The PER doe of microclima of the range i The PER note are recorded tops of ridges south-facing 6-11) which a have more sh The solar rad the cooler mic disproportiona microclimate particularly Bi with the prese microclimates	es not adequately consider the importance tes produced as a result of the steepness n relation to fauna. es that the lowest level of solar radiation on areas with steep slopes such as the s, breakaways and cliff faces on the more components of the HAR (shown in Figure also receive less direct sunlight and tend to hadowed areas." (PER p. 6.21). iation data (PER Fig 6.13 on p. 6.24) show croclimate areas in green. A ately large percentage of the cooler areas lies in the two proposed mine areas, ungalbin East. This information, together ence of caves within the cliffs indicates that s could be an important consideration.	The impact of the Proposal on terrestrial fauna is assessed in Chapter 8 of the PER. This includes discussion on the dependence of fauna on BIF habitat. In particular, SRE fauna identified are concluded as having ranges extending along at least the length of the range on which they have been sampled i.e. well beyond the extent of the Proposal and any potential micro-climates.



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		does not appear to have considered fauna. However, cooler microclimates in such an arid landscape are likely to be used as refuges by fauna, as noted in the PER:	
		"The southward aspect of many micro-sites within the HAR provides a greater level of solar protection than the north-facing aspects. It is considered that south-facing aspects will experience lower temperatures than north- facing aspects, and therefore fewer drought events". (PER p. 6.33).	
		"These landforms have a degree of geographic isolation from other BIF ranges and it has been suggested that these ranges have acted as both refugia during drier climate cycles and centres of recent speciation" (PER p. 6.53).	
		Despite the above the PER does not explore the impacts of microclimates on fauna, although both proposed mines (especially Bungalbin East) contain relatively large microclimate areas, and many caves and refugia will be destroyed.	
		Without consideration of the above, the statement in the PER "that ecological function with respect to fauna species, populations and the overall assemblage can be maintained within fauna habitats that will remain unaltered" (PER p. 6.48) is questioned.	
195	BHLF-TWYQ-WP1A-E	Clarification is sought with regard to landform integrity as different figures are used at different points in the PER, and different study areas used in different places. The information on PER page 6.35 and in Table 6.2 indicate that current disturbance of the Helena Aurora Range landform is between 0.4% and 0.5% (11-16ha-	MRL does not consider the 6.6% impact to the landform detailed in the PER to be significant. MRL notes the submitter's alternative view.In response to the comments raised in the PER process, MRL has sort to further reduce the impact of the proposal and has reduced the size of the Bungalbin East



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		depending on the figures used). This disturbed area (primarily in the camping area) is negligible. Clarification is also sought regarding the level of disturbance as a result of the proposal to the landform. The PER states that the proposal will impact 6.5% of the HAR landform p 6.35 based on clearing of 611ha of vegetation and impact to 210ha of the landform. Calculations based on Table 6.2, indicate that the landform disturbance caused by the mine will be 7.21%. This increase of disturbance of the landform from 11ha to 221 ha corresponds to an increase of 2009%, it is unclear how this is not considered a significant impact.	mine footprint to 111ha. While this change has been primarily aimed at reducing the significant impact to flora and vegetation, the impact to landform has consequentially been reduced, such that now 5.4% of the landforms are proposed to be impacted.
196	BHLF-TWYQ-WP1A-E	The statement in the PER that over 97% of BIF within the MMHARCP will remain intact i.e. unaffected by mining." (PER p. vii) is considered irrelevant and the key area of concern is the impacts to the landforms of the HAR not the broader MMHARCP. The proposal will permanently change the landform and visual amenity of the HAR leaving three pit voids and marked changes to the contour of ridge lines and crests. As shown in Figures 6.18- 6.23 of the PER the J5 feature will almost completely disappear, to be replaced	The views of the submitter are noted.
		by a pit and the Bungalbin East will be defaced by 'quarry walls'.	
197	ANON-TWYQ-WP18-5	The BIF ranges are not only stunningly beautiful from a landscape perspective, and include peaks up to 704 m, but provide refuge for diverse fauna comprising 160 species in total, including twelve threatened, protected or endemic species, and eight species fully or partially dependent on BIF. The proposal notes that modification	The impact of the Proposal on terrestrial vertebrate , invertebrate and subterranean fauna is assessed in sections 7 and 8 of the PER.



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		of the landforms through mining is inevitable, therefore there is an inevitable impact on the fauna that depend on them.	
198	Toodyay Naturalists Club	In describing the regional context for the landforms it is not acknowledged that many are already being mined (only 4 out of 14 have higher (3) or equal (1) intactness as the HAR).	MRL acknowledges the submitters statement, and clarifies that parts of some of the ranges elsewhere in the region are being mined. Many of these ranges remain substantially intact, despite mining.
199	Toodyay Naturalists Club	In describing the regional context for the landforms in the PER it is not acknowledged that the HAR rises approximately 200m above an otherwise relatively flat landscape, and the Bungalbin Central comprises the largest continual area of the ranges and includes Bungalbin Hill.	Bungalbin Central and Bungalbin Hill do not form part of the Proposal.
200	Toodyay Naturalists Club	In describing the variety of the landforms in Section 6.29: The PER states that "HAR and Koolyanobbing Ranges are the most visually prominent features in the area mapped by Newby (1985)". It is important to note that Koolyanobbing is being mined. The HAR is not. With regard to past ecological and biological processes, as stated in Chorley et al. (1984), "an understanding of the erosional and depositional processes that fashion the landform, their mechanics and their rates of operation must be obtained in order that the past evolution can be explained and the future evolution predicted". This will not happen on a mining tenement. The submitter is concerned that the proposal would interfere with scientific surveys through the loss of plots used for Flora and Vegetation survey in the BIF	Appendix 6-A states "Flora and vegetation surveys have been conducted on BIF-dominated landforms in the region (see Table 4-1). The HAR survey (Gibson et al., 1997) involved the establishment of 55 permanent plots marked with steel fence droppers. The position of these plots was recorded, but these data are not provided in Gibson et al. (1997). A schematic map of the study area indicates that two of these plots are located at J5 and several are located at Bungalbin East, and would be lost if the Proposal is implemented. Although Gibson et al. (1997) states that the results of their study support the recommendations of Keighery (1980), Henry-Hall (1990) and CALM (1994b), this paper does not comment on whether any subsequent monitoring would be conducted at these plots."



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		dominated landforms in the region. Di Virgilio et al. (2015) concludes that attenuation of solar radiation appears to be a key mechanism by which local elevation variability provides opportunity for ironstone flora to compete for limited sites, facilitating survival. In other words, the shading of the higher HAR is beneficial to the surrounding plant communities' survival, flora endemism and richness.	
201	Toodyay Naturalists Club	In describing the integrity of the landforms in Section 6.31: The increase in impact from 16.2 ha, of which the majority is from tracks and other activities associated with mining exploration, to 6sq km is considered significant. The PER describes "localised alterations to landform contours and surface drainage patterns" as a result of the WRLs. These changes will cause drainage shadows to develop in downstream vegetation. Changes in local wind patterns, Wetness Index and solar radiation potentially will influence microclimates that could in turn affect the biota of the area. Run-off from the WRLs may result in erosion and sedimentation These issues are all raised in the PER, but described as 'localised'. They will be significant in terms of their size. Clarification is requested as to whether the area to be cleared for storage of cleared vegetation and topsoil/subsoil for use in post-mining rehabilitation is in addition to the clearing for haul roads (J5 56.26 ha and BE 67.52 ha) and the WRLs (1.23 sq/km) or has been included in these figures.	The views of the submitter are noted. The clearing proposed includes allowances for the storage of topsoil.



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202	Toodyay Naturalists Club	In describing the ecological functions of the landforms in Section 6.3.2: It is stated that "In terms of geomorphology no claim of uniqueness can be made for HAR." While BIF- dominated and other landforms in the region have many similarities in terms of physical and geochemical characteristics, differences occur in the flora and vegetation of these landforms, as discussed in ecologia Environment (2013), Mattiske Consulting (2001, 2007, 2008, 2009, 2010), Western Botanical (2009 and 2013). This is partly because of the level of geographic isolation that the ranges have from other BIF ranges. This must provide an indication of their uniqueness. As discussed in Warren and French (2001), the conservation of vegetation and fauna habitats must include consideration of geomorphological processes. Although these processes will reduced [sic] or removed [sic] within the predicted areas of disturbance associated with the Proposal, it is expected that effective implementation of rehabilitation and closure works will allow a degree of ecological function to develop in rehabilitate [sic] areas (see Section 6.4.3) Based on the above, it is concluded that ecological function of the landforms of the LAU can be maintained where vegetation and fauna habitats remain unaltered. If the landform is changed (or removed) this is no longer the case.	The views of the submitter are noted. The Proposal does not remove the landform in its entirety and, whilst ecological function will be altered in respect of the disturbance area, the remaining vegetation and fauna habitats will continue to function as they do now.
203	ANON-TWYQ-WP1Q-X	The HAR is the most significant BIF landform in the region. The nearest other BIF ranges of recognized high conservation value are all compromised by open cut	The PER acknowledges the relative intactness of the HAR and provides a comparative analysis of BIF landforms through the region in this regard (refer to



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		 mining (Koolyanobbing Range, Mt Jackson Range, Windarling Range). The PER does not address the loss of retaining the HAR as a representative, complete BIF landform with intact environmental and wilderness values. The PER does not demonstrate how the proposal conforms to the EPA objective embodied in the recommendation for A Class reservation, or describe special circumstances that justify the EPA recommending approval for the proposal. A full and proper environmental impact assessment of the proposal cannot be completed as required by the EP Act and Administrative procedures without a detailed and comprehensive analysis of the cumulative impact of the proposal on (a) the Helena and Aurora Ranges banded iron formation; and (b) the values of the Mt Manning - Helena-Aurora Ranges Conservation Park. 	 Table 6-2 in the PER) In respect of wilderness values, the submitter is referred to the response to Issue 285 in this regard. The PER is not required to demonstrate how the Proposal is consistent with the EPA recommendation for A-Class reservation. The appropriate reserve classification of the MMHARCP is a matter for Government. In respect of the cumulative impact of the Proposal, the submitter is referred to Section 5 and Section 6 of the PER.
204	ANON-TWYQ-WP1Q-X	Proposals to mine the BIF ranges elsewhere within the region have relied, in part, on the existence (and persistence) of BIF environmental values and beneficial uses within the HAR ranges (and therefore that proportional loss/relative impact is regionally less significant) and environmental approvals has been given in the knowledge that these values will continue to be represented within the HAR. These proposals include substantial open cut mining at the previously intact Jackson Ranges, Windarling Range, Finnerty Range. As a consequence of the mining on these ranges and approved expansions to mining at the Koolyanobbing Range the conservation significance of the HAR, as the most substantive intact and relatively	The EPA assesses all proposals on their merits including consideration of the cumulative impacts described.



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		undisturbed BIF in the region is amplified.	
205	ANON-TWYQ-WP1Q-X	The decision by the Minister for the Environment, on appeal, to direct the EPA to assess the proposal at the level of Public Environmental Review was to enable a fuller and public examination of the proposal, in particular with respect to the interrelationships between landforms, ecological function and environmental values. The PER document does not provide for this, nor does it fulfil requirements of the Environmental Scoping Document. Specifically, analysis of the impact on the 'integrity, wholeness and intactness of the Helena- Aurora Range BIF landform' is largely derived from comparisons of desktop-determined 'landform analysis criteria' (elevation, slope, aspect, topographic position index, Wetness Index, and solar radiation) and areas of ground disturbance (PER chapter 6). As applied these metrics do not meaningfully inform judgements of impact on the values of integrity and intactness, as outlined in Table 1, below.	Contrary to the opinion of the submitter, the PER provides a fuller and more public examination of the Proposal, including consideration of the interrelationships between landforms, ecological function and environmental values. The submitter is referred to relevant sections of the PER (sections 6.2.9 and 6.3.2) and the supporting Landform Impact Assessment (PER, Appendix 6-A) in this regard. In respect of 'integrity' or intactness, the submitter is referred again to section 6 of the PER, in particular Table 6-2, which quantifies landforms at a regional scale in terms of intactness. In respect of ecologia (2002) and approval decisions in relation to mining at Windarling Range, please refer to the response to Issue 144 and Issue 14.
		The PER is deficient in that it does not address the presence and significance of outcropping rock features which are (i) a fundamental and distinctive part of the landform; (ii) the substrate of, and therefore 'intrinsically linked' to, unique and varied habitats; and (iii) would be impacted (removed) by the proposal. Limited references occur at page 6-9, including – "Bedrock exposures are common on the steep slopes and crests, and scree slopes occur in a number of locations throughout the HAR." In its assessment report of the Koolyanobbing Iron Ore Expansion the EPA noted "The proposal targets the banded ironstone ridges of Mt Jackson and	



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		Windarling. These ironstone ridges are what make the region visually spectacular. There are unique landforms and these are associated with their own unique flora" (EPA Bulletin 1082, December 2002).	
		(EPA Bulletin 1082, December 2002). An inventory of the significant landform features of the region was developed in 2002 based on field investigations (Portman Iron Ore Ltd, 2002, Koolyanobbing Expansion Project: Rocky outcrop and monolith landscape impact assessment. Unpublished report prepared by Ecologia Environment). The study concentrated on six substantial BIF ranges in the region – Helena and Aurora Range, Die Hardy Range, Jackson Range, Koolyanobbing Ranges (south), Windarling Range, Mount Manning Range. Other ranges not investigated in detail because they were of lower elevation and did not contain sufficiently large outcrops by comparison, based on contour maps, aerial photography and previous studies (Ecologia 2002, Mayfield Exploration Activities - unpublished report commissioned by Portman Ltd: Gibson N and Lyons	
		<i>M.N 1997 Floristic Survey of the Hunt Range,</i> <i>Yendilberin and Watt Hills of the Eastern Goldfields of</i> <i>Western Australia</i> – unpublished report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management) included Highclere Hills, Watt Hills, Hunt Range and Yendilberin Hills.	
		The study identified the HAR as the most significant BIF by far for hosting significant outcrops and monolith type rock features with 49% of 161 identified. Since this study there has been significant loss of outcrops at two of the	



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		ranges, Jackson and Windarling through mining, and environmental approval granted that facilitates further loss at the Koolyanobbing Range (EPA Report 1581, Koolyanobbing Range F Deposit, September 2016), as outlined in Table 1. This removal/approved future removal further elevates the regional significance of the HAR (which in approximate terms will retain in the order of 66% of the remaining significant landform features of the region).	
		Both the proposed J5 and Bungalbin East pits contain significant rock outcrops included in the inventory recorded in 2002. The PER makes no mention of this.	
		In the knowledge of the outcomes of the regional rocky outcrop impact assessment by Portman (described above), the EPA advised that the landscape and geology features at Windarling were of local significance (Appeals Convenor, Report to the Minister for the Environment, Koolyanobbing Iron Ore March 2003). Reflecting the value of these features the then Minister for the Environment approved mining at the Windarling Range on the basis that key landscape and geological features at the W1 deposit were protected (Statement 627, Condition 7). These key landscape and geological features at the W1 deposit have since been mined, further adding to the significance of these features that remain in the HAR.	
		Table 1 Rocky Outcrops and Monoliths in the widerKoolyanobbing Region (derived from Table 3.1 PortmanIron Ore Ltd, 2002. Koolyanobbing Expansion Project:Rocky outcrop and monolith landscape impactassessment. Unpublished report prepared by Ecologia	



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		Environment).					
		Range	Number of Outcrops	Proportion of all outcrops (%)	Number of outcrops/km ²	Outcrops removed/ approved to be removed since 2002 study (estimated) ¹	
		Die Hardy	2	1.2	0.05		
		Helena and Aurora	79	49.1	1.82		
		Jackson Koolyanobbing (south)	14	6.2	0.64	5(?) - F deposit	
		Mt Manning	3	1.9	0.39		
		Windarling	53	32.9	6.66	31 (?)	
			161	100	0.95	42	
		1. A rigorous study is	warranted to co	nfirm losses an	d landforms approve	ed for removal.	
206	ANON-TWYQ-WP1Q-X	The landforr adequately wilderness of references of applied in W Landscape J <i>Leeuwin-Na</i> <i>Cowan, L. a</i> Heritage pro <i>CALM.).</i> The Koolyanobb that propose Ranges " (local) impa- and a mode wilderness of Koolyanobb supplementa John Cleary mining; (ii) g values of the Jackson Ra	m impace evaluate other, m /A (CAL Assessing turaliste operty L ese mel ing Iron ed minin will have ct on fea rate (rea quality" ing Exp ary stud Planning reater r e HAR r nges; a	ct analy e impac EPA Bu ore me <i>.M, 199</i> ment S <i>e Ridge</i> <i>h, P., 1</i> andsca <i>chodolo</i> Ore E <i>andsca</i> thodolo Ore E <i>gional</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>ansion</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i> <i>(Portm</i>))))))))))))))))))))))))))))))))))))	vsis within ct on land ulletin 108 eaningful i 97. Leeuw tudy, Stag Planning 999. Sha ape Study ogies, app xpansion e Windarl oderate (r of visual a to high (li an Iron O Project: I ublished i ven (i) cor il importar to the Wi ne absence	the PER does not scape and 2 (December 2002) methodologies rin-Naturaliste ge 1 Report, g Review Cleary, J., rk Bay World , Draft report lied to the proposal concluded ing and Mt Jackson egional) to high aesthetic significance ocal) impact on re Ltd, 2002b. Landscape report prepared by mparable scales of nce and landscape indarling and ce of any meaningful	The PER assesses impacts on landscape values in the context of amenity, where the landforms of the Helena- Aurora Range are acknowledged as contributing to the visual amenity of the surrounding area. The submitter is referred to the PER (section 10) and the supporting Visual Impact Assessment (PER, Appendix 10-B), which conclude that the Proposal will result in localised, but permanent alterations to the contour of ridgelines and crests from mining activities.



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		analysis within the PER, it is reasonable to conclude the same impact (at a minimum) on the HAR.	
207	ANON-TWYQ-WP1Q-X	Typically BIF occurs in the region as elongated, linear type landforms with a single ridge line, reflecting the geological origins and subsequent geomorphological processes. The analysis within the PER does not identify that the landform morphology around the Bungalbin East site is unusually more complex, comprising two sub- parallel ridge lines, with an intervening valley. This is reflected in Figures 6-8 to 6-13. This warrants more detailed investigation to understand the scarcity of this morphology in regional BIF landform and any associated particular drainage and ecological characteristics (such as might arise from internal drainage and a relatively sheltered central valley).	Yilgarn BIFs commonly have more than one ridge line. In some cases this is due to lithological sequences being repeated by thrust faulting and in other cases due to the cyclical nature of the BIF deposition alternated with recessive rock types such as tuffs and basalts. Examples of Yilgarn BIFs include the Jackson Ranges, Dryandra Range and Weld Range.



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			nage out is detailed in a second of the seco
			View of the Dryandra Range looking north showing parallel
			BIFs.

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			The word of the Weld Range looking north-east showing parallel BIFs
			The tortuous morphology of the HAR is also not unique. Due to the age of the BIFs, they have enjoyed multiple deformation events commonly resulting in tortuous morphologies. Examples include the Die Hardy Ranges
			Mt Manning Range and an excellent and more impressive analogue for the HAR landform can be found at the Robinson Range.



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			View of Die Hardy Ranges looking north exhibiting tortuous morphology.



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			View of the Mt Manning Range exhibiting tortuous morphology.
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			View of the Robinson Ranges exhibiting tortuous morphology.Mt Fraser is a 770mRL peak (higher than the HAR at 702mRL) in the Robinson Ranges located 540km north- north-west of the HAR and 20km west of Peak Hill. The Robinson Ranges are a Proterozoic BIF. The box folded segment of the Robinson Range BIF is 25 km long (not unfolded) compared to HARs 11km.
208	ANON-TWYQ-WP1Q-X	The proposition in the PER (6.52) that there is a linear correlation between % area removal and landform integrity is flawed.	The PER does not claim a linear relationship between % area removal and landform integrity. It is merely the simplest way to quantify an otherwise subjective value. It



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Issue No.	Submitter	 Submission and/or issue a) The open cuts will remove sections of more prominent elevated landform; b) the integrity of the HAR landform, which is currently effectively unaffected by anthropogenic influences, is irreversibly compromised. Figure 6.1 and related text in 6.5 regarding variety and rarity does not recognise that landform integrity can, and 	Response to comment is the method specified in the ESD. Consistent with the EPA's mitigation hierarchy, MRL has sought to avoid and minimise disturbance wherever possible. Attachment 1 details the reduction in mine pit footprint at Bungalbin East from 147ha to 111ha. The area proposed to be mined no longer includes the majority of the north-western ridge at Bungalbin East.
		should also be evaluated in terms of rarity. As Mining on BIF landforms has progressed (and more BIF landforms are altered/compromised), so remaining intact BIF landforms increase in rarity.	The south-eastern flank of this ridge hosts many rare plants that prefer lower solar radiation (Di Virgilio, 2016 – refer Appendix D). The revised PER figures (6-15 to 6- 20) illustrate that this also has the effect of preserving
		that the HAR has a similar range of elevations compared to the Mount Manning, Mount Jackson and Die Hardy ranges are not supported by data in Table 6-2:	features will be preserved on this ridge. The maximum slope angles quantified in Table 6-2 of the PER are smaller than those quantified in the LAU as
		 HAR 447 m (AHD) – 692 range = 245m Die Hardy 460 – 644 range =184m Mt Manning 434 – 631 range = 197m Mount Jackson ranges 425 – 605 range = 180 m The PER (page 6-7 and Table 6-2) states none of the maximum slopes exceeded 31 degrees. Many of the BIF landforms listed have vertical free faces – which presumably is a slope of 90 degrees. The data is considered flawed and therefore invalidates the landform 	different scales of data is used in the two assessments as clarified in footnote 2 to Table 6-2. By using the regional topographic data set, smaller maximum slopes are recorded, but meaningful comparisons can be made with other regional landforms when analysed at the same scale that the regional dataset allows. The resolution of the data does not allow meaningful comparison of vertical free faces. This in no way invalidates the landform and visual analyses. The submitter's view on intactness is noted.
		The PER (page 6-7 and Table 6-2) contains measures of landform integrity. Determining '% intactness' based on ground disturbance is simplistic and not representative landform integrity. For example the ground disturbance on the HAR is predominantly	



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		historical surface removal of vegetation. As acknowledged in the PER (page 6-35) ("No landforms or the environmental values they support have been removed due to previous or current land use").There is negligible material alteration of natural ground contours in the HAR LAU and intactness is therefore closer to 100% (minor historical cut and fill exploration tracks and drill pads exist).		
209 4. Subter	ANON-TWYQ-WPF5-Q	 These values include the following: exceptional landforms and spectacular beauty. At 704 m above sea level, the Helena and Aurora Range is the highest in the Coolgardie Bioregion 5 endemic flora species—found only on this range 2 declared Threatened Flora 14 priority flora species 3 threatened fauna species 10 BIF-dependent flora species 1 Priority One ecological community 9 troglofauna species known only from the HAR 350 native plant species and 113 native fauna species one of the geologically oldest areas in WA and the world high indigenous significance tremendous tourism potential. 	MRL acknowledges the submitter's statement.	
4. Subterranean fauna				
210	DMP	The PER states that "it is likely that species occurring within the proposed mine pits have ranges extending	Refer to the response to Issue 19 in Attachment 3.	

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		outside the pits; however positive demonstration of this was hampered by the lack of drill holes outside the pits at Bungalbin East and J5 and specimens being inaccessible and unsuitable for use in genetic analysis." The DMP notes that troglofauna sampling effort for the proposal does not meet the sampling requirements specified in Guidance Statement 54a ⁷⁶ . Given that a total of 15 troglofauna species have only been recorded from within pit areas (Table 7-3) and limited sampling has occurred outside impact areas to date, the DMP believes that there is still uncertainty remaining on whether those species recorded from within the pit areas only will be threatened by mining associated with this proposal. Additional sampling or genetic analysis should be undertaken to verify the use of geological mapping to demonstrate that troglofauna species recorded from within the pit areas only are likely to extend beyond	
		these areas.	
211	Parks and Wildlife	The surveys conducted for subterranean fauna do not provide the level of information required by EPA guidance, and the issues and constraints faced by the proponent in endeavouring to address this factor are recognised. Parks and Wildlife understands that the proponent is currently undertaking additional surveys and habitat assessments in an effort to address some of the uncertainties associated with assessing the impact	The species in both deposits are likely to have ranges extending into undisturbed, weathered lithologies around the impact areas and are unlikely to be threatened by mining development (see supplementary Troglofauna report at Appendix E and response to Issue 19 in Attachment 3). Further information on the broad distributions of species in relation to weathering and to specific geologies is provided.

⁷⁶ EPA (2007) Guidance for the Assessment of Environmental Factors (in accordance with the Environmental Protection Act 1986) Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia. Perth, Western Australia.


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		of the proposal on troglofauna. Parks and Wildlife welcomes the opportunity to comment further on troglofauna when these results are made available.	
		From the work conducted to date, it appears that:	
		 the troglofauna communities at J5 and Bungalbin East have not been fully sampled (only 35-40% of taxa are estimated to have been collected; PER, page 7-12); 	
		• there are a number of sampled taxa with uncertain identities;	
		 nine of the 15 taxa collected from J5 or Bungalbin East are currently only known from the pits; 	
		• there appears to be little overlap between the J5 and Bungalbin East communities, with only one taxon confirmed to occur in both communities (Appendix 7, page ii); and	
		• the only taxon collected outside the footprint at Bungalbin Hill (one sample at one bore hole) was not collected at either J5 or Bungalbin East.	
		Statements in the PER inferring broader connected distributions of apparently restricted taxa such as:	
		• "it is likely that species occurring within the proposed mine pits have ranges extending outside the pits" (PER, page 7-9);	
		• for taxa only known from the proposed mine pits that "similar species" or "Possibly conspecific"	



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		 (PER, Table 7-3, page 7-7 and 7-8) records are known from other iron ore deposits⁷⁷; apparently restricted taxa have "…probably been recorded at Bungalbin East", "…is expected to be relatively widespread…", "…may be more widespread…" (PER, page 7-14) or it "…is reasonable to infer the species are more widespread" (PER, page 7-15); and 	
		 "There are no clear barriers to dispersal of troglofauna species" (PER, page 7-15), are not able to be verified or supported without the provision of further supporting evidence/information 	
		One hypothesis that could reasonably be considered at the HAR is that because both development footprints occur in similar geology, they would be more likely to support similar or genetically related species suited to that habitat (possibly for reasons other than current connectivity). A potential issue presented by this proposal is that the areas with geologies prospective for hematite have their own suite of adapted troglofauna, with at least some taxa that do not occur in non- prospective geologies within the HAR or MMHARCP.	
		It is recognised that little geological information is available to inform the assessment of potential habitat/s for troglofauna species. Appendix 7-A includes a discussion of which geologies the troglofauna specimens were found in and how these are represented in the surrounding landscape. Table 7-4	

⁷⁷ The deposits listed are all approved for mining (other than J5 or Bungalbin East) and whilst they provide context, they cannot be considered controls.



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		 (page 7-13) in the PER summarises this information, but does not provide details the geographic areas used as the basis for estimating the extent of habitats and proportion of habitats impacted. Mineralised geothite had eight troglofauna taxa collected from the two proposed pits (of which four only occurred in this geology), but the pits represent about 70% of this geology in the vicinity. Other geologies are less affected by the pits (30% for Canga which had three taxa and 10% for siliceous BIF which had nine taxa). It is noted that no specific management, mitigation or offsets are proposed for troglofauna. 	
212	Parks and Wildlife	Stygofauna surveys have not been conducted for the proposal on the basis that "significant numbers of stygofauna are unlikely to occur" (PER, page 7-14), mining below the groundwater table is not proposed and "The majority of process water will be sourced from existing water infrastructure at Carina and J4" (PER, page 7-14). The PER also states that "groundwater will be abstracted from bores in proximity to each ore body to supply water for operational purposes such as dust suppression" (PER, page 9-6). If groundwater is required to be abstracted from near the HAR in the MMHARCP, additional stygofauna investigations may need to be considered as part of the assessed by the EPA.	No field sampling of stygofauna has occurred at Bungalbin East or J5. Previous sampling in the local area collected only one specimen of harpacticoid copepod. The J5 and Bungalbin East deposits and similar areas appear unlikely to support stygofauna communities. A further reason as to why stygofauna are unlikely to occur at Bungalbin East and J5 is that the depth to water table is approximately 200 m. The likelihood of stygofauna occurring decreases with depth to water table and significant stygofauna communities are rarely observed at depths greater than 30 m. A relatively low volume of groundwater will be abstracted from bores adjacent to the mine pits at both deposits for operational purposes (e.g. dust suppression). For the reasons outlined above, MRL considers the risk of any significant impact to stygofauna is sufficiently low,



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			to the extent that stygofauna investigations are not practicable.
213	ANON-TWYQ-WPFK-D Track Care WA ANON-TWYQ-WP4A-H ANON-TWYQ-WPP9-5 ANON-TWYQ-WPP9-5 ANON-TWYQ-WPPG-K ANON-TWYQ-WPPG-K ANON-TWYQ-WPF0-U ANON-TWYQ-WPF1-K ANON-TWYQ-WPF9-U ANON-TWYQ-WPF7-S Bird Life Australia ANON-TWYQ-WPF7-R ANON-TWYQ-WPFV-R MVA Native Orchid Study and Conservation Group Inc. BirdLife WA ANON-TWYQ-WPFJU-U ANON-TWYQ-WPBJ-8 ANON-TWYQ-WPBJ-8 ANON-TWYQ-WPBJ-9 ANON-TWYQ-WPBQ-F ANON-TWYQ-WPJC-9 ANON-TWYQ-WP4J-T	 Submitters raised concerns about the proposal impacts to troglofauna, such as: There are 9 endemic troglofauna species known to occur in the HAR and species yet to be discovered. Further investigations for subterranean fauna are required before the EPA objective can be met. For example at least seven species are known from the two mine-sites. The 'potential impacts' and residual impacts appear to be based on supposition rather than facts. The proponent has been unable to demonstrate that Subterranean Fauna species (troglofauna) found only within the pit at J5 and Bungalbin East are represented outside the pit, and with minimal geological information that habitats are connected beyond the pit boundary. Therefore, there is a significant risk that development of the Bungalbin East pit will result in the extinction of subterranean fauna species. Further field investigations are required prior to a decision being made as to whether the EPA's objective for Subterranean Fauna can be met. 	MRL has undertaken further investigation for troglofauna, which is included in Appendix E. The assessment of potential impacts and residual impacts is based on far more than 'supposition' as asserted by the submitter. The assessment of the impacts of the Proposal on troglofauna is based on numerous surveys by qualified subterranean fauna specialists and extensive habitat mapping by qualified geologists, together with the knowledge and experience of these professionals in respect of the typical distributions of subterranean fauna. The additional fieldwork undertaken suggests troglofauna species are likely to occur in weathered lithologies outside the proposed mine pits as well as inside the pits. Some species at the J5 deposit have been shown to occur across a range of geologies, so it appears that weathering rather than a particular type of geology is the key to species occurrence. It is expected all species have ranges extending outside the impact areas. Please also refer to the response to Appendix E and the response to Issue 19 for further information in this regard.



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Issue No.	Submitter ANON-TWYQ-WP2K-S ANON-TWYQ-WPPC-F ANON-TWYQ-WPPD-G ANON-TWYQ-WP2Q-Y ANON-TWYQ-WP2W-5 ANON-TWYQ-WP2K-S ANON-TWYQ-WP2K-S	Submission and/or issue	Response to comment
	ANON-TWYQ-WPBE-3 ANON-TWYQ-WPF5-Q Toodyay Naturalists Club		
214	ANON-TWYQ-WPBA-Y	A "Desktop survey" for the proposal found that aquifers at J5 and Bungalbin East would not contain a significant assemblage of stygofauna. This view arises from surveys of similar aquifers elsewhere. Drill holes at J5 and Bungalbin East did yield troglofauna, 57 specimens of 9 orders and 16 species. This discovery must be regarded as indicating "significant" presence of these ancient invertebrate life forms. Potential Impacts are that the proposal would impact directly on the troglofauna through habitat destruction. Abstraction of groundwater could impact on stygofauna if present, but " <i>no specific management of subterranean fauna is proposed.</i> " Residual impact on troglofauna is deemed " <i>unlikely to have a significant impact</i> ". The PER claims " <i>The EPA</i> 's <i>objective for subterranean fauna can be met.</i> " The submitter is concerned with the assessment and questions whether they would now be heading for	The depth to the groundwater is large and the final elevations of all mine pits will be at least 3 m above the pre-mine water table. There is no reason to expect impacts on any stygofauna assemblage that may be present. Furthermore, the desktop study suggested the occurrence of any stygofauna species is unlikely. There is not a direct relationship between occurrence of stygofauna and troglofauna. Reasons for expecting no significant impact of troglofauna are provided in the responses to Issue 19.



Issue No.	Submitter	Submission and/or issue	Response to comment
		extinction due to human activity?	
215	ANON-TWYQ-WPJB-8	The subterranean fauna assessment is inadequate. The limited sampling has almost exclusively occurred in impact areas and the proposed distributions of species beyond Bungalbin/J5 is tenuous and not quality controlled by DNA analysis. In this day and age it is surprising that DNA analysis has not been conducted. The diversity at Bungalbin, although far less than a Pilbara BIF range, stands quite highly compared to Yilgarn BIFs. The sample effort appears inadequate for troglofauna and no sampling has been undertaken for stygofauna given the huge water requirements of this proposal. Why are there no bores drilled for stygofauna sampling? The depth to water may be great (and presence of stygofauna unlikely at such great depth) but is this depth not based on areas in the range? What is the depth to groundwater where abstraction will occur? The habitat assessment for troglofauna is also substantially flawed.	Refer to the response to Issue 19 in Attachment 3 in respect of the adequacy of sampling and genetic analysis. The submitter is also referred to the responses to "Hydrological processes and inland waters environmental quality' for further information regarding depth to groundwater. DNA analysis has been undertaken to the extent possible, given that many of the target animals for comparisons were unable to be borrowed from the Western Australian Museum. The results of DNA analysis have been incorporated into the assessment (refer Appendix E). Troglofauna sampling effort was slightly less than agreed with the OEPA for logistical reasons but adequately demonstrates there will be no significant impact on troglofaunal conservation values (see responses to Issue 19). No stygofauna sampling was undertaken for the reasons outlined in response to Issue 212.
216	357	 The submitter reiterates statements in the PER: Fractured rock aquifers in the Yilgarn do not contain significant aquatic fauna (stygofauna); 9 troglofauna (air-breathing) species recorded only from the mine pits, but habitat assessment indicates a broader distribution throughout the Helena-Aurora Range; 	MRL notes these statements from the PER, as re- iterated by the submitter.
217	Toodyay Naturalists	The Proposal will directly impact some troglofauna	It is agreed that other (additional) species may be found.

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	Club	individuals and from identified species as well as potential habitat. Eight species are currently known only from goethite mineralization and 75 % of goethite mineralisation in the vicinity of the Proposal will be removed. However, given the occurrence of many species in siliceous BIF and canga (90 and 70 % retained, respectively), it is likely that some or most of these species will also occur in patches of weathered BIF. The submitter is concerned that other species may be found in the remaining goethite mineralisation.	Please refer to Appendix E and the response to Issue 19 for the reasons for expecting these species to have wider ranges and for there to be no significant impact of troglofaunal conservation values as a result of the Proposal.
218	Toodyay Naturalists Club	The submitter is concerned that no specific management of troglofauna is proposed	No specific management of troglofauna is proposed on the basis that the impact of the Proposal is not significant given the availability of habitat elsewhere in the range and the likely occurrence of these fauna within habitat that is beyond the disturbance area of the Proposal. Please also refer to the response to Issue 19 for further details in this regard.
219	ANON-TWYQ-WP1Q-X	Section 7-2 of the PER concludes that the fractured rock aquifers at J5 and Bungalbin East will not contain a significant assemblage of stygofauna because previous surveys of similar aquifers in the region have not produced any evidence of stygofauna occurrence (Appendix 7-A), thus a field survey is unnecessary. Assessment of stygofauna would not appear to meet requirements of EPA Guidance Statement No. 54a and conclusions drawn on environmental risk are overly tenuous for the potential impacts in an area of high conservation value.	MRL advises that the assessment of stygofauna meets the requirements of the relevant EPA guidance, for the reasons outlined in the PER (section 7.2.1). Refer also to section 4 of Appendix 7-A of the PER, which provides further detail in respect of stygofauna.



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5. Terrest	rial fauna		
220	Parks and Wildlife	Surveys undertaken in 2015 show a number of known and potential Short Range Endemics (SRE) invertebrate taxa (nineteen) are proposed to be impacted by the proposal, and six of these (approximately 32%) are currently only known from (and therefore possibly restricted to) the proposal area.	Please refer to the detailed response to this issue in Attachment 6 (Section 5).
		It is difficult however, to assess the risks posed by the proposal to potential or known SRE fauna taxa or their conservation significance as:	
		there were difficulties in accessing specimens from previous collections for comparison;	
		 species identifications were not confirmed using molecular methods; and 	
		• comments on distributions and habitat for some taxa being present outside the footprint do not appear to be based on a scientific understanding of potentially restricted taxa habitat, but rather on possible association with broader scale habitat types.	
		Further information for the known and potential SRE taxa (in particular those that were only found within the footprint) to determine if they occur elsewhere in the	
		region or are restricted to habitats (such as substrates) specifically associated with the orebody should be conducted. This could be either through wider targeted	
		surveys or habitat focused investigations to provide evidence to support comments in the PER that taxon habitat is present outside the footprint.	
		Comments from the PER (page 8-22 to 8-25) inferring broader distributions for the six taxa restricted to the	



Issue No.	Submitter	Submission and/or issue	Response to comment
		footprint, such as:	
		 "Missulena sp. B11 is expected to have a linear range that is at least as wide as the BIF on which it has been foundThus, the range of the species almost certainly extends outside the proposed Proposal disturbance area"; 	
		• "Yilgarnia sp. B03is likely to occur more or less continuously through 10 km of BIF that runs north-west of J5";	
		• "the distribution of <i>Synsphyronus</i> sp. B06 is likely to follow the geological formation upon which it has been found, which extends for 11.5 km";	
		• "It is considered likely that the snail <i>Bothriembron</i> sp. B01 occurs outside the proposed impact areas at J5";	
		 "Synothele sp. B13is almost certain to occur more widely on rocky breakaways and outcrops at Bungalbin East and Bungalbin Hill"; and 	
		• " <i>Teyl</i> sp. B01linear range is expected to encompass Bungalbin Hill and Bungalbin East as there are no obvious limitations to dispersal",	
		are not able to be verified or supported without the provision of further supporting information such as detailed microhabitat assessment.	
		No further investigations, or specific management, mitigation or offsets are proposed for SRE fauna. The proposed fauna management measures are generic and do not specifically address monitoring or management of invertebrates of conservation significance.	



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221	Parks and Wildlife	<u>Idiosoma nigrum - shield-backed trapdoor spider</u> Specimens of the threatened mygalomorph spider <i>Idiosoma nigrum</i> have recently been reviewed by the WA Museum, with eight new potential taxa split out from the previously identified <i>I. nigrum.</i> This includes <i>Idiosoma</i> sp. B02 which based on the advice of the WA	MRL understands that the Intergovernmental Memorandum of Understanding is an agreement between the Australian Government and states and territories on a common assessment method for listing of threatened species and threatened ecological communities.
		 <i>Idiosoma</i> sp. B02 which based on the advice of the WA Museum has a distribution "…<i>limited to the Koolyanobbing and Helena-Aurora ranges</i>…" (PER, page 8-26). <i>Idiosoma</i> sp. B02 has a small range in comparison to some of the other potential new taxa from the <i>I. nigrum</i> complex and there has already been significant loss of habitat and individuals, particularly from the approved activities on the Koolyanobbing Range. Consistent with the Common Assessment Method for national listing of threatened species⁷⁸, and the intergovernmental Memorandum Of Understanding⁷⁹ for threatened species listing which the WA Minister for Environment has signed, <i>Idiosoma</i> sp. B02 is currently considered to be a threatened species and should be treated as such for the purposes of management and 	MRL also understands that whilst Western Australia has signed the MoU there are various legislative and administrative changes required to implement the common assessment method, as well as the need to transition currently listed threatened species to an agreed threat category on a single operational list. DPaW state that <i>"Idiosoma sp. B02 is currently considered to be a threatened species"</i> . It is presumed the basis for this statement is that <i>Idiosoma nigrum</i> is regarded as a parent species of <i>Idiosoma</i> sp. B02. The policy paper for implementation of the Common Assessment Method states that in relation to listing/delisting of species <i>"Once ALL subspecies/varieties have been assessed, prepare de- listing advice for the parent species that includes a brief</i>
		decision-making. The assessment in the PER does not consider <i>Idiosoma</i> sp. B02 as a threatened species, only as a confirmed SRE species. The proposal would impact on one of the three known records for the species at the HAR. Further	assessment of any conservation implications for its infra- specific taxa". This suggests that <i>Idiosoma nigrum</i> should not be delisted until listing (or not) has been considered for the eight species likely to be described with the <i>Idiosoma</i>

⁷⁸ Threatened Species and Ecological Communities Working Group (2016) *Policy Paper for the Implementation of the Common Assessment Method*.

⁷⁹ Intergovernmental Memorandum of Understanding (2015) *Agreement on an assessment method for listing of threatened species and threatened ecological communities.*



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		information should be provided by the proponent on the cumulative direct and indirect impact of this proposal and the exploration and mining at Koolyanobbing Range on <i>Idiosoma</i> sp. B02 as the cumulative impact of exploration and mining on <i>Idiosoma</i> sp. B02 may be significant and full protection of occurrences within conservation reserves considered appropriate. It is noted that no specific management, mitigation or offsets are proposed for <i>Idiosoma</i> sp. B02.	 <i>nigrum</i> species complex. But it remains unclear at this time whether <i>Idiosoma</i> sp. B02 will be determined to warrant listing. Regardless of the listing status of <i>Idiosoma</i> sp.B02, MRL advises that the species is not confined to the Helena-Aurora Range, having been sampled from two sites within the <i>Eucalyptus</i> woodland habitat type, both of which occur outside the disturbance area and will not be affected by the Proposal. The species is also known from the Koolyanobbing Range, based on advice from the WA Museum. It is most probable that further survey effort by others in the future will discover additional populations as its preferred habitat type is well distributed throughout the region. MRL therefore considers that provision of further information on the cumulative direct and indirect impact of the Proposal as well as offsets is unnecessary.
222	DEE	 The DEE considers that impacts to the EPBC Act listed Malleefowl (<i>Leipoa ocellata</i>) are acceptable, and proposed mitigation/management measures detailed in the PER are sufficient and consistent with the <i>National</i> <i>recovery plan for Malleefowl Leipoa ocellata⁸⁰</i>, specifically: reduction of fire threat to Malleefowl habitat through appropriate fire prevention and management strategies; inclusion of information on Malleefowl conservation and management information as part of site 	MRL acknowledges and agrees with the submitters statement.

⁸⁰ Benshemesh (2007) National Recovery Plan for Malleefowl. Department for Environment and Heritage, South Australia.

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		 environmental inductions; installation of road signs to alert personnel when they are entering Malleefowl habitat; and reporting of Malleefowl sightings to the WA Department of Parks and Wildlife. 	
223	BirdLife WA	 The submitter is concerned about the lack of scientific rigor in the proponent's PER document. 1. The proponent provided little, if any, evidence to support their conclusions In all of the chapters that address the Key Environmental Factors, the proponent concluded that their proposal meets the objectives defined by the EPA. However, the proponent provided little evidence to support these conclusions. 	MRL disagrees with the submitter's assertion that little evidence has been provided to support conclusions in the PER regarding the EPA objectives. The assessment is supported by site-specific field and database surveys conducted in accordance with State and Commonwealth guidelines. The assessment is also consistent with the requirements of the ESD set by the OEPA. Further information would be required from the submitter for each factor in respect of this assertion, in order for MRL to respond in further detail.
		 The proponent downplayed the environmental impacts of their mining proposal by using the literature selectively and making claims that are neither sourced or evidence based. This is highlighted by the following paragraph from Chapter 8 "Terrestrial Fauna" (Page 8-28, PER), which downplays the indirect impacts of noise, vibration, light emissions, or dust on vertebrate species: "Regardless of the phase of the Proposal, such emissions [noise, vibration, and light emissions] may cause vertebrate fauna species to move away from the area, alter their behaviour, or change community structure (Larkin 1996; Raddle 1998). Over time it is expected that most vertebrate species will either habituate to the dust light and noise associated with 	MRL notes that whether or not the Proposal meets the EPA objectives is ultimately a matter for the EPA's determination. However, MRL considers that the Proposal can meet these objectives. This conclusion is supported by the evidence-based, objective assessment presented in the PER. MRL has not sought to downplay the environmental impacts of the Proposal by using the literature selectively and making claims that are neither sourced nor evidenced-based. MRL acknowledges that the articles cited by the submitter support the broad hypothesis that human activities are capable of affecting fauna in various ways. However, the sections of the articles cited by the submitter do not accurately represent the key findings of



Issue No.	Submitter	Submission and/or issue	Response to comment
		mining operations, or move to a suitable distance away from the source so that they are no longer disturbed (Larkin, 1996; Radle, 1998 cited in ecologia Environment, 2014). Due to the large areas of relatively undisturbed habitat north and south of the disturbance area and the mobility of most species, individual animals should be able to move away from dust, light, noise and vibration sources and thus avoid these impacts."	the articles, which support the conclusion that the indirect impacts of the Proposal on vertebrate fauna from noise, dust and light are likely to be highly localised and not significant at the species level.
		 a) Although cited by the proponent, Larkin (1996), Raddle (1998), and Radle (1998) are not included in the PER reference list, nor are Larkin (1996) or Radle (1998) cited in ecologia Environment (2014) report. The submitter found the Larkin (1996) paper in a literature search but could not find Raddle (1998) or Radle (1998), and did find a literature review written by Radle in 2007 (Radle 2007). Her literature review did not cite Radle (1998). 	
		 b) Larkin (1996) and Radle (2007) addressed noise on wildlife, not vibration, light emissions, or dust. Larkin (1996) focused on noise from military activity. 	
		c) The proponent failed to acknowledge that Larkin (1996) also stated that noise can damage hearing in wildlife and cause "behavioral effects that might decrease chances of surviving and reproducing include retreat from favorable habitat near noise sources and reduction of time spent feeding with resulting energy depletion".	
		d) Radle (2007) wrote in her literature review on noise: "Most researchers agree that noise can affect an animal's physiology and behaviour, and if it becomes a chronic stress, noise can be injurious to an animal's energy budget, reproductive success and long-term survival.	



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		Armed with this understanding it should follow that humans would attempt to minimize the threat to wildlife by reducing the amount of noise that they are exposed to in natural areas; but this has not been the situation."	
		 e) Larkin (1996), Raddle (1998), and Radle (1998) are old papers. A quick search of the literature highlights that a wealth of knowledge has been generated since. Shannon <i>et al.</i> (2016) conducted an extensive review of the scientific literature published from 1990 to 2013 on the effects of anthropogenic noise on wildlife. They found considerable evidence that anthropogenic noise is detrimental to wildlife and natural ecosystems, including altered vocal behaviour to mitigate masking, reduced abundance in noisy habitats, abandonment of territory, changes in vigilance and foraging behaviour, and impacts on individual fitness and the structure of ecological communities. 	
		 f) As the proponent pointed out, some animals will habituate to noise associated with mining operations. All vertebrates are capable of habituation (Bowles 1995, Shannon <i>et al.</i> 2016). What the proponent failed to point out was that habituation to noise can also have negative impacts on wildlife (Bowles 1995). For example, animals that habituate to traffic noise are vulnerable to vehicle strike. The proponent also failed to point out that Larkin (1996) wrote "even when habituation to a stimulus has occurred, significant physiological effects may nevertheless still be taking place". 	
		The proponent's claim that "animals should be able to	
		move away from dust, light, noise and vibration" is at	
		move away from dust, light, noise and vibration" is at odds with their conclusions for Chapter 8 (PER): "from	



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		an ecological perspective[the mining proposal is] not expected to affect the functioning of the remaining 90% of this habitat type" and "the Proposal is therefore capable of being implemented whilst maintaining ecological function with respect to fauna species, populations and the overall assemblage" (Page 8-33, PER). Clearly, the proponent has failed to recognise that animal movement impacts on ecological functioning. It reduces survival and increases energetic expenses. If suitable habitat exists away from the proposed area of disturbance, it is likely to be occupied by other individuals, leading to increased competition and aggression, and displacement of animals in these habitats.	
224	ANON-TWYQ-WPH1-N ANON-TWYQ-WP2E-K ANON-TWYQ-WP27-5 ANON-TWYQ-WP2Y-7 ANON-TWYQ-WP2S-1 ANON-TWYQ-WPPF-J ANON-TWYQ-WPPF-V ANON-TWYQ-WPPF-V ANON-TWYQ-WPP5-1 ANON-TWYQ-WPPK-Q ANON-TWYQ-WPPK-Q ANON-TWYQ-WPHW-U ANON-TWYQ-WPHB-6 Track Care WA	 Submitters object to the proposal based on: the impacts to local and endangered fauna; the HAR is home to three threatened fauna species, one Specially Protected fauna species and more than 113 native fauna species (with potentially more terrestrial fauna yet to be discovered); the HAR provides habitat to specialist vertebrate and invertebrate fauna that have adapted to the arid conditions; the proposal and associated infrastructure such as haul roads, would lead to the loss of habitat, noise and road kill of fauna; the disturbance to fauna habitat could cause fauna to become more vulnerable to predators; the BIF ranges act as a refuge for fauna, particularly small insectivores, as they retain moisture and 	 MRL notes the objection of the submitters to the Proposal for the stated reasons. The three "threatened" fauna species and one "Specially Protected fauna species" are all 'Specially Protected Fauna' as per the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2015</i> (see DPaW, 2015) MRL assumes the threatened fauna referred to by the submitter are: Malleefowl (Schedule 3) Fork tailed Swift (Schedule 5 – Migratory) Rainbow Bee-eater (Schedule 5 – Migratory) Peregrine Falcon (Schedule 7) The detailed assessment presented in the PER concludes that the direct and indirect impact of the Proposal on these threatened fauna will not be significant. Statements such as "the proposed mining"



Issue No. Si	Submitter	Submission and/or issue	Response to comment
Issue No. Si Bi AI Bi BI Bi AI AI AI AI AI Bi BI Bi	Submitter Sirdlife WA NON-TWYQ-WP45-5 SHLF-TWYQ-WPJ8-X SHLF-TWYQ-WPJ8-X SHLF-TWYQ-WPJ8-X SHLF-TWYQ-WPJ8-X SHLF-TWYQ-WPJ8-S SHLF-TWYQ-WPZ9-F NON-TWYQ-WPZ9-F NON-TWYQ-WPZ5-9 NON-TWYQ-WPZ5-9 NON-TWYQ-WPZ6-C NON-TWYQ-WPZ6-C NON-TWYQ-WPZ6-C NON-TWYQ-WPZ6-C NON-TWYQ-WPE6-9 NON-TWYQ-WPE6-9 NON-TWYQ-WPB6-M NON-TWYQ-WPB6-M NON-TWYQ-WPB6-M NON-TWYQ-WPB4S-3 Sird Life Australia VA Native Orchid Study nd Conservation Group nc. NON-TWYQ-WPJU-U NON-TWYQ-WPJU-U NON-TWYQ-WPBJ-8 NON-TWYQ-WPBK-9 NON-TWYQ-WPBC-F NON-TWYQ-WPBC-9 NON-TWYQ-WPFV-R	 Submission and/or issue provide shelter in a semi-arid environment, including home to more than 75 bird species; GWW are known to be sites of high fauna biodiversity and should not be sacrificed for short-term profit motives; disturbance of the range would alter the habitat and interrupt the natural balance of the different populations of fauna and flora. As one example, Malleefowl surveys that have been undertaken in the area have provided information on the distances the birds can roam and the resources and conditions they need for food and breeding activity. Mining disturbance in one area has repercussions in areas distant to the immediate area of mining and potential destruction of resources vital to the survival of the malleefowl; and the proposed mining activity would cause permanent and irreversible disturbance to populations of terrestrial fauna with repercussions for the biodiversity within the area. The proposed mining at J5 will destroy two rock holes which are used by fauna. Given the patchy and sporadic rains in the interior, it is possible that those rock holes sustain life in a given season. 	Response to comment activity would cause permanent and irreversible disturbance to populations of terrestrial fauna with repercussions for the biodiversity within the area" are not supported by evidence and lack the objective and detailed analysis presented in the PER. MRL advises that there are no vertebrate fauna that are endemic to the range. MRL advises that the fauna habitats that will be disturbed by the Proposal and support conservation significant fauna are well represented locally and in the region, and therefore the natural balance of the different populations of fauna and flora will not be affected. Further detail is provided in section 8 of the PER. The PER quantifies the loss of habitat for vertebrate and invertebrate fauna, and proposed management actions will minimise impacts over the life of the Proposal. Road kill of fauna, whilst it unfortunately does occur from time to time in relation to MRL's Yilgarn operations, does not occur in sufficient frequency or intensity in relation to any vertebrate fauna species to the extent it would be considered a significant impact. In any event, MRL's EMS includes controls to reduce the occurrence of road kill (e.g., by reducing vehicle speeds). In regard to the rock holes at J5, no habitat of special importance was recorded during the surveys. The area in and around J5 was surveyed and the results included in the survey report (PER Appendix 8-A). As detailed in section 8.6 of the PER, MRL considers that the consument in the DER summarts the considers
AI	NON-TWYQ-WPFR-M		that the EPA's objective for terrestrial fauna can be met



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	ANON-TWYQ-WPFP-J		in respect of the Proposal.
	ANON-TWYQ-WPBA-Y		
	ANON-TWYQ-WPP9-5		
	ANON-TWYQ-WPPG-K		
	ANON-TWYQ-WPPW-3		
	ANON-TWYQ-WPPQ-W		
	ANON-TWYQ-WPFC-5		
	ANON-TWYQ-WPF1-K		
	ANON-TWYQ-WPF9-U		
	ANON-TWYQ-WPF7-S		
	ANON-TWYQ-WP4J-T		
	ANON-TWYQ-P22-Z		
	ANON-TWYQ-WP2K-S		
	ANON-TWYQ-WPPC-F		
	ANON-TWYQ-WPPD-G		
	ANON-TWYQ-WP2Q-Y		
	ANON-TWYQ-WP2W-5		
	ANON-TWYQ-WP46-6		
	ANON-TWYQ-WP2K-S		
	ANON-TWYQ-WPBE-3		
	355		
	ANON-TWYQ-WP2D-J		
	ANON-TWYQ-WPF5-Q		
	ANON-TWYQ-WPFW-S		
	ANON-TWYQ-WP1C-G		
225	The Wilderness Society	The HAR has a rich if often elusive faunal community.	MRL notes the submitter's opinions with the regard to





Issue No.	Submitter	Submission and/or issue	Response to comment
Issue No.	Submitter	Submission and/or issue Birds and reptiles are a special feature of the range and its surrounding woodlands. Disturbance as proposed will significantly and cumulatively impact the fauna of the range, especially specialist and short range species. The causes of impacts include direct loss of habitat and deaths (e.g. on haul roads and at mine sites); degradation of food and other habitat requirements from dust, increased fire frequency, etc; constant noise; introduction and spread of predators via haul roads and heavy vehicles; and changed hydrological conditions.	Response to comment the direct and indirect effects of the Proposal on fauna. MRL disagrees that the PER has failed to adequately address the impacts of the Proposal on fauna. The PER is consistent with the requirements of the ESD and is appropriately focussed on threatened and priority fauna as these are the animals deemed most at risk by the Australian Government and the Western Australian Government. The information in the PER is appropriate to the level of risk presented by the Proposal in relation to threatened and priority fauna.
		The proponent has failed to adequately address the impacts of its operations on fauna. For example, in relation to noise, the proposed fifteen years of continuous noise that the project would entail would have potentially serious long-term impacts on fauna but the proponent has made no attempt to quantify the impact or address it. In relation to noise and other emissions, the proponent states (PER, page 8-27), "Noise with accur throughout	and priority fauna. Further work, such as quantifying the impacts of noise on individual species, is unnecessary in relation to this Proposal and would add little to the detailed assessment already undertaken. MRL disagrees with the submitter's opinion that "noise disturbance in the Helena-Aurora Range is already significant due to relatively distant mining activity associated with J4 (and possibly Mount Jackson, Windarling, Carina and Koolyanobbing)." MRL refers the submitter section 10.2.3 of the PER, which discusses the baseline poise environment of the
		the disturbance area as a result of mining activities (drilling, blasting, machinery and vehicle movements) and ore haulageRegardless of the phase of the Proposal, such emissions may cause vertebrate fauna species to move away from the area, alter their behaviour, or change community structure (Larkin 1996; Raddle 1998). While the impact of noise, vibration and light is not well documented for SRE species, it is likely that these indirect effects may impact populations located close to the source of the disturbance (e.g. road,	 Helena-Aurora Range and more broadly the Mt Manning – Helena-Aurora Range Conservation Park. The area is considered to be a relatively quiet environment with background noise consisting of wind, rain and bird calls. The PER acknowledges other sources of noise from vehicles and haulage trucks on distant haul roads, but demonstrates that these cannot be construed in any way as being significant. MRL disagrees with the submitter's contention that



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		mine infrastructure, light sources). SRE species are unable to move significant distances to avoid such disturbances although effects of noise, vibration and light emissions are likely to dissipate rapidly with distance from the source and are not considered to be a significant risk to SRE species. Over time it is expected that most vertebrate species will either habituate to the dust, light and noise associated with mining operations, or move to a suitable distance away from the source so that they are no longer disturbed (Larkin, 1996; Radle, 1998 cited in ecologia Environment, 2014)Due to the large areas of relatively undisturbed habitat north and south of the disturbance area and the mobility of most species, individual animals should be able to move away from dust, light, noise and vibration sources and thus avoid these impacts." The submitter opposes the statements in the PER above and notes noise disturbance is already significant in HAR due to relatively distant mining activity associated with the proponent's "J4" mine (and possibly Mount Jackson, Windarling, Carina and Koolyanobbing). To suggest that affected species, i.e. most species, can just move to another location is ridiculous since the "other location" is already the territory of other members of that species; and mining activity is spreading throughout the region and will spread even further if this and other proposals are approved, meaning that there will be no "other locations"	statements in the PER regarding habitat quality and extent are false on the basis of impacts from mining throughout the Yilgarn. This contention is at odds with the widely held view that the GWW, which includes the Helena-Aurora Range, is the largest remaining area of intact Mediterranean climate woodland on Earth (see, for example, DEC (2012)). MRL refers the submitter to section 6.2.3 of the PER, in particular Table 6-2, which quantifies the extent of disturbance across BIF ranges in the entire Mt Manning area relative to the total area of these ranges. Of the 14 ranges listed in Table 6-2, exactly half (7) are more than 99% intact. A further four ranges are more than 90% intact. Only three ranges out of the 14 ranges (Evanston Range, Koolyanobbing Range, Windarling Range) have been disturbed by more than 10%. It is clear from these figures that mining has, in fact, had very little impact in terms of the overall extent of these ranges. In MRL's view, the assessment in the PER clearly demonstrates that the impacts of the Proposal on terrestrial fauna can be managed to meet the EPA's objective to maintain representation, diversity, viability and ecological function at the species, population and assemblage level.



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		for species to move to get away from such impacts.	
		As one recent study reported ⁸¹ :	
		"Global population growth has caused extensive human-	
		induced environmental change, including a near-	
		ubiquitous transformation of the acoustical environment	
		due to the propagation of anthropogenic noise. Because	
		the acoustical environment is a critical ecological	
		dimension for countless species (to obtain, interpret and	
		respond to environmental cues), nignly novel	
		impact organisms that use accustics for a variety of	
		functions, such as communication and predator/prev	
		detection Using a comparative approach with 308	
		populations of 183 bird species from 14 locations in	
		Europe, North American and the Caribbean, I sought to	
		reveal the intrinsic and extrinsic factors responsible for	
		avian sensitivities to anthropogenic noise as measured	
		by their habitat use in noisy versus adjacent quiet	
		locations. Birds across all locations tended to avoid noisy	
		areasCollectively, these results suggest that	
		anthropogenic noise is a powerful sensory pollutant that	
		can filter avian communities nonrandomly by interfering	
		with birds' abilities to receive, respond to and dispatch	
		acoustic cues and signals."	
		In relation to fauna impacts, the proponent goes on to	
		state (PER, page 8-32),	

⁸¹ Clinton Francis (2015). Vocal traits and diet explain avian sensitivities to anthropogenic noise. Global Change Biology journal.



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		"Overall, the fauna habitat types within the disturbance area are also well represented elsewhere in the landscape and region. Habitat connectivity is excellent due to the remote and largely undisturbed nature of the area". The submitter contends that these statements are false as mining operations, haul roads and other impacts spread across the Yilgarn landscape. Anyone who has visited HAR in recent years will see the spread of mining impacts, loss of habitat and disturbance from Koolyanobbing to Carina, "J4" to Mt Jackson and beyond. In this context, to talk of "Habitat connectivity is excellent due to the remote and largely undisturbed nature of the area" is simply false and cannot be relied upon, as the proponent does, as the ultimate means by	
		which the EPA's fauna objectives can supposedly be met.	
226	Wildflower Society of WA ANON-TWYQ-WPBH-6	Table E-4 of the PER states that six SRE species were found only inside the disturbance area. The loss of these six species is not mentioned in the potential impacts column and further justification should be provided. The loss of these species does not align with the EPA fauna objective.	The seven species referred to are <i>potential</i> SRE species, meaning they belong to a group of species where there are gaps in knowledge, either because the group is not well represented in collections, taxonomic knowledge is incomplete, or the distribution is imperfectly understood because sampling has been intermittent. The identification of SRE species is only a filtering process to determine whether species may be significantly impacted by development. Whilst SRE species have the potential to be impacted because their
			ranges may fall entirely within an area of disturbance, the actual level of impact to SRE species depends on the relationship between the species' range and the



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			Proposal disturbance area (Bennelongia 2016). The minimum linear range of the seven potential SRE species is estimated to range between 11 and 20 km based on habitat characteristics (Bennelongia 2016). It is therefore most probable that these animals occur outside the disturbance area. For this reason, these species are not likely to be significantly impacted as a result of the Proposal.
227	ANON-TWYQ-WP2B-G Toodyay Naturalists Club	 Submitters raised concerns regarding the introduction and/or increase in feral animals due to the proposal: The proposal would increase introgression by introduced species (cats and foxes). This will impact upon the fauna in the area through direct clearance, changes to hydrogeology, increased predation and competition, and changes to species' home ranges and/or movement patterns. These concerns have not been adequately addressed by the proponent, irrespective of the scale of any purported 'offsets'. The submitter is concerned that the PER does not contain procedures to control feral animals apart from reporting them. The submittor is concerned that feral animals will be attracted as a result of open water, waste and light spill. The number of feral cats at Koolyanobbing/Windarling/Mt Jackson for 2016 (to date) is 31 (with 15 since June). Cliffs have employed a contractor to eradicate feral animals. There appears no commitment from the proponent to undertake similar controls even though they admit that feral animals will be attracted to the site 	MRL advises that several feral animal species have been recorded from the Mt Manning area including mice, cats, rabbits, dogs, foxes and camels (Appendix 8-A, ecologia, 2016). Ecologia (2016) noted that the local abundance of these introduced mammals may have contributed to the lower mammalian diversity recorded during its fauna surveys of the area. It is not clear from the submission how the Proposal might indirectly affect genetic structure through introgression (Note definition: <i>the transfer of genetic information from one species to another as a result of hybridization between them and repeated backcrossing</i>) by introduced species (cats and foxes), nor which species might be at risk as a result of cats and foxes. Regardless, the assessment of such indirect effects is not required by the ESD and is beyond the scope of the PER. The PER (section 8.4) refers to MRL's plans and procedures that are relevant to the management of fauna, including feral animals.



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			will not have a significant effect on feral animal numbers. In fact, the Proposal presents an opportunity to reduce feral animal numbers in the MMHARCP through targeted management initiatives jointly implemented by MRL and DPaW.
228	ANON-TWYQ-WP17-4	This area is home to a number of marsupial animals, mining operations and human habitation could lead to an increase in the number of feral animals in this area. This could impact these animals including, Dunnarts, ash grey mice, pygmy possums, and Southern ningaui (which only exist in isolated pockets).	Please refer to the response to Issue 227 in respect of feral animals.
229	ANON-TWYQ-WP18-5	The BIF ranges provide refuge for diverse fauna comprising 160 species in total, including twelve threatened, protected or endemic species, and eight species fully or partially dependent on BIF. The proposal notes that modification of the landforms through mining is inevitable, with therefore an inevitable impact on the fauna that depend on them.	MRL acknowledges and agrees with the submitter's statement. If the Proposal is approved and implemented, approximately 95% of BIF habitat within the HAR will remain.
230	69	The HAR is a magnificent area, with variation between plants evident over small isolated patches, as described by botanists at Wildflower Society meetings. The Insect Study Group has had talks on the little known insects that live in these ranges, where underground living insects within short distances from each other, are different species and do not interbreed. The range is obviously unique and biodiverse and entreat the EPA to act on the science and again recommend against these mines.	At increasingly fine scales of assessment, every environment becomes unique. The science and experience of mining BIF ranges to date does not support the conclusion that ecological function will be irreversibly impaired should mining proceed in the Helena-Aurora Range.
231	ANON-TWYQ-WPZS-9	There are a number of species of terrestrial fauna in the GWW that are threatened or near threatened; perhaps	MRL acknowledges and agrees with the submitter's statement. Please refer to MRL's response to Issue No.

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		even occurring nowhere else. It is highly important to maintain suitable habitat that these species continue to survive, indeed further measures should be implemented to ensure that these and other species diversity and assemblages are maintained at a sustainable level.	224.
232	ANON-TWYQ-WPJ7-W BirdLife WA	 Approving this mining proposal will impact on the natural values of terrestrial fauna and ecological functioning at HAR. The mining proposal cannot maintain representation, diversity, viability, and ecological function of terrestrial fauna at the species, population, and assemblage level at HAR. Given that HAR lies within a conservation park, with the purpose of "the proper maintenance and restoration of the natural environment, the protection of indigenous fauna", this proposal is environmentally unacceptable. The proponent inadvertently supported this by acknowledging that their mining proposal will cause: 1. <i>"Direct loss of habitat through clearing will have the largest impact on terrestrial fauna and SRE invertebrate fauna."</i> (Page 8-29, PER). 2. Indirect effects of "vegetation degradation, fire, noise, light, vehicle strike, food waste and open water" (Page 8-27, PER). 3. Residual impacts on vertebrate and SRE invertebrate fauna (Page 8-31; PER): a) <i>"Loss of high quality habitat for several species that are specially protected under either the EPBC Act, the WC Act, Parks and Wildlife Priority Fauna list, or both."</i> 	MRL acknowledges that the Proposal will have direct and indirect impacts on fauna habitat, but the relevant test is whether or not they are significant residual impacts determined by the EPA. The PER, supported by extensive field and database surveys, states that high quality habitat will be lost for several conservation significant species, but it also quantifies the extent of habitat loss and notes that the loss represents a small proportion of the overall habitat available in the region. The assertion that the representation, diversity, viability and ecological function of terrestrial fauna could only be maintained in the absence of the Proposal, is not supported by the available evidence.



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		 b) "Loss of high quality habitat for other non-listed species that are at the limit of their distribution and/or appear reliant on such habitat for survival." 	
		c) "Loss of high quality habitat for four listed and confirmed SRE invertebrate species and six potential SRE species known only from the disturbance area but likely to be more widespread."	
		Despite this acknowledgement, the proponent still concluded that "from an ecological perspective, the removal of 10% of the rocky ridge habitat type is a localised impact that is not expected to affect the functioning of the remaining 90% of this habitat type" and "the Proposal is therefore capable of being implemented whilst maintaining ecological function with respect to fauna species, populations and the overall assemblage" (Page 8-33, PER).	
		The proponent drew this conclusion without providing evidence to support it.	
233	ANON-TWYQ-WPJ7-W BirdLife WA	Approving this mining proposal will have a dramatic impact on terrestrial fauna and ecological functioning at HAR. This can be highlighted using birds, by demonstrating that the mining proposal will change the bird community at HAR with impacts felt in the area of disturbance, across the whole range, and in the surrounding landscape. The principles also apply to other terrestrial fauna.	The PER documents the fact that the Helena-Aurora Range provides habitat for birds and supports an avian assemblage that is comparable to other surveyed areas of the GWW. MRL notes that the following species referred to by the submitters are not listed as threatened pursuant to Commonwealth and/or WA legislation: • Crested Bellbird • Gilbert's Whistler
		1. HAR provides an important habitat for birds and supports a healthy bird community	 Purple-crowned lorikeet Rufous Treecreeper



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		 a) 111 bird species have been recorded within 20 km of HAR (BirdLife Great Western Woodlands Database). Analysis of BirdLife's Great Western Woodland survey data shows higher richness of bird species directly on and fringing the range than in surrounding woodland areas (E. Fox, BirdLife Australia, pers. comm.). b) HAR provides important habitat for woodland birds that have declined significantly in numbers or are locally extinct in the neighbouring wheatbelt. These species include Crested Bellbird (<i>Oreoica gutturalis</i>), Gilbert's Whistler (<i>Pachycephala inornata</i>), Purple-crowned Lorikeet (<i>Glossopsitta porphyrocephala</i>), Rufous Treecreeper (<i>Climacteris rufus</i>), and Chestnut Quail-thrush (<i>Cinclosoma castanotum</i>) (Plates E4.1-E4.5). c) HAR provides an area of refuge for birds in an otherwise flat and semi-arid landscape. Rocky outcrops channel and retain water, creating local and atypical microclimates and resulting in greater biomass and higher productivity of fringing vegetation than the surrounding landscape (Mosblech et al. 2011, Schut et al. 2014)⁸². This creates a locally atypical microclimate that enables these areas to act as refugia and ensure the survival of species during periods of drought. Flora, including <i>Banksia arborea</i>, flower at different times to many species on the surrounding landscape, providing an important source of nectar. This ensures the survival of species during periods of drought. 	 Chestnut Quail Little Woodswallow Scarlet-chested Parrot Crested shrike tit (western) The extent to which the HAR "provides a refuge for birds in an otherwise flat and semi-arid landscape" requires clarification. The submitters state that rocky outcrops channel and retain water, creating local and atypical microclimates and resulting in greater biomass and higher productivity of fringing vegetation than the surrounding landscape. Mosblech et al (2011) and Shut et al (2014) are cited in support of the above statement. In broad terms these articles address the importance of (micro) refugia for species adaptation to rapid anthropgenic climate change. Neither Mosblech et al (2011) nor Shut et al (2014) discuss the particular circumstances of the Helena-Aurora Range and how the area proposed for disturbance may include 'micro-refugia'. Mosblech et al (2011) discusses the importance of microrefugia in the light of population migration and genetic drift whereas Shut et al (2014) is concerned with the rapid characterisation of vegetation structure to predict refugia, based on work undertaken on granite inselbergs or outcrops in southwestern WA. MRL advises that the Helena-Aurora Range is

⁸² Mosblech NA, Bush MB, van Woesik R (2011). On metapopulations and microrefugia: palaeoecological insights. J. Biogeograph. 38, 419-429. Schut AGT, Wardell-Johnson GW, Yates CJ, Keppel G, Baran I, Franklin SE, Hopper SD, Van Niel KP, Mucina L, Byrne M (2014). Rapid Characterisation of Vegetation Structure to Predict Refugia and Climate Impacts across a Global Biodiversity Hotspot. PLoS ONE 9(1): e82778





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		Both the rocky outcrops and their fringing vegetation need to be protected from disturbance in order for species from the surrounding region to persist long-term.	geologically and hydrologically distinct from granite outcrops of the Yilgarn Craton. Whereas granite outcrops channel water, nutrients and plant residues to the fringes of the rock because the granite is largely
		 d) HAR provides important habitat for Vulnerable and Specially Protected species: Malleefowl (<i>Leipoa ocellata</i>) and Peregrine Falcon (<i>Falco peregrinus</i>). 	impermeable, BIF Ranges are characterised by high rates of water infiltration due to extensive weathering, especially in mineralised areas that are highly
		 e) HAR provides habitat for a migratory species protected under an international agreement: Rainbow Bee-Eater (<i>Merops ornatus</i>). 	cavernous. As such, the Mosblech and Schut articles referred to by the submitter are not of direct relevance to the circumstances of this Proposal and do not support
		 f) HAR supports species that depend on BIF ranges for habitat: Little Woodswallow (Artamus) 	the proposition of the submitter in regard to the HAR being a refuge for birds.
		<i>minor</i>) and Peregrine Falcon. These species are only able to persist in the local area because of breeding and hunting habitats provided by HAR. The Little Woodswallow has already lost breeding habitat at Windarling Range because of mining (Shapelle McNee, pers. comm.).	The PER notes that it is the mixed eucalypt woodland habitat type that supports the highest vertebrate species diversity, due to the greater structural complexity of the vegetation and the presence of tall trees that provide hollows, logs and habitat for arboreal species such as
	 g) HAR expands the distribution of several bird species by providing habitat that is unique in the surrounding region. Species that have been recorded either outside or on the very edge of their usual distribution include Little Woodswallow, Scarlet-chested Parrot (<i>Neophema splendida</i>), Crested shrike-tit (<i>Falcunculus frontatus</i>), and Red-tailed Black-Cockatoo (<i>Calyptorhynchus banksii</i>). Unique areas such as HAR can be particularly important in the face of climate change as species g) HAR expands the distribution of several bird birds (ecologia, 2016). MRL disagrees that the Helena-important habitat for Malleefowl. evidence of Malleefowl has been and the set of the proposal on number of the	birds (ecologia, 2016). MRL disagrees that the Helena-Aurora Range provides important habitat for Malleefowl. MRL advises that no evidence of Malleefowl has been found in the Helena- Aurora Range, whether through direct sightings or inactive/active nests, despite extensive traverses of the range undertaken as part of flora and fauna surveys since 2012. The impact of the Proposal on migratory and specially	
		h) HAR is within the area mapped as potential old-	protected species such as the Rainbow Bee Eater and the Peregrine Falcon, respectively, are assessed in





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		 growth woodland areas (Fitzsimons et al. 2014)⁸³. Areas of old-growth woodland are disproportionately important for birds, as well as other fauna. Species richness increases as woodland age increases and some species, including Rufous Treecreeper, are highly-dependent on the habitat provided by old-growth woodland (Fox et al. 2016)⁸⁴. These species do not occur outside of old-growth woodland. The extent of old vegetation in a landscape is a major driver of bird diversity (Taylor et al. 2012, 2013, Kelly et al. 2014)⁸⁵. The extent of old-growth woodland in the GWW in currently unknown, but is likely to be very limited due to the number of recent fires. It is a priority for conservation and protection. 2. Approving this mining proposal will attract bird species that benefit from human disturbance Mining sites attract bird species that benefit from the provision of nest sites, permanent water, enhanced food or foraging opportunities associated with mining-related disturbance and infrastructure (Read 1998, 1999; Read et al. 2000a. 2000b. 2015)⁸⁶ At HAR, these species will 	section 8.3.1 of the PER. The assessment has concluded impacts are not significant. In relation to habitat provided by the HAR for birds at the limit of their ranges, MRL re-iterates that about 2 % of the mallee woodland on rocky footslope habitat type will be impacted by the Proposal. MRL also advises that the impact of the Proposal on the rocky ridge habitat type has been reduced from 9.7% in the final PER to 7.4% as part of the revised proposal in response to public submissions. This small percentage impact is unlikely to have any material adverse consequence to bird ranges. The submitters state that the HAR is within the area mapped as potential old-growth woodland areas, and Fitzsimons et al (2014) cited as the source for this work. The distribution and extent of potential old-growth woodland are not provided, nor is the method used to identify this type of woodland. Indeed, the paper deals primarily with offsets. As such, it is not a reliable reference for the proposition put by the submitters. MRL notes the submitters' comments that the Proposal

⁸³ Fitzsimons J, Heiner M, McKenney B, Sochi K, Kiesecker J (2014) Development by Design in Western Australia: Overcoming offset obstacles. Land 3, 167-187

⁸⁴ Fox E, McNee S, Douglas T (2016). Birds of the Great Western Woodlands. Report for The Nature Conservancy. BirdLife Australia, Melbourne.

⁸⁵ Kelly LT, Bennett AF, Clarke MF, McCarthy MA (2014). Optimal fire histories for biodiversity conservation. Conserv. Biol. 29, 473-481.

Taylor RS, Watson SJ, Nimmo DG, Kelly LT, Bennett AF. Clarke MF (2012). Landscape-scale effects of fire on bird assemblages: does pyrodiversity beget biodiversity? Diversit. Distribut. 18, 519-529.

Taylor RS, Watson SJ, Bennett AF, Clarke MF (2013). Which fire management strategies benefit biodiversity? A landscape-perspective case study using birds in mallee ecosystems of south-eastern Australia, Biol. Conserv. 159, 248-256.

 ⁸⁶ Read JL (1998). Vertebrate fauna of the Nifty Region, Great Sandy Desert with comments on the impacts of mining and rehabilitation. West. Aust. Natural. 22, 29-49.

Read JL (1999). Bird colonisation of a remote arid settlement in South Australia. Aust. Bird Watch. 18, 59-67.



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		 include Australian Raven (<i>Corvus coronoides</i>), Galah (<i>Cacatua roseicapilla</i>), Grey Currawong (<i>Strepera</i> <i>versicolor</i>), Magpie-lark (<i>Grallina cyanoleuca</i>), Grey Butcherbird (<i>Cracticus torquatus</i>), Yellow-throated Miner (<i>Manorina flavigula</i>), Nankeen Kestrel (<i>Falco</i> <i>cenchroides</i>), and Crested Pigeon (<i>Ochyphaps</i> <i>lophotes</i>). a) Increases in the carnivorous and omnivorous species will impact other species through direct predation, including eggs. Increases in the aggressive Galah will provide competition for nest sites with other hollow-nesting species, including Major Mitchell's Cockatoo (<i>Lophochroa</i> <i>leadbeateri</i>) and Rufous Treecreeper. b) Increases in abundance of the species attracted to mining sites are just as symptomatic of adverse impacts on a biota, ecosystem dysfunction, and instability as declines or extinctions (Recher 1999)⁸⁷. These species can readily impact on ecological processes and ecological functioning. 	 will attract bird species that like human disturbance and deter bird species that do not. Such effects are not expected to be significant with respect to threatened and priority bird species that are the focus of the PER. MRL also notes the submitters' concerns regarding enigmatic impacts in the form of cumulative impacts, offsite impacts, cryptic impacts and secondary impacts and the interactions between these types of impacts. Please refer to the response to Issue 64 in respect of enigmatic impacts. MRL has engaged suitably experts and assessed impacts to vertebrate fauna in accordance with the requirements of the ESD, relevant guidance materials and contemporary environmental impact assessment practice. As a result, direct and indirect impacts on vertebrate fauna are adequately addressed in the PER.
		3. Approving this mining proposal will deter bird species that are susceptible to human disturbance	
		Mining activity and infrastructure facilities are environmental stressors that lead to declines in bird species (Read et al. 2000a, 2015, Smith et al. 2005,	

Read JL, Reid N, Venables WN (2000a). Which bird species are useful bioindicators of mining and grazing impacts in arid South Australia? Envir. Manag. 26, 215-232.

Read JL, Ebdon FR, Donohoe P (2000b). The terrestrial birds of the Roxby Downs Area: a ten year history. South Aust. Ornithol. 33, 71-83. Read JL, Benjamin AC, Parkhurst B, Delean S (2015). Can Australian bush birds be used as canaries? Detection of pervasive environmental impacts at an arid Australian mine site. Emu 115, 117-125.

⁸⁷ Recher HF (1999). The state of Australia's avifauna: a personal opinion and prediction for the new millennium. Aust. Zool. 31, 11-29.

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		Benítez-López et al. 2010, Fox et al. 2016) ⁸⁸ .	
		 a) Fox et al. (2016) identified several bird species in the GWW, including threatened and declining species and ground-foraging insectivores, that were adversely impacted by disturbances, such as mining and the provision of artificial watering points. 	
		 b) Read et al. (2000a, 2015) showed that the impact of mining at Olympic Dam mine on the richness of bird species, particularly insectivorous species, was at least 1 km from the mining activity. Read et al. (2015) also implied that the impact was probably greater than 1 km. 	
		4. Approving this mining proposal will bring about enigmatic impacts that impact on birds across the HAR and into the surrounding landscape	
		Raiter <i>et al.</i> (2014) highlighted that human disturbance, including mining activity, brings about ecological impacts	
		that are easily and often overlooked and are not	
		addressed in impact evaluations. They were not	
		can be large and far-reaching and those stemping from	
		The proponent's mining proposal will probably extend	
		across the HAR and into the surrounding landscape.	

⁸⁸ Read JL, Reid N, Venables WN (2000a). Which bird species are useful bioindicators of mining and grazing impacts in arid South Australia? Envir. Manag. 26, 215-232.

Read JL, Benjamin AC, Parkhurst B, Delean S (2015). Can Australian bush birds be used as canaries? Detection of pervasive environmental impacts at an arid Australian mine site. Emu 115, 117-125.

Benítez-López A, Alkemade R, Verweij PA (2010). The impacts of roads and other infrastructure on mammal and bird populations: a meta-analysis. Biol. Conserv. 143, 1307-1316.

Fox E, McNee S, Douglas T (2016). Birds of the Great Western Woodlands. Report for The Nature Conservancy. BirdLife Australia, Melbourne.



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		They include:	
		 a) Cumulative impacts. Sum of individual impacts that alone are considered negligible, but accumulate over space and time and are so numerous that they are significant when considered in totality. Cumulative impacts are often overlooked because impact evaluations are often limited to impacts deemed to be significant or foreseeable. 	
		 b) Offsite impacts. Impacts that are difficult to account for in impact evaluations because they are outside the immediate location of the disturbance. Some offsite impacts are considered in The proponent's PER as indirect impacts, but there are countless impacts that are not included because they are outside the designated project area. Offsite impacts include effects that may occur at great distances from the development, such as air, water, light, or noise pollution, or contamination of ecosystems with dust, salt, or other toxins. They also include alterations to habitat quality away from the disturbance, such as changed microclimates, altered foraging potential, and susceptibility to predation near edges, barriers to water flow, and changes in animal behaviour with flow-on effects for ecosystems. 	
		c) <i>Cryptic impacts</i> : Impacts that elude detection and may be overlooked because of inherent limitations of impact evaluations, but they can be substantial. Reliable detection may be compromised by limited assessment time frames, spatial scales, statistical power, practitioner skill, technology, and resources, and the practicalities of survey design. Often only impacts on specific taxonomic groups, ecological communities, or environmental	



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		features are evaluated. Cryptic impacts include: noise and light pollution effects on bird communication, foraging, reproductive behaviour and success, visual capabilities, community structure, and predator-prey interactions; air pollution impacts on ovule and pollen viability; fragmentation of populations and loss of genetic connectivity; and unwitting disease and invasive species introductions.	
		 d) Secondary impacts. Impacts are not directly caused by mining activity but are facilitated by them, yet are generally not considered the legal responsibility of development proponents in impact evaluations. For example, secondary impacts of a mine site include the (unintended) impacts of activities facilitated by the road network required for its construction and maintenance. Secondary impacts are frequently associated with increased access to relatively undisturbed areas through such road networks. These uses almost inevitably result in further impacts that can extend far beyond the initial impacts of a development both in space and time, such as introductions of invasive organisms with major ramifications for ecosystems. 	
		 e) Interactions between cumulative, offsite, cryptic, and secondary impacts. Possibly the most overlooked impacts lie beyond the full extent of individual impacts. The combined effect of the two impacts, their interactions, are often greater than their sum, or one phenomenon might facilitate another. For example, the synergistic effects of many impacts could reduce the area of refuge for birds at HAR which, in turn, impacts on birds across the range and far into in the surrounding landscape. 	



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234	ANON-TWYQ-WPJ7-W	Approving this mining proposal will attract bird species that benefit from human disturbance. Mining sites attract bird species that benefit from the provision of nest sites, permanent water, enhanced food or foraging opportunities associated with mining-related disturbance and infrastructure (Read 1998, 1999; Read et al. 2000a, 2000b, 2015). At HAR, these species will include Australian Raven (<i>Corvus coronoides</i>), Galah (<i>Cacatua roseicapilla</i>), Grey Currawong (<i>Strepera versicolor</i>), Magpie-lark (<i>Grallina cyanoleuca</i>), Grey Butcherbird (<i>Cracticus torquatus</i>), Yellow-throated Miner (<i>Manorina flavigula</i>), Nankeen Kestrel (<i>Falco cenchroides</i>), Crested Pigeon (<i>Ochyphaps lophotes</i>). Increases in species abundance are just as symptomatic of adverse impacts on a biota, ecosystem dysfunction and instability as are declines or extinctions, and can adversely affect ecological processes and ecosystem function (Recher 1999) ⁸⁹ . Increases in carnivorous and omnivorous species will impact other species through direct predation (including eggs), while increases in the aggressive hollow-nesting Galah will provide competition for nest sites with other species including Major	Please refer to the detailed response to Issue 233. The PER predicted indirect impacts of the nature discussed in the submission and concluded that these impacts were not significant.
		Mitchell's Cockatoo and Rufous Treecreeper.	
235	ANON-TWYQ-WPJ7-W	Approving this mining proposal will cause declines in bird species that are susceptible to human disturbance. Mining activity and infrastructure facilities generates environmental stressors that lead to declines in bird	Please refer to the detailed response to Issue 233. The PER predicted indirect impacts of the nature discussed in the submission and concluded that these impacts were not significant.

⁸⁹ Recher, H. F. (1999). The state of Australia's avifauna: a personal opinion and prediction for the new millennium. Australian Zoologist 31: 11-29



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		species in the vicinity of mine sites (Read <i>et al.</i> 2000a, 2015, Smith <i>et al.</i> 2005, Benítez-López <i>et al.</i> 2010) ⁹⁰ . Fox <i>et al.</i> (2016) ⁹¹ identified several bird species, particularly the threatened and declining species and ground-foraging insectivores, which were negatively impacted by disturbance-related variables, including mining and the provision of artificial watering points, in the GWW.	
		Research by Read <i>et al.</i> (2000a, 2015) showed consistently and significantly reduced counts of key avifauna response variables adjacent to the Olympic Dam mine infrastructure, a mine in arid Australia, which contrasted with counts of these species at remote control sites over the 13-year study period. The impact of mining on species richness, particularly insectivorous birds, was detected at least one km from the mining activity/infrastructure on bird populations extended over distances up to about one km (Benítez-López et al. 2010) ⁹² . Given that the proponent propose to create two mine-pits 1.4 and 2.4 km long, this implies that their mining activity will impact on bird richness over at least $1.4 + 2 \times 1$ km and $2.4 + 2 \times 1$ km = 7.8 km or 20% of the HAR.	
236	ANON-TWYQ-WPJ7-W	Cumulative and cryptic impacts to birds will be significant. Impacts to species are not just limited to the	Please refer to the response to Issue 233 in relation to cryptic impacts. MRL disagrees that impacts of this type

Benítez-López, A., et al. (2010) The impacts of roads and other infrastructure on mammal and bird populations: a meta-analysis. Biol. Conserv. 143, 1307-90 1316

⁹¹ Fox, E., McNee, S., Douglas, T. (2016) Birds of the Great Western Woodlands. Report for The Nature Conservancy. BirdLife Australia, Melbourne. ⁹² Benítez-López, A., et al. (2010) The impacts of roads and other infrastructure on mammal and bird populations: a meta-analysis. Biol. Conserv. 143, 1307-1316





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		footprint of the mine. WRL, haul roads, mine camps etc. all create significant impacts, both within and outside their immediate footprints. Studies have shown that infrastructure can impact species abundance in birds and mammals up to one km and five km respectively, while roads can cause impacts up to 10 km away (Benitez-Lopez <i>et al.</i> 2010) ⁹³ . The impact footprint is therefore significantly larger than the mining footprint and will affect the entire range, as well as much of the surrounding vegetation. In addition, no consideration has been included on the cumulative impacts of the mine on environmental values. The cumulative impacts of mining and exploration on environmental values in the area surrounding HAR are already significant and the impacts associated with the proposed development are unacceptable in light of this. Spatial analysis in the vicinity of the HAR Conservation Park shows that there is already a total disturbed area of approximately 1877 ha due to tracks and disturbed areas. The level of disturbance at which ecological functioning is lost is not known and thus any additional impacts to the unique BIF Ranges should be avoided until there is a clearer understanding of cumulative impacts.	 will be "significant" (as MRL interprets significance under EPA guidelines). MRL also disagrees that the impacts of mining and exploration on environmental values in the area surrounding the HAR are already significant. Native vegetation across the HAR is largely intact and will remain so even if this Proposal is implemented. Please refer to the response to Issue 60 in respect of the cumulative impact of the Proposal as a whole.
237	ANON-TWYQ-WPJT-T Toodyay Naturalists Club	The HAR has special fauna, including Perentie monitor, which is at the extreme southern end of its distribution at the HAR, and Peregrine Falcon, which breeds at	The Perentie monitor is not specially protected under Commonwealth and/or WA legislation. The southern limit of the distribution of this species extends from

⁹³ Benítez-López, A., et al. (2010) The impacts of roads and other infrastructure on mammal and bird populations: a meta-analysis. Biol. Conserv. 143, 1307-1316



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		proposed Bungalbin East mine site.	Western Australia to western Queensland. Please refer to the response to Issue 233 in relation to
			the Peregrine Falcon.
238	ANON-TWYQ-WPP9-5 ANON-TWYQ-WPPG-K	The surrounding area supports one of the most diverse communities of geckos anywhere in the world.	Noted. The gecko species recorded in high number numbers by ecologia (2016) are all widespread and abundant in the arid south-west.
239	Toodyay Naturalists Club ANON-TWYQ-WPZJ-Z	The submitters are concerned about increased vehicle strike and feral predators as a result of the proposal. The submitter has recorded evidence of Malleefowl on the Koolyanobbing track approximately 8km south of Bungalbin hill in low scrubland. The submitter is concerned that the fauna survey undertaken are not adequate as the transverse lines (in open and hilly terrain) undertaken by the consultants and presented in Figure 8-3 are not close to typical Malleefowl habitat. Further surveys should be carried out prior to any disturbance.	Please refer to the responses to Issue 227 in respect of feral predators and Issue 240 in respect of Malleefowl.
240	National Malleefowl Recovery Group Inc	The submitter considers that if the proposal goes ahead, it would see an increase in Malleefowl road death, an increase in fox numbers (not raised in the PER), an increase in habitat fragmentation and loss of about 600 ha Malleefowl habitat. The site of the proposal is located in a region of high Malleefowl numbers and one of the most important conservation areas for the species in WA. Although the PER tracks state that 76 person hours were spent on targeted survey for Malleefowl, it is unclear where this occurred. Similarly, the PER states that the Malleefowl Preservation Group searched an area, but details of where this occurred, the size of the search area, or the	There is no evidence tendered to support the submitter's prediction of increases in Malleefowl road death, fox numbers and habitat fragmentation as a result of the Proposal. The loss of habitat for Malleefowl does not comprise 600 ha. In doing so, the submitter implies that the entire disturbance area for the Proposal represents high quality Malleefowl habitat. This is not the case, as Malleefowl are most often recorded from the southernmost portion of the disturbance area, in association with the 'sandy plain with shrubland' habitat type. The submitter also contends that the Proposal is located


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		results are not provided (was the 'targeted survey' in fact the search undertaken by the Malleefowl Preservation Group). The only results provided on Malleefowl are that there were six records from within the study area, all but one of which was opportunistic (Table 4.3 of Appendix 8- A), which implies that the targeted surveys were poorly targeted. Most records of mounds were located in the 'Sandy plain with shrubland' habitat type which was barely searched for Malleefowl.	in a region of high Malleefowl numbers and one of the most important conservation areas for the species in WA. Malleefowl are well-distributed throughout southern WA, as demonstrated by the data on Malleefowl sightings (Attachment 6). Presumably there are many opportunities for improved Malleefowl conservation outcomes within the 16 million hectares of land that comprise the GWW. The key area of potential habitat for the Malleefowl was identified in the sand plain located at
		Far more Malleefowl may be detected within the study area if a more targeted and detailed search was undertaken. While footprint searches to detect Malleefowl may be useful in sandy areas after periods of dry, still weather (prints are destroyed by wind), searching for mounds is more generally applicable across habitat types. While searches can be done on the	the southern extremity of the Proposal where the haul road traverses and intersects the J4 haul road. As the haul road is a linear infrastructure type with minor disturbances required, habitat loss in the sand plain is not significant and as this habitat is well represented both locally and regionally to the Proposal area, there will be no effect to the survival of the Malleefowl.
		ground by people, the effort involved means that only small areas can be searched and the results depend on the prior identification of suitable areas. The submitter recommends a full search be undertaken (by LiDAR for example) of the proposed project area and surrounding areas before any approvals are given so that we have a full understanding of the implications of the proposed native vegetation clearance.	In relation to Malleefowl survey effort, Figure 8-3 in the PER clearly shows the traverses that were conducted in relation to the identification of Malleefowl occurrence throughout the disturbance area for the Proposal. Targeted searches were not conducted by the Malleefowl Preservation Group but were undertaken by MRL's specialist consultant ecologia. The opportunistic survey effort which included botanists and geologists
		It is essential that more detailed searches be conducted before any consideration and decisions on mining approval is determined to ensure that a decision is made with complete knowledge of the total population that will be impacted upon by the proposal. We do not agree with statements or findings in Section 14. (Summary Of Matters Of National Environmental	was much greater than the targeted survey effort so it was not unexpected that there were more observations made opportunistically. Given the extent of the foot traverses undertaken, it is very unlikely further survey would significantly change the survey result. Since the commencement of operations at Carina, in 2011, and more recently J4, there have been three



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		Significance). The proposal has the potential to have significant impact on local populations of Malleefowl, a population that it is suspected has been underestimated. Death of Malleefowl arising from vehicle operations is a serious threat that may undermine the local population, while habitat destruction and an increase in invasive predators may severely compromise the sustainability of Malleefowl in the area. Malleefowl populations in WA, and particularly in the Goldfields region, are critical to the conservation of the species.	Malleefowl deaths recorded by MRL. Two of these occurred in 2011 on the Mt Walton Road east of the Carina operation, one of which was attributed to a mine- related vehicle with the other unknown. This death may not have been a from a mine-related vehicle as the Mt Walton Road is publically accessible and provides an alternative means of access to the Helena-Aurora Range from the east via Mt Dimer. The third recorded Malleefowl death occurred on the section of the Koolyanobbing Track between the J4 haul road and Aurora Village. It is not known whether this animal was struck by a mine-related vehicle, as the Koolyanobbing Track is publically accessible.
			In relation to MRL's Carina and J4 operations, there have been a total of 23 Malleefowl sightings (observed, not injured) recorded between 2012 and 2016:
			Carina haul road (7)
			J4 haul road (5)
			Koolyanobbing Track (10)
			Carina irrigation area (1)
			The Malleefowl sightings in the vicinity of the Koolyanobbing Track are consistent with the results of MRL's vertebrate fauna survey in which the species was recorded via secondary evidence in the form of mounds and tracks within the 'sandy plain with shrubland' habitat type.
			The submitter refers to a statement in the PER " <i>that the Malleefowl Preservation Group searched an area</i> ", however MRL is not able to locate this statement. The



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			PER does refer to the classification of Malleefowl mounds found by ecologia (2016) in accordance with the guidelines published by the MPG. MRL advises that it has not commissioned the MPG to undertake any Malleefowl surveys in relation to the Proposal. In relation to the submitter's recommendation that further searches for Malleefowl by undertaken (by LiDAR for example), MRL advises that such searches are not necessary. This position is supported by the submission from the Australian Government Department of Environment and Energy on the PER (Issue 222). The comprehensive survey effort underpinning the assessment did not identify any active Malleefowl mounds within the study area. The assessment in the PER conclusively demonstrates that the Proposal will not have a significant impact on this species.
241	ANON-TWYQ-WPBA-Y	Table E-4 in the PER refers to six major vertebrate fauna habitats within study area, the most extensive being mixed eucalypt woodland. This habitat would be impacted by the haul roads that see a huge area of vegetation removed. Three other fauna habitat types – rocky range, drainage lines and seasonal swamps - occupy approximately 4% of study area, but will have provided niche habitats for specialist fauna. Potential impacts of the proposal are identified as loss of habitat due to land clearing. The Tree-stem Trapdoor Spider is a Parks and Wildlife P4 species and "fairly widespread" so of little concern to proponent. The undescribed <i>Idiosoma</i> sp. spider is restricted to	The PER acknowledges the direct and indirect impacts associated with the Proposal and accepts there will be habitat loss. MRL does not consider terrestrial fauna to be "of little concern" but has proposed a range of measures by which impacts can be reduced, and explains how the EPA objective can be met in respect of terrestrial fauna in section 8.6.



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		 woodland habitat about Koolyanobbing – and HAR – but was recorded both inside and outside study area – so apparently not of concern to proponent. Other impacts included habitat degradation through dust, noise, vibration and light emissions, changes to fire regimes, attraction of feral animals to sources of water and food waste and vehicle strike. The Residual Impact statement that "loss of habitat for fauna generally beyond that which can be restored through rehabilitation" does not appear to worry the proponent. The Environmental Outcome column states boldly "EPA's objective for terrestrial fauna can be met." 	
242	ANON-TWYQ-WPB8-P	In the PER in Section 8.2.1 the fauna assemblage is said to include feral cat, house mouse, and European rabbit. The PER makes no effort to quantify the extent of the impact of these invasive species. Given the aridity and lack of standing water it would be expected that the three introduced species would only survive during defined periods. This means that the significance of the area for native flora and fauna is especially high, yet the PER has not discussed the enhanced value of the HAR to native species.	Quantification of the extent of the impact of introduced species is beyond the scope of the PER, particularly as there is no baseline available that characterises the fauna assemblage prior to the introduction of feral animals. The objective of the Proposal would be to ensure the occurrence of feral fauna does not increase as a consequence of MRL's operations.
243	ANON-TWYQ-WPBX-P	The genetic history of species found on the range including a short-range endemic millipede ⁹⁴ point to long periods of population isolation and divergence across	The millipede referred to by the submitter (<i>Atelomastix bamfordi</i>) has a linear range of 170 km and is likely to have an overall range greater than the 10,000 km ² SRE

⁹⁴ Nistelberger H, Byrne M, Coates D, Roberts JD (2014) Strong Phylogeographic Structure in a Millipede Indicates Pleistocene Vicariance between Populations on Banded Iron Formations in Semi-Arid Australia. PLoS ONE 9(3): e93038. doi:10.1371/journal.pone.0093038



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		these sites, a feature likely to be representative of species occurring on this isolated feature today. It is vital to preserve the genetic diversity and divergence that characterises species of this range, particularly in view of the destruction occurring as a result of mining on nearby features including Mount Jackson and the already decimated Windarling range.	threshold. Nistelberger et al. (2014, p.8) suggested that the five known populations of the species should perhaps be treated as separate conservation units but the data they presented suggests the populations at J5/Bungalbin East and at Koolyanobbing belong to the same evolutionarily significant unit. While the populations of some other invertebrates at J5/Bungalbin East may have been isolated from other populations of these species on other ranges, the populations are not necessarily sufficiently genetically divergent to warrant protection. It should also be recognised that there is very little evidence that the populations of these species within the study area are restricted to the proposed impact areas. In most (if not all) cases, the populations at J5/Bungalbin East will persist within the study area and protect any significant genetic divergence.
244	ANON-TWYQ-WPJ7-W	Although the proponent states that "the Proposal is capable of being implemented whilst maintaining ecological function with respect to fauna species, populations and the overall assemblage" (PER, page 8- 33), the proponent provides no evidence to support this conclusion. Approving this mining proposal will not only mean that the HAR would be fragmented, it would impact on the terrestrial fauna and ecological functioning. Given that the HAR lies within a conservation park, with the purpose of "the proper maintenance and restoration of the natural environment, the protection of indigenous flora and fauna", this proposal is environmentally unacceptable.	MRL notes the submitters' position in respect of whether the Proposal meets the EPA's objective for terrestrial fauna. The nature of EIA is such that there will always be uncertainty associated with predictions. MRL re- iterates, however, there is sufficient information in the PER and supporting studies with which to make an informed assessment of the environmental effects of the Proposal and their overall significance. With regard to the inclusion of the HAR within a conservation park, decisions about the State's reserve system are ultimately made by the Western Australian government. MRL notes that the conservation park classification considers other the existence of competing land uses, such as mining, occurring within parks (subject to assessment).



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245	ANON-TWYQ-WPJB-8	The SRE fauna surveys at the range are inadequate to properly assess the proponents proposal. They confirm that Bungalbin/J5, like many of the other Yilgarn BIFs, comprise a highly diverse assemblage that appears restricted to Bungablin and J5. The 2015 SRE survey found over half the species collected are likely to be SREs. The 2015 SRE assessment notes that many of these potential SREs are not restricted to the proponents proposal but this is false because the proponents proposal covers a moderate to small area of the range (Bungalbin and J5). For this reason, it is imperative that the full extent of the proponents impacts should be provided before any assessment is considered over such a biologically significant area where their distributions are limited to this confined biological island. The 2015 SRE assessment does not appear to align its findings with the previous 2014 assessment, that together appear to make Bungalbin and J5 the most diverse BIF range in the Yilgarn for terrestrial SREs.	 The submitter states that "the 2015 assessment notes that many of these potential SREs are not restricted to the proponent's proposal but this is false because the proponent's proposal covers a moderate to small area of the range (Bungalbin and J5). For context, the submitter contends elsewhere in the submission that MRL has further plans to extend mining at J5 and Bungalbin East that are not part of the Proposal, and that therefore these potential SRE species will be restricted to the disturbance area. MRL advises that it has offered to relinquish exploration tenure over the balance of the Helena-Aurora Range if the Proposal proceeds. The SRE fauna surveys are therefore adequate to properly assess the Proposal because the number of species that may be impacted in a significant way is analysed in tables 2-7 of response to issue 20. Those tables represent the combined results of the surveys by Ecologia (2014) and Bennelongia (2016). MRL advises that the 2015 SRE assessment also complements the 2014 assessment by ecologia by: further characterising the SRE community in relation to the Proposal; addressing comments from the OEPA and DPAW on the 2014 assessment; and providing additional information on the distributions of potential SRE species and potential SRE habitats in this area.



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			to species level and align identifications with those made in 2012 wherever possible.
246	356	The species list for birds doesn't appear to include all the common species found.	MRL assumes the submitter is referring to the species list included in Appendix D to ecologia (2016). It is possible that some common species are not represented in this table, especially if they have not been previously recorded and lodged with the relevant government agencies e.g. DEE, DPaW. Without further details of which common species the submitter is referring to, MRL is unable to comment further.
247	Toodyay Naturalists Club	The submitter has raised about the veracity of the fauna surveys undertaken to inform the PER. Including concerns that: the study area covered the entire Helena-Aurora Range (HAR) and the eastern extent of the Jackson Range which is much larger than the proposed mine; and The surveys were undertaken during October-December as opposed to May- August as recommended in the EPA Guidelines.	The fauna surveys have been undertaken in accordance with relevant EPA policy and guidance statements, and in consultation with OEPA and DPaW, and advice from those agencies. It is usual practice for surveys to extend well beyond the Proposal area to enable the surrounding areas to also be characterised. Field surveys were undertaken across the seasons - spring/summer 2012, autumn 2013 and spring 2013.
248	Toodyay Naturalists Club	The submitter is concerned that significant impacts could occur to the Woma as a result of blasting. The results of the desktop study and field survey suggest a medium likelihood that this reptile species of conservation significance may occur in the study area.	The Woma was not recorded by ecologia (2016), despite being specifically targeted at all systematic and opportunistic survey sites (including camera trapping), nor any of the regional fauna surveys. It has a medium likelihood of occurrence based on records within 100 km of the Proposal, the majority of which are located in proximity to the Great Eastern Highway. Wilson and Swan (2013) note that the Woma is typically found sheltering under logs or in tree hollows of eucalypt



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			trees. This suggests that it is more likely to be found within the woodland surrounding the range, away from the mine pits where blasting will occur.
249	Toodyay Naturalists Club	 The submitter is concerned about the impacts to invertebrate spp. including: spider <i>Missulena</i> sp., one of which is presently known only from the J5 impact areas, <i>Yilgarnia</i> sp., also from the J5 area; and pseudoscorpion <i>Synsphyronus</i> sp. is also is restricted to J5. 	Please refer to the response to Issue 220 and Issue 226 in respect of SRE species that have only been recorded within the disturbance area.
250	ANON-TWYQ-WP4N-X	The report does not consider interactions between species. There seems to be no analysis of the expected impact of the reduction of one species on another. The report notes on page 8-28 that noise, vibration and light emissions "may cause vertebrate fauna species to move away from the area, alter their behaviour, or change community structure (Larkin 1996; Raddle 1998)". The impact of this on the wider ecosystem is not considered. Given this lack of analysis, statements such as "all reasonable measures" will be taken are meaningless.	Please refer to the response to Issue 225 in respect of indirect impacts on fauna.
251	357	 The submitter supports the proposal and states that: Vertebrate fauna is well understood with no evidence of identifiable, discrete populations of specially protected vertebrate fauna or other vertebrate fauna species of conservation significance. All vertebrate fauna habitat types are extensively represented throughout the Mt Manning area. 2 confirmed SRE species (a spider and a millipede) 	Noted. MRL thanks the submitter for the positive response.

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		 and one listed invertebrate species (Tree-stem Trapdoor spider), all of which occur elsewhere in the Mt Manning area. SRE habitat types area extensively represented throughout the area. 	
6. Hydrol	ogical processes and inla	nd waters environmental quality	
252	Department of Water (DoW)	 <u>Groundwater Level Assessment</u> The DoW considers the requirements 34 to 41 of the ESD have not been adequately addressed in the PER. According to the PER groundwater abstraction is not anticipated to have significant impacts, however the DoW considers that insufficient information, investigations and commitments have been provided to demonstrate this, which is not in accordance with the <i>Western Australian water in mining guideline</i> (DoW, 2013). The proponent has stated in the PER (Section 9.3.4, page 9-6) that "<i>Mining will not occur below the water table</i>", however the depth of the water table has only been estimated via a desktop assessment conducted by Rockwater (2016)⁹⁵ and has not been confirmed with on-site investigations. The DoW recommends the following further information/investigations that could be committed to in the PER documentation: A network of monitoring bores would need to be installed and monitored to determine groundwater levels before, during and after mining to verify that 	MRL has provided relevant information on groundwater in the PER consistent with the ESD. It is not possible to be more definitive at this stage of the approvals process with respect to groundwater levels, volume and quality until monitoring bores are installed post approval. However, the commitment that "Mining will not occur below the water table" is unequivocal and does not rely on full and detailed knowledge of ground water levels at this time. Nevertheless, MRL has provided a revised Groundwater Levels Assessment Report (Rockwater, 2016) (see appendices) to more fully address the requirements of an H1 level of assessment in Operational Policy 5.12 - Hydrogeological reporting associated with a groundwater well licence (DoW, 2009). This assessment includes a water balance confirming that the majority of water requirements will continue to be sourced from existing licenced bores at Carina and/or J4. MRL is committed to completing further investigations

⁹⁵ Rockwater (2016) *Mineral Resources Ltd Assessment of water levels at the J5 and Bungalbin East Deposits*. Jolimont, Western Australia.



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		mining takes place a minimum of 3 m above the winter (maximum) water table.	and works in relation to groundwater, including a monitoring network and program, H2 Hydrogeological
		It should be noted for the groundwater licence	Report (or H3 if required) and Licensing Operating
		application under the Rights in Water and Irrigation Act	Strategy. These investigations and works can be
		1914, the DoW will be likely to require a H2	undertaken simultaneously during construction of the
		Hydrogeological Assessment and Basic Operating	Proposal, which includes additional drilling and
		Strategy to supply the 219,000 kilolitres per year (kL/yr)	installation of monitoring bores, with the outcomes used
		from local production bores at J5 and Bungalbin East. If	to guide detailed mine planning and operations.
		it is decided that the total water supply of 630,000 kL/yr	
		is required from local production bores at J5 and	
		Bungalbin East, then this would also need to be justified	
		by an upgraded H2 Level Hydrogeological Assessment	
		and revised Operating Strategy. If the H2	
		Hydrogeological Assessments indicates that impacts on	
		groundwater dependent ecosystems (GDE) is possible,	
		then a H3 Level Hydrogeological Assessment would	
		likely be required.	
		The DoW considers that the groundwater levels	
		assessment provided in the PER is insufficient and not	
		in accordance with the requirements of a H1 level of	
		hydrogeological assessment as outlined in Operational	
		Policy 5.12 - Hydrogeological reporting associated with	
		a groundwater well licence (DoW, 2009). The DoW	
		therefore recommends the following issues and	
		comments are addressed and included in the Response	
		to Submission:	
		The assessment should be undertaken in accordance	
		with the requirements for a H1 level of assessment in	
		Operational Policy 5.12 - Hydrogeological reporting	
		associated with a groundwater well licence (DoW, 2009).	
		All existing available regional and local data and	



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		investigations should be presented in the document, including locations of monitoring bores, raw data, hydrographs, groundwater contours etc.	
		An indicative cross-section of the estimated mining depth and winter (maximum) water table to demonstrate that mining will occur a minimum of 3 m above the winter (maximum) water table should be provided.	
		Provide a Water Supply Strategy which outlines where the water supply for the proposal is coming from (including proposed local bore and existing off-site bore locations and volumes) and proposed uses of water from these sources.	
		Provide a section in the document that describes the proposed pre-development baseline monitoring program, including proposed monitoring bore locations and depths, frequency, duration etc.	
		There should be a clear commitment in the document to complete further investigations and works prior to construction and operation, including a pre- development monitoring network and program, H2 Hydrogeological Report and Licensing Operating Strategy.	
		Please ensure all sources of information and data are correctly referenced in the document.	
253	Parks and Wildlife	The limitations that the proponent has faced in addressing hydrology in the PER are recognised, however there is still a lack of adequate certainty about how impacts of altered hydrology would be managed. For groundwater:	MRL has committed to mining above the water table. This commitment includes provision for a 3 m buffer over the water table. MRL has committed to maintaining surface water flows through the haul road corridors to ensure there are no up or down gradient impacts to vegetation or other
		It is noted that the groundwater level is	up or down gradient impacts to vegetation or other



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		predicted to be 420 m Australian Height Datum (AHD) in the vicinity of J5 based on previous wet core sampling and 450 m AHD at Bungalbin East based on predicted mounding. This appears to be close to the predicted pit depths for both J5 and Bungalbin East pits.	environmental attribute. Section 9.4, Appendix 9-C and MRL-EN-PRO-0003 Surface Water refer to surface water management for the proposal. The SWMP has been updated as an appendix to this response to submissions document and includes additional measures to prevent hydrocarbon contamination
		For surface water (in addition to implications for biodiversity):	including bunding of all chemical storage locaions to contain a 72 hour 1:100 ARI rain event and wash-down
		 Appendix 6-A states that the two haul road corridors would "…traverse a number of larger surface drainage lines. Management of drainage in these areas requires special consideration which is outlined in Golder Associates (2014)". However, it does not appear that this issue or the specific management measures that could be applied to avoid or address impacts have been discussed within the PER. Within the area to be bisected by the two proposed haul roads, there are ephemeral drainage lines that would require management measures to ensure flow during rainfall events is not significantly impeded. In addition, some areas of ephemeral drainage and salmon gum and gimlet woodlands are known to become rapidly waterlogged, making traversing difficult (it is a sensitive environment) and specific management and mitigation measures that could be applied do not appear to have been developed. It should be noted that during heavy rainfall 	contain a 72 hour 1:100 ARI rain event and wash-down bay water quality will be tested for contamination (TPH and BTEX) on a quarterly basis and compared against NEPM Guidelines to establish suitability for dust suppression. Additional detailed designs and surface flow management measures where required will be provided in the <i>Mining Act 1978</i> Mining Proposal, on which Parks and Wildlife will have the opportunity to review and provide comment. Detailed designs are not required at this phase of the assessment. The PER process is aimed at determining whether the Proposal can be implemented. The general approach to surface water management has been outlined – should be Proposal be approved, detailed design will follow. Appropriate track diversions will be provided around the mine infrastructure to enable safe public access to and from the MMHARCP; however these tracks will not be accessible in any weather, consistent with the current network of tracks. There are no catchments flowing in to the pits, the only water entering the pits will be from rainfall. As the
		events, there can be flooding in the ephemeral creek between J5 and Bungalbin Hill that	volumes are insignificant, there will be no requirement to discharge water from the pit either to a turkey nest or a





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		 renders the tracks impassable, without damage. It does not appear that specific measures to manage access and the values during periods of heavy rain have been developed. In regard to mining of the Bungalbin East deposit, it may be problematic to divert surface water during peak flow around the proposed supporting infrastructure areas. Specific storm water management and mitigation measures to ensure flow is not impeded and vegetation downstream negatively impacted do not appear in the PER and may not have been developed. Should there be a requirement for water to be temporarily discharged from the mine pit (pit not identified), this discharge would be into a turkey's nest dam in the first instance, or into a local drainage line. A thorough environmental assessment of the latter option should be undertaken 	local drainage line. MRL has provided the relevant information on the impacts and management associated with hydrological processes in the PER to satisfy assessment under Part IV. Further refinement of the management measures will be provided at the detailed engineer design phase prior to ground disturbance. This information will be provided for assessment under the <i>Mining Act</i> 1978 and <i>RIWI Act</i> 1914 on which DPaW will have an opportunity to review and provide comment. Regarding the use of saline water for dust suppression , the general approach is outlined on p9-8 of the PER.
		 One of the identified key risks of the proposal is that roads may block or redirect flow, and in particular, major flood ways. No mitigation measures have been identified, although the impact is identified as representing a high level of risk. In addition, the risk of degrading nearby terrestrial ecosystems is assigned a high overall risk rating with no mitigating factors identified. Although mitigation measures have been identified here, these are considered to be broadly defined, and lacking in sufficient detail to enable evaluation or implementation. Where there are management measures, they may not be appropriate for a conservation 	



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		reserve (e.g. one proposed management measure is to direct water from the sites wash- down bays to a sump or turkeys nest for reuse as dust suppression, which has the potential to be a source of hydrocarbon contamination).	
		 As the use of potentially saline – hypersaline water is proposed for dust suppression, a risk assessment and appropriate management measures to mitigate negative impacts on vegetation fringing the operation does not appear in the PER and may not have been developed. 	
254	CSIRO	Groundwater appears to be deep in the area of the proposed mine and all mining operation will take place above groundwater level. No GDE were identified. However, the report presents limited data on groundwater investigations, providing only secondary information (interpretation of the groundwater levels or proposed abstraction rates) without references to the source of such information (e.g. number of monitoring bores and monitoring data, pumping test results, modelling). This may be because such information is available in other technical documents. Additionally, the long-term reliability of the proposed groundwater abstraction rate is not discussed. A brief report (3 pages) from Rockwater indicated a "restricted size aquifer", and there is no discussion on the groundwater replenishment/recharge rates. Arid climate, infrequent rainfall events and a significant depth to	See response to issue 252. MRL has undertaken a water balance for the proposal based on water balances for the existing J4 and Carina operations. It is unlikely there will be water supply shortages.
		infrequent rainfall events and a significant depth to groundwater do not commonly indicate a likelihood of high groundwater recharge rates.	





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		It is not clear if/how the mine water management may need to address potential water shortages.	
		The proposed groundwater abstraction for a mine operation is 785 kL per day (about 0.3 gigalitres per year). To ensure water resources are sufficient, available and reliable into the future, further consideration of the longer-term impacts of water use and the mine water management strategy may be necessary.	
255	ANON-TWYQ-WP19-6	The proponent advises that 286,525 kL of water will be abstracted from groundwater sources, at the J5 and Bungalbin East pits, on a yearly basis. This equates to 286.5 million litres of water, but the proponent has not provided any details of the quality of this water, but does note on page 9-6, that the ground water is saline. Groundwater quality data should be provided particularly if the water is saline and is used for dust suppression.	MRL has been unable to undertake groundwater exploration drilling to acquire water quality data, however estimates that it is likely to be around 25,000 mg/L TDS, consistent with water quality at the Carina and J4 operations located to the east and west of J5 and Bungalbin East Proposal area.
256	ANON-TWYQ-WP19-6	It is noted in the PER that 940 kL of water would be provided from the J4 and Carina pits, however, further discussion on how this water will be delivered to Bungalbin East is required.	The pipeline supplying water from either Carina or J4 would be buried within the 'V' drain of the haul road. Water quality of these sources is provided in S9.2.3 of the PER.
		Would the water be transported by pipeline, and if so, would the pipeline be buried or would it be located above ground? This design component needs to be fully explained. Water quality data from these sources should be included in the PER.	
257	ANON-TWYQ-WP19-6	The PER states (page 9-6) that "as there are no permanent, or semi- permanent water bodiesthere can be no measurable effect on the hydrology of creeks from groundwater abstraction".	MRL is not aware of the location on the northern side of Bungalbin East the submitter is referring to or any evidence that this perched groundwater supply exists, also it has not been identified by MRL consultants in



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		However, the role played by shallow alluvial aquifers, and perched aquifers in the landform-vegetation system should be addressed. On the northern side of Bungalbin East, a major clay layer (\geq 8 m thick) lies approximately 16 m below the surface. This horizon has the potential to create an impeding layer to the vertical movement of meteoric input, accordingly providing a 'near surface source' (perched) groundwater supply for eucalypt species such as <i>E. ebbanoensis</i> , which are dominant in the area.	their hydrogeological assessments. However, if it is north of Bungalbin East it is likely to be higher in the catchment than any of the proposed mine operations (see PER Figure 9-1) and therefore will be unaffected by the Proposal.
258	ANON-TWYQ-WP19-6	The PER states (page 9-7) that all storm water will be trapped and treated on site. This appears to be incorrect as storm water will not be treated. There will be a certain detention time in sediment retaining structures according to the design of these structures. The proponent has included sediment traps at low points to reduce sediment concentration in runoff water prior to release from site. A review of the design of these structures indicates that they will have limited value in sediment retention. The proposed design for Bungalbin East shows a structure that is 1.5 m deep, 4 m wide, and 11 m long, but it is unclear how this structure sits in space in terms of its placement in drainage systems. The water entry point is not defined as being either the side of the structure, in which case the spillway is 11 m long, or the end wall, in which case the spillway is 4 m wide. This needs to be clarified, as there will be a marked effect on the depositional environment within the structure. The proponent proposes to trap all sediment that is equal to, or coarser than, half the medium sand size (0.14 mm), which means that all sediment, finer than half	Designs provided in the PER are conceptual and provided as consultant recommendations. "Treatment" is used in the sense than storm water is retained to give any entrained sediments an opportunity to settle. MRL notes the submitter's statements on sediment delivery and detention and will take these in to consideration when detailed engineering designs are commissioned to support the <i>Mining Act 1978</i> Mining Proposal and other approvals as necessary. Detailed designs of such structures are not usually provided at this stage of an assessment. As a general comment, however, the purpose of sediment traps is not to contain all runoff in 1 in 100 year or similar significant rainfall events.



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		the medium sand size, will be discharged to the	
		environment. This will include all sediment size particles	
		finer than 0.14 mm and includes clay, slit, fine sand and	
		some medium sand. These sediments will create a	
		significant sediment plume in discharge flows. As the	
		settling velocity of the particle size 0.14 mm in diameter,	
		is 5 cm/sec, then, under non-turbulent conditions, all	
		sediment equal to or greater than this particle size, would	
		be expected to settle out of the water column in its	
		journey through the sediment trap. With the remainder of	
		the sediment load being discharged. However, given the	
		small size of the sediment retention structures proposed,	
		it is most likely that now states in and through the	
		structure will be turbulent, resulting in a greater	
		Sediment retention structures are about detention time.	
		The longer it takes a discharge event to flow through the	
		structure, the greater the volume of sediment that will	
		settle from the water column. The design presented in	
		the PER suggests that sediment retention is not a priority	
		for the proponent in terms of environmental	
		management, which is contrary to the statement given in	
		its Table 1-1, page 4-21 of the Surface Water	
		Management Plan, that a Management target is that	
		there will be	
		environment outside of the proposed disturbance areas".	
		Any given discharge event will contain a bed load, a	
		saltation load, and a suspended load, and that how much	
		of each will be a function of sediment available for	
		transport within the system, sediment source areas,	



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		rainfall intensity, total particle size distribution, duration of the peak discharge, total duration of the discharge hydrograph, and turbulence of flow. Without a basic knowledge of these parameters, effective sediment retention structures cannot be designed.	
		retention structures cannot be designed. It is noted in Appendix 9-A Part 2, page 5-4, that a typical sediment retention structure has a pond surface area of 40 m^2 . This value appears to be incorrect because if the length is 11 m, the depth is 1.2 m, and the cross-section is trapezoidal with side slopes of 3:1 as shown, then the surface area is approximately 132 m ² . This equates to the volume being around 130 m ³ . This means that at peak discharge, the 1:100 year event would take approximately 7 seconds to fill the structure. However, it is most likely that such a small sediment retention structure would fill very early during the rising limb of the discharge occurs, the sediment trap would be full. Sediment delivery characteristics in such an event are difficult to define, but the flow would be kept in suspension. With only 0.6 m allowed for settlement, it is anticipated that scouring would occur during the 1:100 year event, and, dependent on the hysteresis effect, a similar process is also likely to occur during the 1:10 year event, when the structure would fill with sediment laden water in 26 seconds at peak discharge.	
		Further, with the spillway located at 1.2 m above the floor, the depth of storage is less than 1.5 m as stated. The proponent should re-evaluate the issue of sediment delivery and detention.	



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259	ANON-TWYQ-WPFK-D Helena and Aurora Region Advocates Inc. ANON-TWYQ-WPHW-U	The submitter objects to the proposal based on the significant impact the proposal would have on water in the area. The submitter does not believe the EPA's objective can be met. Removing the top of a range can have significant consequences for plants located on lower slopes near the mine pit edge as the result of an altered water regimes such as a reduced water catchment area when it rains. This is most noticeable at times of drought and can result in deaths or severe declines in condition. The proposal and associated infrastructure, such as haul roads, will lead to run-off and interruption to drainage patterns.	Hydrological regimes will be maintained as far as practicable around permanent mine infrastructure. There will be some minor loss of water input to the hydrological regimes from rainfall directly on to pit areas. The waste rock landforms are designed to be water harvesting to retain water for vegetation growth and stability purposes, however there could be some return of water from these landforms back in to the regime. It must be noted that the mine site locations are high in the local catchment areas, therefore water flowing through the sites will be minimal. Please see more detail on the hydrological regimes associated with J5 and Bungalbin East in Chapter 9 and Appendix 9-A.
260	ANON-TWYQ-WPHK-F Track Care WA	The proponent has not provided enough consideration to the potential impacts to the unique ecosystem from the large volume of groundwater extraction required.	MRL has provided detailed information on the potential impacts to the environment from groundwater abstraction in section 9 of the PER. As a general comment, groundwater is very unlikely to play an important role in supporting vegetation due to its salinity and depth below the surface.
261	Wildflower Society of WA ANON-TWYQ-WPBH-6	The report states that no waste characterisation of the fresh rock is required as mining will not go within 3 m of the top of fresh, however it also states that "due to restrictions over access to the Proposal area, no field investigations of groundwater have been conducted" – meaning that all designs are based purely on rough estimates. Additionally, the proposed pit areas have groundwater mounds under the BIF ridges that are estimated to be $10 - 30$ m higher. This is a large variance considering they are intending to mine within 3 m of their estimated water levels. The actual depth of	MRL commissioned an expert consultant with substantial experience on groundwater in the region to undertake the baseline assessments of the groundwater levels. The predicted groundwater levels are as defined in section 9.2.3 of the PER. MRL has committed to undertaking further hydrogeological investigations at the very first phase of mining to further define groundwater contours, volume and quality. MRL has also committed to not mining below the water table, regardless of where the groundwater level contours identified. Preliminary pit designs have been



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		 water table therefore has the potential to significantly change the Company's proposed pit designs. If, due to these broad groundwater level estimates, the fresh rock is intersected within the pit, potential acid-forming minerals could be exposed to oxidising conditions, as banded iron formation has the potential to contain naturally occurring iron sulphides. 	prepared on this basis. The likelihood of intersecting large volumes of 'fresh rock' with high sulphide content is minimal, as mining will occur above the groundwater levels where waste material has been weathered.
262	ANON-TWYQ-WPZS-9 Toodyay Naturalists Club	The majority of the GWW lies in the Arid Zone and water is an ephemeral and scarce resource. Hydrological and surface water regimes need to be maintained to ensure existing usage and associated ecosystem are protected. Any mining activity with a dust problem is likely to want to use scarce water resources to mitigate the problem. Any use of saline waters will exacerbate the dust problem by introducing salts to areas where vegetation has no tolerance, continued usage would cause massive problems to the point of death. A submitter is concerned that dust suppression with saline groundwater would increase the spread of salinity.	Hydrological regimes will be maintained around permanent mine infrastructure. There will be some minor loss of water input to the hydrological regimes from rainfall directly on to pit areas. The waste rock landforms are designed to be water harvesting, however there could be some return of water from these landforms back in to the system. It must be noted that the mine site locations are high in the catchment areas, therefore water flowing through the sites will be minimal. Please see more detail on the hydrological regimes associated with J5 and Bungalbin East in Chapter 9 and Appendix 9-A. Saline water will be used sparingly at the fringes of the disturbance areas adjacent to remnant and rehabilitated vegetation when dust suppression activities are being undertaken. Rather than the use of sprays and jets in these areas, drip bars will be used. MRL will also investigate the use of dust suppression additives to assist with the crusting of running surfaces, which will reduce dust generated and therefore the need for frequent dust suppression activities requiring saline water. MRL will commit to monitoring of vegetation around the disturbance areas to assess vegetation health.



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263	ANON-TWYQ-WPF6-R	Water used in the operation is effectively being mined. The impact of the loss of ground water on existing ecological communities has not been given due consideration. Nor has the potential impact of salt contamination from overspraying.	Groundwater Dependent Ecosystems have not been identified within or in the vicinity of the proposal area. Groundwater is very unlikely to play an important role in supporting vegetation due to its salinity and depth below the surface, therefore the impacts of groundwater abstraction on ecosystems has not been considered.
			Saline water will be used sparingly at the fringes of the disturbance areas adjacent to remnant and rehabilitated vegetation when dust suppression activities are being undertaken. Rather than the use of sprays and jets in these areas, drip bars will be used. MRL will also investigate the use of dust suppression additives to assist with the crusting of running surfaces, which will reduce dust generated and therefore the need for frequent dust suppression activities requiring saline water. MRL will commit to monitoring of vegetation around the disturbance areas to assess vegetation health.
264	ANON-TWYQ-WPBA-Y	J5 and Bulgalbin East mines would change the soil/rock profile and topography with pits replacing the BIF crests and the consequent adjacent "landforms" of waste rock, difficult to accept that the hydrological regimes of groundwater and surface water could be maintained as stated in the EPA's objectives. The proposed mine would be taking 785,000 litres a day from aquifers. How might this affect troglofauna? How would the natural pre-mine drainage pattern be restored after the mine's 15 years of operation? About 30 kms of bitumen road would be laid for transportation for the mines' purposes. How would the	There are no predicted impacts to troglofauna as a result of groundwater abstraction however Bennelongia (2015) discuss the potential impacts to troglofauna in section 7 of their report at Appendix 7-A of the PER. The submitter's concerns about drainage are acknowledged. Table drains, culverts and other drainage infrastructure on the haul roads will be designed to ensure that surface water flows through the road are not impeded. To the extent possible, existing drainage regimes will be retained. Potential contamination of surface water from mine activities is readily manageable.



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		table drains along their verges impact on surface water movement? The submitter contends that altering the existing hydrological regime and subsequently modelling and implementing drainage systems to accommodate operations is fraught with difficulties, particularly with regard to the potential for increased frequency and intensity of weather events due to climate change. The submitter comments on the potential contamination of water due to mining processes, waste food etc. The submitter does not believe the EPA objective for this factor can be met.	It is important to reiterate that both the J5 and BE projects occur in the upper portions of the surface water catchments and thus there impact on downstream flow processes will be negligible (i.e. the project will not interrupt or intersect and major drainage systems, and as specified in the SWMP, site infrastructure will be located outside of significant surface water flow pathways and flood-prone areas. Where site infrastructure does cross defined surface water features (e.g. linear haul roads) then hydrological modeling will be undertaken to ensure adequacy of drainage control structures (e.g. culverts) to minimise upstream (flooding) and downstream (quantity and quality of flows) impacts. Given the ephemeral, sheet flow dominated nature of the surface water regime, and with the above management approaches of avoiding where possible and minimising impacts, the resultant effect on the pre- mining drainage patterns will negligible.
265	ANON-TWYQ-WPBC-1	An investigation of potential cryptic impacts of mining infrastructure in the area of the current proposal has been undertaken. The investigation included the effects of extensive track, road, and rail networks on water movement was explored. Over 1100 km of linear infrastructure and off-road transects and 300 stream crossings was assessed, strong associations between linear infrastructure and evidence of altered surface and near-surface hydrology was found. Ninety-eight percent of stream crossings showed evidence of flow impedance, flow concentration, flow diversion and/or channel initiation. A number of engineering and environmental factors influence the	MRL has been informed that the submitter is referring to the UWA PHD thesis <i>Enigmatic ecological impacts of</i> <i>mining and linear infrastructure development in</i> <i>Australia's Great Western Woodlands</i> . (Raiter, 2016). Detailed engineering designs for linear infrastructure will consider the findings of hydrological studies completed by expert consultants as provided in the PER, and utilise existing lidar contour data over the proposal area to assist in appropriately designing linear infrastructure with the necessary drainage features (e.g. culverts, sedimentation ponds, drains) to ensure impacts are ALARP. It is important to note that there are not surface water



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		frequency and severity of these impacts, which it was estimated number at least 335,000 across the GWW. In the study it was noted that the impacts were particularly severe around the HAR due to the combination of topography, soil type, and some feral cattle grazing; thus the impacts of the proposal are likely to far exceed those addressed in the PER.	dependent ecosystems in the Project Area (there can't be given the arid climate) and any concentrated surface water flows intersected by linear infrastructure will be (and have been) identified by hydrological modeling and accounted for during the design of drainage management structures to minimise any upstream or downstream impacts.
266	357	 Submitter states that the impacts of the Proposal on surface water drainage and water quality are not significant as there are no permanent or semi-permanent surface water bodies within 60 km of the Proposal. Mine and infrastructure areas are located in elevated areas in upper reaches of the catchments. Regional groundwater level is ~410m AHD, slightly higher beneath the Helena-Aurora Range. Very low risk of groundwater contamination. 	MRL acknowledges the submitters statement.
267	ANON-TWYQ-WP1Q-X	 The submitter seeks clarification of the groundwater levels in the proposal area as the PER provides confusing information including: that Rockwater (Appendix 9-B) notes that groundwater level contours slope downwards to the southwest, in keeping with surface drainage towards Lake Deborah East, and indicate that the water levels at J5 and Bungalbin East are likely to be about 410 mAHD and 420 mAHD, respectively. On this basis, it is estimated that the height of 	MRL commissioned an expert consultant with substantial experience on groundwater in the region to undertake the baseline assessments of the groundwater levels. The predicted groundwater levels are updated in the attached H1 hydrogeological assessment. MRL has committed to undertaking further hydrogeological investigations at the very first phase of mining to further define groundwater levels, volume and quality. MRL has also committed to not mining below the water table, regardless of where the groundwater level



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		the groundwater mound at Bungalbin East is probably about 30 m above the regional water level (20 m higher than at J4), which places the water level elevation there at about 450 mAHD. It is difficult to reconcile the quoted groundwater levels (J5 and Bungalbin East are likely to be about 410 mAHD and 420 mAHD, respectively) with data presented in Table 6-2 (HAR height 447m AHD – 692m AHD) and the statement at page 7-14 concerning stygofauna risks (the available evidence indicates that significant numbers of stygofauna are unlikely to occur at either J5 or Bungalbin East because the depth to groundwater is about 200 m at Bungalbin East and 130 m at J5.) The confusion, and fact that the analyses are based on almost no validated field data, means conclusions within the PER relating to groundwater and stygofauna impacts cannot be relied upon and provides uncertainty about the fundamental proposal characteristic that mining will not occur below the groundwater table.	contours are found to be. With regards to reconciling "the quoted groundwater levels", the depths to water referred to are those below the proposed pits. Groundwater may be closer to the surface on the surrounding plains. However, the potential for stygofauna to occur in the Proposal area was addressed by the specialist consultant (PER Appendix 7-A) who said "the Project lies in an area that has depauperate stygofauna communities" and that "geologies other than alluvium and calcrete have recorded very low levels of stygofauna richness". These geological types are not known from the immediate Proposal area.
268	Toodyay Naturalists Club	The PER does not adequately address the potential for surface water contamination as a result of the landfills (and tyre disposal), sewage treatment systems and storage of dangerous goods such as diesel, oil and chemicals described in Section 9.3.2 of the PER. The principle of waste minimization should be addressed.	MRL will apply for the appropriate licence and/or permits for these types of infrastructure which will involve a risk assessment by the relevant government agency, of which surface water impacts and management will be considered. Surface water management measures are well defined in Section 9.4, Appendix 9-C and MRL-EN- PRO-0003 Surface Water and further refinements will be made to management measures once detailed designs are complete. The SWMP has been updated to address the potential impacts from contaminant release. Impacts to surface water guality as a result of contaminated water was



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			identified as a key risk (Table 3-1 of the SWMP), with the identified management actions now including:
			 self-bunding of chemical storage areas to capture any spills and to accommodative a 1:100yr 72hr design storm event;
			 water from wash-down bay will be directed to an appropriately sized turkey's nest, with sufficient residence time, and reused for dust suppression purposes on haul roads; and
			• no uncontrolled release of surface water from disturbed land areas within the disturbance footprint.
			Any uncontrolled release of contaminated water, with the potential to impact on the surrounding environment, will be reported as an environmental incident, triggering a contaminated sites investigation and remediation works to remove or minimise the impact. The SWMP is a Management-based EMP and not a Outcome-based EMP; hence there are no trigger or threshold levels, with the over-arching environmental objectives being met through management targets and
			actions. The SWMP adequately covers the management targets for potential contamination impacts, and includes management actions, mitigation measures and monitoring to identify suitability and performance of the management approach.
269	Toodyay Naturalists Club	The submitter is concerned about the impacts of soil sterilisation as a result of the application of saline water and stockpiling of soil for any length of time which can alter soil biota and render it infertile thereby negating attempts to rehabilitate.	Saline water will not be used on pre-strip areas where the topsoil resource is beneficial for rehabilitation purposes. In these areas, topsoil will be stripped in favourable weather conditions such as wind speed and direction and cooler periods of the day where soil



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			conditions may be moister. There are areas in SMU3 soil type that are not beneficial for use where saline water will be used if dust emissions are excessive.		
			The comment regarding the effect of long term stockpiling of soils is acknowledged and will be a consideration when developing material handling schedules to manage the mining and rehabilitation process.		
270	Toodyay Naturalists Club	The submitter considers that monitoring of both water quality and hydrological regimes should be undertaken independently of the proponent to ensure that the EPA's objective is met.	MRL typically undertakes internal water sampling and monitoring in accordance with the relevant regulatory approvals, and sends those samples to NATA accredited laboratories for analysis. The results will be provided to the regulatory agencies for their review annually or otherwise as required.		
271	BHLF-TWYQ-WP1A-E	Table E5 states that there will be "minor abstraction of groundwater adjacent to the mine pits."(PER p. xiii), however, the body text states that "the estimated overall water requirement for the construction and operations phases is 1,725 kL per day (629,625 kL per annum)." PER p.9.6. The submitter considers that this equates to more than minor extraction in an arid region.	These rates are consistent with a typical iron ore mining project where water is consumed only for use at the immediate mine location for potable water supply, dust suppression and vehicle maintenance. Local groundwater is very unlikely to play an important role in supporting vegetation due to its salinity and depth below the surface.		
7. Ameni	7. Amenity				
272	Parks and Wildlife	Visual and aesthetic values are characteristics of a landscape that help define its character and degree of uniqueness. The high visual landscape value of the Mount Manning area, in particular the ranges, granite outcroppings and surrounding sandplains and woodlands, suggest that the future ongoing potential for	MRL notes DPaW's summary of the (visual) amenity of the Mt Manning area, and that visual amenity is addressed in detail in the PER and Appendix 10-B.		



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		visitor recreation, education and scenic enjoyment, is high. Naturalness, diversity and ruggedness, the key indicators of human preference for landscape scenic quality, are currently found in various locations in the Mount Manning area. This aesthetic landscape value, in addition to having ecological importance, has high value for nature based tourism.	
		The HAR is part of the MMHARCP which is managed for conservation and nature-based tourism and recreation. Existing recreation activities in the Mount Manning area include camping, 4WD exploration and nature study, with the HAR a key visual feature in the landscape of the Mount Manning area and a focal point for visitor activities in the park. The range is viewed for long duration in foreground, middle-ground and background distance zones when traversing key access routes from the south, north, west and east.	
		From a distance, the uplifted hills and ranges of the Mount Manning area become dominant focal points and when viewed at close proximity, command the landscape. The ranges and ridgelines, particularly of HAR, are of particular visual sensitivity as viewed from surrounding viewer positions (e.g. access tracks and other ranges) and should be highly valued. The uniqueness of the landscape character based on uplifted ranges, salt lakes and diverse vegetation patterns emphasized by the horizontal character of the plain in the area is rare in the Goldfields landscape context.	
		The ability of this landscape to absorb change without detrimental impact on the desired natural character of the landscape is greatest on the horizontal plains (as	



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		long as the development does not restrict access into the areas of interest) and least on the uplifted landforms, which are visible from great distances and are seen as a holistic landscape (middle-ground and background), not only as individual features (foreground). The high visual value/quality ratings within the reserve support the future value of the range for visitor recreation, education and scenic enjoyment.	
273	Parks and Wildlife	The HAR can be viewed from four access tracks into the MMHARCP; the Koolyanobbing Track from the south, the Marda Track from the west, the Mount Dimer Track from the east and the Pittosporum Rock - Menzies Track from the north-east forming an important feature that significantly contributes the attractiveness of the local landscape. The HAR is a prominent visible feature of the reserve, and a focal point for recreational tourism and visitors in the broader area. The conservation park is a relatively undisturbed environment that provides opportunities for a remote outback experience for visitors in a landscape with striking views and variety. The scenic qualities of the HAR's " <i>distinctive rock formations, rugged ridgelines and contrasting vegetation patterns</i> " and " <i>high level of visibility and the complexity of the landform and its habitat means that it contributes significantly to the "sense of place" associated with</i> " the MMHARCP (PER, page xv). While there are currently limited recreation and camping facilities in the area due to limited resource availability and the need for sensitive planning to protect the area's values, there is significant potential for an increase in the level of facilities and opportunities	It is not the intent of the PER, nor does MRL believe the PER can reasonably be interpreted, to "lead the unacquainted reader to believe that this location/conservation area is already substantially impacted." It is the intent of the PER to provide the reader with a balanced account of the extent of disturbance that has already occurred in the area. The statement that the HAR and surrounds are <i>"relatively intact but not pristine"</i> (PER, page 10-14) is well documented in the PER and elsewhere, and is not used in the PER to suggest that impacts of the Proposal are more justified. It is obvious from the PER that the area has not been substantially impacted, and that the Proposal will result in "localised but permanent alterations to the contour of ridgelines and crests" (PER, page 10-29). MRL notes that there has been no exploration/mining activity at J5 since 2006 and at Bungalbin East since 1970. In contrast, unmanaged (until recently) recreational activities such as camping and four-wheel driving have occurred during this time. As a result, camping at Bungalbin East is now prohibited by DPaW





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		provided in the future, depending on government decisions relating to mining in the area and subject to budgetary considerations and processes. The statement in the PER suggesting that MMHARCP incorporating the HAR and surrounds are " <i>relatively</i> <i>intact, but are not pristine</i> " (PER, page 10-14) may lead the unacquainted reader to believe that this location/conservation area is already substantially impacted. This is not the case. While there have been some land disturbance impacts from recreation use, access and mining exploration in the park, these are at a small scale and typically involved vegetation loss along narrow linear areas, such as tracks or drill lines. Such limited levels of disturbance should not be used as a basis for suggesting that impacts on the reserve associated with the proposed open cut mining operation are more justified. The impacts proposed in the PER are at a scale that is an order of magnitude greater than those that exist now or discussed in Section 3.5 of Appendix 10 B. The	due to ongoing degradation of this area. MRL disagrees that the impacts proposed in the PER are at a scale that is an order of magnitude greater than those discussed in Section 3.5 of Appendix 10-B (Visual Impact Assessment) (VIA). The PER together with Appendix 10-B clearly demonstrate the full extent of the impacts. The VIA of the Proposal has been undertaken not only in accordance with the ESD for the Proposal and relevant EPA and non-EPA guidance and policy, but also consultation and agreement with both OEPA and DPaW on the selection of sites to be used for the assessment. Further, the work was peer-reviewed by an EPA-endorsed subject-matter expert and revised in accordance with the recommendations arising from the review. The VIA is therefore a comprehensive, objective and reliable assessment of the visual impact of the Proposal It is not the intent of the PER, nor does MRL believe the
		proposed landscape modification for mining is far different to that which is described as existing and includes major and permanent landform change and large scale vegetation clearing. The current area of disturbance for the HAR is quoted at 16 ha. The proposed disturbance of the range is over 200 ha for the pits (the disturbance for the whole proposal is over 600 ha). The references to existing disturbance and impacts should be considered carefully and in context to the proposal, without using it as justification for further impacts. The proposed mine would have significant	and significant of existing impacts and down-play the proposed impacts. It is the intent of the PER to present a balanced assessment of the visual impact recognising the inherently subjective nature of the subject matter. MRL advises that the submitter appears to have misinterpreted Table 10-4 in the PER in stating that the visual impact to view experience would be negatively impacted for most of the viewpoints and access routes assessed. In this regard, MRL refers the submitter to the PER (page 10-17), where it clearly states that there will be views of both the J5 and Bungalbin East mines





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		 impacts on landform that would be highly visible in comparison to existing low level impacts. The conclusions and comments in the PER appear to upscale the level and significance of existing impacts and down-play the proposed impacts. This could be misleading to members of the community that have not visited the area. The following information is also worth consideration as 	from the four main access routes and two regional viewpoints as assessed in the VIA. The important point to note, however, is that the extent of visual impact along these access routes is highly variable and depends on the position of the viewer in the landscape, and the distance between the viewer and the mine(s), and the screening effect of landform and vegetation. For this reason, the visual impact varies across the MMHAPCP from Not Evident to Blending to Prominent
		 part of the assessment: The visual impact of the proposal would be prominent from six of the 11 viewing sites investigated, and overall the mine and its operations would have a considerable impact from the surrounding landscape. The visual impact to view experience would be negatively impacted for most of the viewpoints and access routes assessed (PER, page 10-16; Table 10-4). The proposal would permanently impact on the values that have high significance for the visitor experience (e.g. monolith at J5; access to travel routes to Bungalbin East from the north; prominent viewing point at Bungalbin East with its sweeping views across the vast, remote, varied and natural landscape). 	MRL is unable to speculate on whether visitors are likely to be deterred from visiting the MMHARCP during operation. The submitters statement in this regard is opinion only and not supported by any objective evidence. The Proposal does not involve the closure of any of the four major access routes to the MMHARCP and MRL has prepared an Amenity Management Plan to ensure that these impacts are reduced to as low as reasonably practicable, in accordance with the EPA's objective for the amenity factor (Appendix 10-E). The PER is not dismissive of the fact that the HAR is proposed for permanent impact, based on relevant statements in respect of: (a) landforms (see section 6.5 and section 6.6); and (b) amenity (see section 10.5 and section 10.6).
		• Visitors are likely to be deterred from visiting the MMHARCP during operation and visitor experiences would be diminished significantly after closure due to the impact of the proposal on key features of interest in the reserve.	VIA is inherently subjective and based on the experience of the viewer. The PER recognises that visitor numbers and interactions form a legitimate part of the visual landscape assessment process, and quantifies the level of visitation to the area. Visitation levels provide some indication of how important and



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		The suggestion within the PER that the "The mine pits at J5 and Bungalbin East occur within BIF- dominated landforms that occur throughout the region. The area of disturbance within the HAR [Helena-Aurora Range] is considered small and affects landform values that are represented elsewhere across the HAR, so the impact on the physical landform is not considered significant" (PER, page 10-4) is dismissive of the aggregated landscape values and significance of the HAR not found in other areas of the GWW or elsewhere. It is also dismissive of the fact that key landscape features of the HAR and the MMHARCP are proposed for permanent impact with little mitigation or management identified as proposed or potentially feasible to address these impacts. The PER also states that "The serenity of the area and the fact that it does not have high visitation rates are drawcards for most of the stakeholders consulted, as is the relative ease of access" (PER, page 10-7). The relatively low visitor numbers is an attribute that enhances the remote and wild character of the area, and therefore, the visitor experience. The proposal would change the ability of visitors to access and enjoy the key recreation sites (J5, Bungalbin East and along the existing access track) during operation and permanently into the future as these sites would be removed from the landscape and new waste dumps would be built (blocking the range from some view sheds). Any inferences that proposed changes to this landscape are publically acceptable on the basis of current low levels of visitation is not consistent with the intent of	 highly valued the (visual) landscape features of an area perceived by the general public, in the absence of any value-judgements that may be held by the submitter. In relation to aggregated values, particularly in respect of landforms, please refer to the response to Issue 143 (Table 1). Whilst the Helena-Aurora Range may provide a focal point for recreational tourism in the MMHARCP, the fact remains that visitation to the MMHARCP is low relative to other destinations in Western Australia. The area is not recognised as a major tourism destination, and there appears to be very little promotion of the area. The PER and supporting VIA (Appendix 10-B) provide sufficient information to assess the impact of the Proposal on (visual) amenity. The suggested considerations for further assessment of scenic quality are unnecessary in light of the work already completed and in any event will not add significant value to the assessment. MRL disagrees with the statement by the submitter that "the visual landscape features that are partially obscured by vegetation need to be assessed appropriately based on the landform characteristic and not downgraded based on the ability for them to be seen through vegetation" The impact of the Proposal on landforms is appropriately assessed in section 6 of the PER. The impact of the Proposal on amenity from a visual landscape perspective is addressed in section 10. It is not appropriate to deliberately remove an element of this



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		visual impact assessments. Whilst it is noted that visitor numbers and interactions form a legitimate part of the visual landscape assessment process, these aspects are not intended to provide a basis/justification for accepting major changes to important and highly valued landscape features. The assessment of this proposal should recognise that the aggregated combination of biodiversity, landform and amenity values found at the HAR acts as a focal point for recreational tourism in the MMHARCP, and that the proposal would have short term, long term and permanent impact on those values and the future quality of the range and the park as a public conservation and recreation asset. The scenic quality of the HAR landform should fully	visual landscape (in this case vegetation) when assessing visual impacts. The peer reviewer, in consideration of the ESD and all of the available guidance material, did not identify any need to remove the vegetation from the assessment. MRL considers the PER, supported by the VIA, clearly demonstrates that the impacts to visual amenity are reduced to as low as reasonably practicable and that the Proposal will meet the EPA's objective for this factor.
		 assessed in light of the following considerations: The small monolith at J5 and cliff faces should be placed in the high scenic quality category, rather than the moderate category to better reflect their value. The visual landscape characteristics and quality of landforms or landscape features that are partially obscured by vegetation need to be assessed appropriately based on the landform characteristic and not downgraded based on the ability for them to be seen through vegetation. It is recommended in particular that the western portion of the HAR and foothills be reclassified using the Visual Quality Classification – Frame of Reference as a base, as described in Reading the Remote, Landscape Characters of Western Australia, CALM 1994. 	



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		Classifications of scenic quality should be based on landscape character as defined in Section 3.5 of Appendix 10-B including recognition of Scientific integrity (page 3-19) as a " <i>measure of the wholeness or</i> <i>completeness of the landscape</i> ".	
274	Department of Environment Regulation (DER)	Emissions estimates have been provided based on National Pollutant Inventory (NPI) emissions estimations manuals. There is significant uncertainty in fugitive dust emissions. It should be noted that fugitive dust emissions are dependent on wind speed and therefore under predictions in wind speed will potentially underestimate emissions. No meteorological monitoring occurs near the proposed site. The proponent has used a prognostic meteorological model, The Air Pollution Model (TAPM), to estimate meteorological data. TAPM is known to under-estimate peak winds under some circumstances. The Air Quality Assessment report compares TAPM modelled versus observed windroses and while the report concludes they are similar it is clear that the model under-predicts strong winds which will likely underestimate emissions.	The modelling undertaken is the standard baseline assessment for an iron ore mining operation. MRL recognises that there will be diurnal and seasonal variability in fugitive dust emissions due to factors including ambient air temperatures, humidity, moisture of bare surfaces, wind speed and direction. Variability of fugitive dust emissions can be readily managed in the context of MRL's overall approach to dust management in combination with specific measures proposed in the Amenity Management Plan (AMP) for the Proposal. As concluded in the PER, there are no predicted residual impacts in relation to dust and implementation of the AMP will ensure the EPA's objective for this factor will be met.
275	DER	The Air Quality Assessment identified four sensitive receptors which are categorised as potential camp sites. Of these sensitive receptors, the modelling indicates the potential for exceedances using the TAPM meteorology, estimated background concentration and NPI emission factors at sensitive receptor 1, which is to the east of the Bungalbin site. Limited information is provided on these sensitive receptors except for noting they are potential camp sites. Consequently, the potential frequency of	Camping is undertaken informally at numerous locations throughout the MMHARCP. These locations are the most well-known and were therefore included as potential sensitive receptors. MRL notes that the MMHARCP is infrequently visited by the public (approximately 340 vehicles per year) and there are no permanent sensitive receptors in the MMHARCP or even in its vicinity.



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		habitation is unknown.	MRL has utilised background concentrations from Hannans Golf Club in Kalgoorlie, which are a conservative surrogate for background concentrations in the MMHARCP, as well as an overestimated baseline for the Proposal as defined by the consultant Pacific Environment Limited (2016). MRL notes that DER has recommended that no further modelling is required (see Issue 276).
276	DER	The report makes use of the Mann-Whitney U statistical test to identify a representative year. It should be noted that there is no generally agreed methodology for identifying representative years for air quality assessment. The use of the Mann-Whitney U test is an attempt to bring a quantitative procedure to evaluate whether there is a statistically significant difference between the hourly values between a given year and the 16 year long-term record. In this assessment, the selection of a representative year was not clear cut. For example, only wind speed and temperature were evaluated using the Mann-Whitney statistic. Of these, only wind speed was a significant variable for particulate emissions and dispersion. While 2012 was selected as being representative, it is worth noting that it failed the critical test against the 16 year long-term data and was only representative of the years 2009-2014. In its favour, 2012 was in the 10-50 percentile rainfall bracket which essentially means that it was a drier year than normal which is conservative from a dust generating perspective.	Noted and agreed. As concluded in the PER, there are no predicted residual impacts in relation to dust and implementation of the AMP will ensure the EPA's objective for this factor will be met.



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		additional modelling if the camp sites are infrequently used.	
277	DER	Section 6 of the Air Quality Assessment discusses model uncertainty. While it identifies a number of sources of error which might impact the model results, the implications of this uncertainty in light of the current assessment are not discussed. Usually, the largest source of uncertainty for fugitive dust models is in the estimation of emissions as these are generally themselves modelled approximations based on factors such as wind speed and ore moisture levels. Another source of uncertainty that should be considered is the selection of background concentration. The overall conservatism of the modelling cannot be discussed due to the combination of conservative and non-conservative assumptions. As a consequence of the high degree of uncertainty, modelling assessments of dust from proposed mines is a very coarse indicator of risk of dust impacts.	The modelling considered dust emissions from standard mining operations without consideration of management controls. This is an inherently conservative approach to assessment of dust impacts. MRL will employ dust management strategies (e.g. water carts, blasting under desirable wind conditions), to reduce the risk of impacts from dust emissions on the environment. As concluded in the PER, there are no predicted residual impacts in relation to dust and implementation of the AMP will ensure the EPA's objective for this factor will be met.
278	CPC	The HAR Conservation Park was created in 2005 to facilitate recreational activities consistent with the conservation of flora and fauna, and the preservation of archaeological, historic or scientific features. High floristic values in association with complex BIF landforms of the HAR are major features of the HAR Conservation Park. The CPC emphasises the management objective for conservation parks under the CALM Act, as " <i>in the case of conservation parks, to fulfil so much of the demand for recreation by members of the public as is</i>	MRL refers the submitter to section 10 of the PER along with supporting studies into noise, air quality and visual amenity (Appendices 10-A, 10-B and 10-D). These are considered to be core components of the visitor experience, insofar as they relate to matters properly within the scope of a Part IV EP Act assessment, and contribute strongly to the sense of place. The PER and supporting appendices provide sufficient information to assess the impact of the Proposal on amenity. MRL considers the PER clearly demonstrates that impacts to amenity are reduced to as low as



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		consistent with the proper maintenance and restoration of the natural environment, the protection of indigenous flora and fauna and the preservation of any feature of archaeological, historic or scientific interest" (see section 56(1)(c) of the CALM Act).	reasonably practicable and that the Proposal will meet the EPA's objective for this factor.
		Recreation is therefore a significant consideration of the CPC in the context of this proposal. In particular, the proponent's PER document identifies that the pit voids at J5 and Bungalbin East will be a permanent feature of the landscape, and further identifies the key environmental values as follows:	
		• the MMHARCP is a relatively undisturbed natural environment that offers visitors the opportunity to experience a remote, outback experience within a varied landscape that contains diverse native flora and fauna; and	
		• the scenic qualities of the MMHARCP emanate primarily from its distinctive rock formations, rugged ridgelines and contrasting vegetation patterns. The HAR's high level of visibility and the complexity of the landform and its habitats means that it contributes significantly to the "sense of place" associated with the MMHARCP.	
		The PER appears to address amenity impacts of lesser significance (such as dust suppression and noise associated with different stages of the proposal), however, the impacts to the fundamental values relevant to visitor experience and scenic qualities and sense of place (as the proponent identifies) do not appear to be adequately addressed in the PER document (see Table E-6; Amenity, Summary of Impacts, Management and	


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		Environmental Outcomes).	
Issue No. 279	Submitter ANON-TWYQ-WP2F-M ANON-TWYQ-WP2X-6 ANON-TWYQ-WPPH-M ANON-TWYQ-WPFK-D ANON-TWYQ-WPFK-D ANON-TWYQ-WP1U-2 ANON-TWYQ-WPB1U-2 ANON-TWYQ-WPBM-B ANON-TWYQ-WPBM-B ANON-TWYQ-WPBT-J ANON-TWYQ-WPBT-J Society of	Submission and/or issueEnvironmental Outcomes).TourismIf mining does not proceed then the state will, as a consequence, forgo some royalties, how much is open to question but a quantum of \$1 million per annum is realistic. The area is currently visited by tours and the HARA has been investigating the likelihood of eco- tourism and a number of operators suggest that eco- tourism could generate \$500 a day usually with an overall stay of a week to ten days. Such a venture is likely to provide a benefit to the state of some \$1-2 million per year for the indefinite future, arguably a better economic proposition than mining royalty which would have a relatively short life.Mining would downgrade the HAR so it has no economic value. The value of the long-term ecological capital loss must be considered in monetary terms against the short term mining revenue.The HAR (and its surrounding landscapes and	Response to comment MRL advises that in FY 2015-16 MRL generated annual direct payments to Government of \$66.9 million from the mining of iron ore in the Yilgarn including: • Port fees and charges \$43.1M; • State Royalties \$21.4 M; • Local Government \$0.2M; • Payroll tax \$0.8M; • Company tax \$1.4M; Total \$66.9 M. MRL is unable to comment on the tourism potential of the Helena-Aurora Range and notes that visitor numbers to the range are very low relative to other destinations in Western Australia such as Karijini National Park. MRL also notes that consideration of relative economic benefits of different types of activities in the HAR is beyond the scope of a Part IV EP Act assessment.
	ANON-TWYQ-WPBP-Eterm mining revenue.Wildflower Society of WAThe HAR (and its surrounding landscapes and woodlands) is up there, in terms of its very unique natural history, botanical, geological, cultural, scenic and aesthetic values, that WA value. It is close to Perth and as such better able to integrate tourism routes, be a catalyst for tourism development, and contribute to the sustainable economy of local populations.ANON-TWYQ-WPJU-U Pew Charitable Trusts ANON-TWYQ-WP2D-J ANON-TWYQ-WPFQ-KThe HAR is rich in endemic and threatened flora and fauna species, and is part of the South West Australia Global Biodiversity Hotspot) and the Southwest Australia Ecoregion. To quote the WWF-Australia website: "The	also notes that consideration of relative economic benefits of different types of activities in the HAR is beyond the scope of a Part IV EP Act assessment. Any tourism development in the area would also need to comply with all relevant legislation including the EP Act. In regard to the existing rubbish and other disturbance in the MMHARCP from historical exploration, MRL has offered, as an environmental offset, to remove this rubbish and rehabilitate these areas. MRL has now quantified the value of this offset as \$250,000. Details of how this estimate was derived are included in the response to Issue 50. MRL agrees that it is the outcome that is most important when considering offsets.	



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		Southwest Australia Ecoregion is a global biodiversity hotspot with outstanding natural environments whose protection is essential for the preservation of the world's biodiversity". HAR rivals the gorges of Karijini National Park; the hills of Fraser Range (those areas not degraded by pastoralism are quite spectacular); the pristine beaches of the southwest between Albany, Bremer Bay and Esperance; and the Karri forests of the southwest. The HAR should be a National Park. Tourists and travellers would visit the Range if it were appropriately advertised The submitter notes that the HAR is already impacted by mining with rubbish (orange plastic bags breaking down full of soil) discarded in the area and is concerned that the proposal will add to this an impact on future generation of visitors.	Proposal is a specific objective of the Rehabilitation and Mine Closure Plan. All waste generated by the Proposal will be disposed of all disturbed areas will be rehabilitated, such that no infrastructure or rubbish are left behind once mining is complete.
280	ANON-TWYQ-WP2E-K ANON-TWYQ-WP2B-G ANON-TWYQ-WP2Y-7 ANON-TWYQ-WPPF-J ANON-TWYQ-WPPR-X ANON-TWYQ-WPPP-V ANON-TWYQ-WPP5-1 ANON-TWYQ-WPPK-Q ANON-TWYQ-WPPK-Q Track Care WA ANON-TWYQ-WPHS-Q	If this mining proposal is approved, the submitters would no longer visit the HAR. The impact of the proposal on the "experience" of the HAR be it the aesthetic/scenic, noise and light pollution, vibration, dust, restricted visitor access, or the unsettling and intimidating feeling of mining activity will be obvious from all points on or surrounding the HAR. Mining in HAR Conservation Park would undermine the park's purpose of "recreation by members of the public". The submitters do not support statements in the PER that "development of the Proposal will not prevent visitor access to the MMHARCP and utilisation of informal camping areas outside the disturbance area" (PER, page 10-17) and "values of MMHARCP and access to a range of recreation and tourism activities will still be	MRL notes the submitters' stated intention to no longer visit the MMHARCP in the event the Proposal is approved. However MRL is unable to speculate on whether visitors are generally likely to be deterred from visiting the MMHARCP during operation and notes that there is no objective evidence to support such a conclusion. MRL disagrees that the effects of the Proposal will be obvious from all points on or surrounding the Helena- Aurora Range. The PER demonstrates that the effects of the Proposal will vary considerably throughout the Helena-Aurora Range, the surrounding MMHARCP and the broader region. MRL also disagrees with the statement that the



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	ANON-TWYQ-WP4P-Z BHLF-TWYQ-WPJ8-X BHLF-TWYQ-WPJV-V BHLF-TWYQ-WPJK-H The Wilderness Society	attainable if the Proposal is implemented" (PER, page 10-18). The HAR is the focal point of the MMHARCP and the main reason for visiting the conservation park. It would be equivalent of claiming that, were Uluru to be mined, visitation to Uluru-Kata Tjuta National Park would remain unaffected.	"recreational values are the aesthetic values, which will be totally destroyed". Recreational values do not only comprise aesthetic values, but include a myriad of other recreational pursuits that visitors engage in such as four wheel driving, camping, photography, bird watching and bushwalking.
	ANON-TWYQ-WPZS-9 ANON-TWYQ-WPP9-5 ANON-TWYQ-WPPG-K ANON-TWYQ-WPPQ-W ANON-TWYQ-WPFC-5 ANON-TWYQ-WPFC-5 ANON-TWYQ-WPF1-K ANON-TWYQ-WPF9-U ANON-TWYQ-WPF9-U ANON-TWYQ-WPF7-S Bird Life Australia ANON-TWYQ-WPFV-R ANON-TWYQ-WPFD-6 ANON-TWYQ-WPFD-6 ANON-TWYQ-WPJE-B ANON-TWYQ-WPJE-B ANON-TWYQ-WPJC-9 ANON-TWYQ-WPFS-N ANON-TWYQ-WPFS-N	Table 6-2 of the PER demonstrates that the HAR is the biggest and tallest in the Region with a low level of disturbance. These are features that make it attractive for public amenity. If mining proceeds at J5 and Bungalbin East (and subsequently other parts of the range), the impacts on amenity will be profound and either long-lasting or permanent. This includes over 600 ha of clearing; 30 km of sealed haul roads; permanent scars on the range visible from surrounding GWW and elevated locations; long-term noise disturbance – 24 hours per day 365 days per year for 15+ years. The PER (page 6-9) notes that <i>"the HAR and Koolyanobbing Range are the most prominent features in the area mapped…</i> ". Given that the visual amenity of Koolyanobbing has been essentially destroyed, only the HAR is left. Also, (at page 10-12) the proponent acknowledges that, <i>"The HAR's high level of visibility and the complexity of the landform and its habitats means that it contributes significantly to the "sense of place" associated with the MMHARCP"</i> .	As the PER has demonstrated, the Proposal involves mining of only a small proportion of the Helena-Aurora Range over a period of up to 15 years. Mining will not be visible from all locations and will not preclude visitiation to other parts of the range. MRL disagrees with the submitters' assertion that the Proposal is the equivalent of mining Uluru and expecting visitation to Uluru-Kata Tjuta National Park to remain unaffected. There are fundamental differences in the natural environment of, and visitation to, Uluru and the Helena-Aurora Range to the extent that such a comparison is essentially meaningless. MRL disagrees that the aesthetic values of the Helena- Aurora Range " <i>will be totally destroyed</i> ". This is an exaggerated claim as the Proposal involves mining of only a small proportion of the range (6.6% of the HAR landforms in the PER).
	ANON-TWYQ-P22-Z ANON-TWYQ-WP2K-S ANON-TWYQ-WPPC-F	The HAR does more than "contribute significantly"; it is the dominant landscape structure and its highly pleasing aesthetic quality depends essentially on its current intact status. In clear conflict with all the evidence, the	



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	ANON-TWYQ-WPPD-G ANON-TWYQ-WP2Q-Y ANON-TWYQ-WP2W-5 ANON-TWYQ-WP46-6 ANON-TWYQ-WP2K-S ANON-TWYQ-WPBE-3 Wildflower Society of WA ANON-TWYQ-WPBH-6 355 ANON-TWYQ-WPFQ-K	proponent implies (page 6-53) that the mine and associated works would have a relatively minor overall landscape impact. The submitters do not support statements in the PER that recreational values will not be excessively affected. The recreational values are the aesthetic values, which will be totally destroyed. None of the proposed offsets address the permanent loss of visual amenity and sense of place which will arise from the destruction of prominent features of one of the most visually significant landforms of the combined Midwest and Yilgarn region.	
281	ANON-TWYQ-WP28-6 ANON-TWYQ-WP2H-P ANON-TWYQ-WP17-4 ANON-TWYQ-WP1Y-6 ANON-TWYQ-WPHW-U ANON-TWYQ-WP45-5 BHLF-TWYQ-WPJ3-S	 The submitter objects to the proposal based on the following: a recreational site would be so significantly impacted by mining that people would no longer want to visit it; the HAR is a spectacular outcrop and not only aesthetically beautiful in its own right, but affords views over the surrounding country. The proposed mine would destroy for all time these valuable attributes; the area is remote yet in relatively close proximity to Perth; and the proposal would restrict public access to this area. The HAR is a wilderness area with interesting landforms providing a high amenity value. It is easily accessible and an excellent site for camping, bush walking, relaxing 	MRL notes the submitters' objection to the Proposal. In regards to public access during operations, the submitter is referred to Section 10.3.2 and Figure 10-3 of the PER which detail how public access will be maintained through and around the HAR in all areas except the actual mining areas themselves. During blasting, all personnel are excluded for a maximum of 30 minutes from a safety buffer zone of 500m to 1000m from the actual blast, depending on the specific blasting conditions. This is managed by the stationing of blast guards at the edge of the exclusion zones. This is effectively managed at J4 where the public continue to safely traverse through and access the areas around the mine along the diversion track installed by MRL. Post operations, an abandonment bund will prevent inadvertent public access by physically preventing vehicular access and by alerting anyone who then



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		and is rich flora with high visual appeal. The area provides an ideal stopping point as part of an	proceeds on foot of the potential hazards associated with an open pit void.
	adventure/tourism circuit that can encoumpass north eastern wheatbelt, Bullfinch, Southern Cross and HAR then leads to interesting sand plain country to the north east and on to Lake Ballart, Menzies and goldfields back	Mining Act tenure is shared tenure and there are no legal impediments to other land users accessing the land other than the basic personal safety requirements described above.	
		to Kalgoorlie.	All other areas of the HAR and MMHARCP can continue to be enjoyed as they currently are both during and after mining operations.
			Please refer to the responses to Issue 284 and Issue 294 in respect of tourism, and to Issue 285 in respect of wilderness areas.
282	ANON-TWYQ-WPFK-D	Each of the environmental values listed in the PER are dependent on not being subject to unnatural disruption, and each value will be severely impacted either during the life of the mines or forever.	Please refer to the response to Issue 285 in respect of the impact of the Proposal on wilderness experience.
		The disturbance areas of the mines are large compared with the size of HAR. They are both in very prominent parts of the range, less than five km from the Parks and Wildlife's campsite shown as R3 or C1 in the PER. It would be difficult to enjoy a wilderness experience in the HAR once mining preparations have begun, due to noise, vibration, closed tracks, new haul roads lights, dust, change to natural ridge lines and rock formations. A wilderness experience is dependent on escape from man's more destructive activities and being with in a setting that is not only devoid of most signs of human presence but also as it could have been for time long gone. Currently HAR offers such an experience, although lights of haul trucks can be seen at night from	



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		the Parks and Wildlife's campsite, and from the hill tops, across the plain a heavily mined range can be seen.	
283	ANON-TWYQ-WPFK-D	Figures 10-4, 5 and 6 of the PER illustrate that noise from the haul roads would be discernable from key high points in the range that remain accessible to the public, and at about 30 decibels (normal speech is 60 decibels), to the campsite C1, day and night. Noise from the mining would also be clearly discernable from these points. Noise is cumulative. The PER should provide a figure showing the sum of mining related noise (one mine and then both together with associated haul roads). It would clearly demonstrate that there would be no attraction for a visitor seeking a wilderness experience to visit the HAR.	MRL notes that the Helena-Aurora Range is not classified as a wilderness area pursuant to the <i>Conservation and Land Management Act 1984</i> (WA) - refer to the response to issue 285 in this regard. Predicted noise emissions from mining are not directly comparable to those from haul roads, as mining noise emissions are continuous whereas haul road noise emissions are not due to the transient nature of haul truck movements. It should be noted that predicted haul road noise emissions (PER, figure 10-4) are maximum levels that are only experienced as the haul truck moves past the receiver i.e., it is not a continuous emission. In respect of cumulative totals the predicted noise emissions from mining (as a continuous source) would increase by no more than 3dB as a result of haul truck movements. But, as noted, the increase is transient and will reduce back to basic mining levels as the haul truck moves away from the receiver. It is also worth noting that the decibel scale is logarithmic and 30dB is approximately 1/30 th as "loud" as 60dB. 30dB is typical of a quiet rural area.
284	ANON-TWYQ-WP1E-J	During and post-mining the proponent should be encouraged to promote the HAR and surrounding BIFs to encourage tourism growth in the area. The proposed landing strip and mining infrastructure could lend itself to tourism. The submitter acknowledges that remedial works back to	MRL agrees that much more could be done to encourage tourism growth in the area than is currently the case. MRL notes that the Proposal presents a major opportunity for ongoing infrastructure investment in the area (e.g. all weather roads, visitor facilities), which



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		original condition would be impossible post-mining, however the infrastructure post mining could be used for tourism. For example haul roads would provide access for tourists particularly for those without 4WD.	could ultimately improve visitor access and the overall level of service provided.
285	WAFBC	Please see Issue number 165. The submission at Attachment 3 relates to landform and amenity factors. Please provide a full and reasoned response to the presentation at Attachment 3.	MRL thanks the WAFBC for its detailed submission on the PER and has provided a detailed response in Attachment 7.
286	The Wilderness Society	Already the amenity values of the range have been impacted and degraded by the constant all night noise of machinery associated with the "J4" mine and associated haul road which are many kilometres from the core of the HAR. This constant low level noise has not previously been experienced in this location and degrades the amenity values of the range. If the proposal proceeds, the public will be excluded from the Range indefinitely. When they return, in decades' time, the range, or what's left of it, will be completely transformed. It is easy to see what magnificent wilderness vistas can be obtained from the range today, with hardly any evidence of human activity. The destruction of wilderness values by the proposed mining unacceptable. The proponent states in the amenity section of the PER that, <i>"The mine pits at J5 and Bungalbin East occur within BIF- dominated landforms that occur throughout the region.</i> The area of disturbance within the HAR is considered small and affects landform values that are represented elsewhere across the HAR, so the impact on the	MRL acknowledges that there will be short-medium term impacts on amenity in the form of noise emissions. This is an ordinary consequence of mining that will cease to occur once mining is complete. MRL advises that the public will not be excluded from the range indefinitely, and that access will be maintained during the operational phase as described in Section 10.3.2 of the PER and in the response to issue 281. The claim that the range will be completely transformed by the Proposal is incorrect. The Proposal will disturb only 5.4% of the Helena-Aurora Range (revised impact tables in Attachment 1) and there will still be opportunities to obtain uninterrupted scenic views both during and after mining. The submitter concludes that the PER misunderstands the impact of the Proposal on amenity values, because it states that the impact on the physical landform is not significant. Unfortunately, the submitter has largely ignored the remainder of section 10.3.1 of the PER in support of this erroneous conclusion, which clearly describes the potential impacts on visual amenity.



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		<i>physical landform is not considered to be significant.</i> " This statement demonstrates a misunderstanding of the impacts of the proposed mines on amenity values. In a spectacular range that is currently all-but intact, where visible signs of alteration, destruction or modification are almost non-existent (aside from some dirt tracks), the visual and noise impacts of the mines will be devastating.	
287	ANON-TWYQ-WPBH-6 Wildflower Society of WA	The proposal is inconsistent with the purpose of a MMHARCP for "recreation by members of the public". The HAR is the focal point of the MMHARCP, and the main destination for visitors to the park.	Recreation by members of the public, focussed on the Helena-Aurora Range, will still be possible during and after mining.
288	ANON-TWYQ-WP4A-H	Open cut mining is an inherently destructive business and the visual landscape will be permanently altered by the pits at J5 and Bungalbin East, there are no options available to the proponent for reducing amenity impacts to as low as reasonably practicable. The work undertaken by Bioscope demonstrates that from many of the view points the visual impacts will be prominent. The HAR is a unique landform amongst the surrounding plains of eucalyptus woodlands, and the intactness of this Range must be protected to maintain its amenity values.	The PER acknowledges the localised but permanent alteration of the landforms at J5 and Bungalbin East. Nevertheless there are several options available to otherwise reduce the impact on visual amenity to as low as reasonably practicable. These options are outlined in Section 10.4 of the PER.
289	ANON-TWYQ-WP4A-H ANON-TWYQ-WPBA-Y ANON-TWYQ-WPJU-U	Visitor access and use of the most significant areas in the HAR would be lost from pit development and due to safety concerns, access to areas in close proximity to the pits will be restricted, further reducing the amenity of the area available to the community. The mining of Bungalbin East would destroy an extraordinary landscape that is estimated to have been formed over a period of 2.6 billion years. It would impact	Please refer to the response to Issue 281 and 294. It is a misconception that mining will exclude other land users from accessing the HAR and MMHARCP other than the areas of the mine and it's immediate (<1000m) surrounds.



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		on the whole Range both visually and by detracting from the appeal of the area, deterring people from visiting and reducing the value of the Range as a destination. The presence of mining activity impacts beyond the active areas robbing the spiritual soul and wilderness qualities from the land.	
		With the presence of the mining operations, even camping in other areas of the HAR will be affected by impacts such as light spill, noise from blasting and mine traffic as well as dust emissions. This in turn affects the amenity of the HAR and mining/heavy industry is incompatible with a positive visitor experience, making the area unattractive for future use. On this basis, the EPA's objective for Amenity cannot be met.	
290	ANON-TWYQ-WPZA-Q	The submitter objects to the underplaying of the visual impacts of this proposal. In the "Visual Impact Assessment 29 August 2016" it states that:	MRL disagrees with the submitter's assertion in regard to the <i>"underplaying of the visual impacts of this proposal.</i> "
		"The MMHARCP is not in pristine condition, but the distinctive rock formations and rugged ridgelines of the HAR are considered to have high scenic value. The HAR's high level of visibility and the complexity of the landform and its habitats means that it contributes significantly to the overall "sense of place" associated with the MMHARCP and is likely to be valued by the wider community. It is a destination for commercial tour groups and others (including four-wheel drive enthusiasts) visiting the Great Western Woodlands, and a number of unofficial campsites occur in the area. Despite this, the MMHARCP has relatively low visitation rates."	The reference to low visitation rates is not used to "brush aside" aesthetic consideration of the landscape, but rather to provide context in terms of how well regarded the Helena-Aurora Range is from a tourism perspective.



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		the landscape, but then brushes it aside by referring to "relatively low visitation rates". Nothing can alter the fact that this proposal will result in the destruction of this landscape. The peaceful setting will be transformed into a noisy, dusty mining operation and the scars will be aesthetically displeasing and permanent.	
291	ANON-TWYQ-WPB8-P	PER Section 10.2.1 - The suggestion that visitation rates are low (dot point 5 on page 10-7) needs qualification. The HAR at J5 and Bungalbin East is not readily accessible. The mining industry is responsible for making access very difficult. Many people would get lost while traversing Koolyanobbing. Access via the Bullfinch Road and J4 is even more difficult. Sign posting is very poor. Everything is done to discourage visitors, yet this point is not acknowledged by the proponent.	MRL notes that mining has changed access arrangements in some areas, and advises that access is generally not discouraged except appropriately in relation to active mining areas. MRL also notes that the mining industry created many of the access tracks in the area over the last 100 years.
292	ANON-TWYQ-WPPZ-6	611 hectares is a huge footprint despite the size of the HAR and totally changes the amenity of the range. The quality of the ambience is hard to describe. "Expert management" and "Sensitive planning" are not of much value when a rock is removed and a flat meadow takes its place.	MRL acknowledges that mining impacts on the range cannot be mitigated to the extent that the pre-mining landform is restored.
293	ANON-TWYQ-WPFD-6 ANON-TWYQ-WP4V-6 ANON-TWYQ-WPBX-P ANON-TWYQ-WPJE-B ANON-TWYQ-WPJN-M	The Bunglbin East pit appears to take in the most spectacular and scenic part of the range and if mined and turned into a pit like Windarling will destroy the integrity of the landform. Industialisation of the surrounding area with broad haulage roads, waste dumps and infrastructure will remove any tourism or scenic values. Existing mining operations are at Mount Jackson,	MRL acknowledges that the potential tourism and scenic values of the Helena-Aurora Range will be affected by Proposal, particularly during the operational phase. It is expected that some of these values can be returned to the area once mining and rehabilitation of disturbed areas such as haul roads and waste dumps are complete. With regard to the Hunt Range to the east of the HAR,



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		Koolyanobbing and Windarling, it is time to cease the destruction of restricted areas of exceptional conservation value. At least one of these ranges needs to be protected from the impacts of mining. The Hunt Range to the east of the HAR is also scarred by mining.	MRL advises that the extent of disturbance to this range is 0.31 ha out of a total area of 151.9 ha Put another way, the Hunt Range is 99.8% intact (PER, Table 6-2).
294	BirdLife WA ANON-TWYQ-WP1Q-X	Approving this mining proposal would irreversibly impact on the amenity values of HAR. Given that HAR lies within a conservation park with the purpose of <i>"recreation by members of the public as is consistent with the proper maintenance and restoration of the natural environment</i> ", this proposal is environmentally unacceptable. If this mining proposal is approved, the submitter would no longer visit the HAR. Mining the HAR would mean that the unique landform and ecology, natural serenity, and stillness of the range would be lost forever. This would be unfortunate because the HAR is a popular destination for the submitter who visits the range to (i) carry out bird surveys, (ii) to enjoy a "wilderness" experience, and (iii) see bird species that have been lost from the neighbouring Wheatbelt. The submitter does not agree with the proponent's assessment of the impact of their mining proposal on amenity. The submitter believes that the impact of the proposal on the "wilderness" experience at HAR, be it visual, visitor access, noise, vibration, light, dust, or the presence of mining activity, would be obvious from all	 MRL is aware of the purpose of the MMHARCP, and advises that exploration/ mining tenure occurs concurrently with conservation tenure in the vicinity of the Helena-Aurora Range. As noted in the PER, MRL maintains that mining can coexist with conservation of the Helena-Aurora Range as it has done, and continues to do so, on BIF ranges elsewhere in WA. For mining to co-exist with conservation there must be acceptance that the benefits that mining brings, including environmental benefits in the form of offsets and improved management of natural areas, cannot occur without some disruption to recreational amenity. The stated desire for unfettered recreation opportunity reasonably ought to be put aside, albeit momentarily, to allow mining to deliver valuable and enduring benefits for all Western Australians (either directly or indirectly). In terms of public access arrangements during mining, the submitters' broad interpretation of the <i>Mines Safety and Inspection Regulations Act 1995</i> is incorrect. Public access is capable of being appropriately managed to ensure continued public access in a safe manner. Please also refer to the response to Issue 281 in this regard.



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		 points on or surrounding HAR: 1. There will be visual impacts, including landscape, scenic, aesthetic a) Mine sites, WRL, haul roads, and mining infrastructure would be visible from any position along the range's ridge line, disfiguring panoramic views. 	MRL notes the submitters' intention to no longer visit the Helena-Aurora Range if the Proposal is approved. MRL believes that visitor numbers can be increased in the medium-long term through the provision of improved visitor access and facilities, and is committed to working with DPaW, other stakeholders and the community to help deliver such outcomes.
		 b) Mine pits and WRL would not be conducive to rehabilitation or revegetation and would forever be a scar on the landscape. 	
		 Permanent alterations to the contour of ridge lines and crests. 	
		 Permanent loss of scenic amenity with at least 3.8 km of rock features, outcropping, caves, buttresses, pillars, fractured rock surfaces, and cliffs being destroyed. 	
		2. There will be limited, if any, visitor access to HAR	
		Allowing public access to the HAR would be in breach of the <i>Mines Safety and Inspection Regulations Act (1995)</i> . The proponent cannot and should not allow public access to the area outlined by the proponent (Pages 10- 17 and 18, PER), nor can or should the proponent allow public access to the areas abounding HAR and north of the proposed haul roads (Figure E6). If access is allowed, the resident Mines Manager, who is responsible for public access at all times, would not be able to ensure that (i) mining areas are free of inadvertent public access during blasting, and (ii) haul roads are always free of public vehicles.	



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		Figure E6. Area abounding HAR and north of the proposed hauls roads, where public access during proposed mining activity would be in breach of the Mines Safety and Inspection Regulations Act (1995). The area is represented by a dashed blue square. Adapted from Figure 10-3 of the PER	
		3. There will be limited use of MMHARCP	
		The submitter does not support statements in the PER that "development of the Proposal will not prevent visitor access to the MMHARCP and utilisation of informal camping areas outside the disturbance area" (Page 10-	



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		17, PER) and "the values of MMHARCP and access to a range of recreation and tourism activities will still be attainable if the Proposal is implemented" (Page 10-18, PER). HAR is the focal point of the MMHARCP and the main purpose for visiting the conservation park. The conservation park was established to protect the natural values of HAR and Mount Manning Range. The claims made by the proponent equate to allowing Uluru to be mined and then arguing that mining Uluru will not discourage visitor access to the Uluru-Kata Tjuta National Park.	
		The proponent claimed that "the operational phase may deter people from visiting the MMHARCP due to the perception of the impacts of the Proposal on amenity" (Page 10-18, PER). The submitter does not believe this is a perception. The submitter is unlikely to visit HAR if this mining proposal is approved, just as they do not visit the Koolyanobbing, Mount Jackson, and Windarling Ranges, which have been severely impacted by mining.	
		The proponent claimed that "activities undertaken in the MMHARCP as listed by stakeholders will still be able to be undertaken both during and after implementation of the Proposal" (Page 10-18, PER). Unfortunately, the proponent failed to mention that these activities will be severely compromised. For example, the submitter knows that the open mine pit will impact on landscape photography and the richness of birds at HAR.	
		 The mining proposal will completely remove two prominent and important landform features: Bungalbin East and J5 	



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		Bungalbin East and J5 are also the two most visited points of HAR and the only points where visitors can drive to the top of the range. Bungalbin East provides spectacular views over the surrounding woodlands and sandplains; J5 has a spectacular iron monolith and provides magnificent views of the main range of Helena and Aurora. These sites are key locations for tourist companies (Tom Grove, Coates Wildlife Tours, pers. com.). Weddings have even been held at Bungalbin East.	
		5. There will be noise and light pollution The distant rumble of haul trucks from the J4 Haul Road can already be heard at HAR on quiet evenings. Light can already be seen from Koolanobbing, J4, and Carina. Both noise and light pollution from the mining proposal will destroy the natural serenity and stillness of HAR.	
		 <i>There will be vibration and dust</i> Can only impact further on the wilderness experience at HAR. <i>Presence of mining is intimidating and unsettling</i> The mere presence of mining activity impacts on camping and wilderness experiences. 	
295	ANON-TWYQ-WPJY-Y	The PER also substantially undervalues the amenity of the range, stating, for example, that '[t]here are areas of the MMHARCP (including areas at lower elevations) that do not have a clear line of sight to the Proposal i.e. the Proposal is not visible from these locations. Visitors can still experience the remote and	The visual impact assessment included at Appendix10-B of the PER considers all frequented viewpoints including campsites, tracks, look outs and regional high points. As such, the statement from the PER that is referred to by the submitter is, in fact, correct. Visitors to the MMHARCP will be able to experience a remote and natural environment, albeit not



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		natural environment of the MMHARCP at the same time that mining is occurring.' This statement is incorrect. Visitors to any region, particularly regions of low overall relief, naturally gravitate towards high points in the landscape in order to gain an overview and, in the case of the GWW, experience a largely intact and relatively pristine landscape. The Helena and Aurora Range is visible from high points across a wide region, and this development, if allowed to proceed, will be at least as visually intrusive as has occurred on many other ranges, if not more so.	in the vicinity of the mining operations. In this regard, the visitor experience can be readily managed to provider alternative recreation opportunities. MRL is committed to working with DPaW in this regard.
296	ANON-TWYQ-WPJG-D ANON-TWYQ-WP48-8	The submitter does not support statements in the PER that the developments at J5 and Bungalbin East would be good for the local economy. The PER does not acknowledge mention emotional impacts on residents or permanent impacts on eco-tourism. The submitter lives in the Goldfields and has seen altered local landscapes created by mining companies who have promised jobs and financial rewards to the local towns. Southern Cross currently has many closed businesses in town, despite the area hosting a number of mining operations; it also features large, open-cut mines, numerous waste dumps, and other industrial legacies. Landscape mining scars often create a negative psyche with residents and unsightly views for tourists. The importance of healthy positive environments for people is well understood by psychologists but negative impacts are not mentioned in the PER. In the future large permanent mining scars will not be seen positively by Yilgarn locals or visitors. The area north of Koolyanobbing is already scarred by huge waste dumps, wide dusty haul roads, massive open-cut	MRL is aware of the extent of historical and current mining in the Koolyanobbing Range and notes that a balance between mining and conservation of that range does not appear to have been achieved. This need not be the case in relation to the Helena-Aurora Range, as MRL has undertaken to relinquish its exploration tenure over the range so that the area can be secured from future exploration and/or mining. Please also refer to the response to Issue 51 in this regard.



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		mines and many "No entry" signs. The limited short-term financial benefits of mining J5 or Bungalbin East will be far outweighed by the long-term negative impacts to sustainable eco-tourism and the negative emotional impacts on local people who have already seen the woodlands in the Koolyanobbing HAR area massively and permanently degraded by mining. The submitters contends that degraded land can only be rehabilitated to an extent.	
297	ANON-TWYQ-WPBJ-8 ANON-TWYQ-WPBK-9	When visitng the area the submitters have been impacted by noise from exiting mine sites. The submitter considers that are active mines or big areas of degraded land are a big deterant to tourists. The area should be considered for sustainable and ecological tourism. Protection as a national park would attract tourist nationally and interantionally. This could provide jobs for locals in the longer term. The mines might provide jobs for people in the short term but what's going to happen after, when there is nothing left at all and the area is completely destroyed? It definitely won't be a place people would want to visit then.	MRL disagrees that the area will be completely destroyed and refers the submitters to the response to Issue 284 and Issue 294.
298	ANON-TWYQ-WPZR-8	The HAR provides an important recreational resource, enjoyed by locals and tourists. As people are now excluded from visiting other ironstone ranges in the region due to mining activity, it is particularly important to preserve this Range and their flora and fauna.	Please refer to the response to Issue 294.
299	356	Helena and Aurora Range is ideally situated to be developed into a premier eco-tourism attraction for the region. This would vield long-term benefits for the local	Please refer to the responses to Issue 294.

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		community and the people of WA. This exceptional place could be promoted to rival Karajini National Park as a destination at it is less than a days drive from Perth and easily accessible. Helena and Aurora Conservation Park sits amid a region already popular with tourists and travellers who come to seek the landscape, nature and history of the greater Goldfields region by utilising developed drive trails and extensive interpretation.	
300	356	Conservation and tourism has been all but overlooked by government in the Yilgarn and Mid-West. Other banded-ironstone ranges are being actively mined or ear-marked for exploitation.	Please refer to the response to Issue 294.
301	356	Submitter visits area and camps and is concerned about the destruction of the Helena Aurora Range along the lines of the Windarling Range, in particular the lack of access and noise pollution. "I have made many visits to the Helena and Aurora Range with friends, scientists and conservation campaigners and each time I discover more reasons to save it from destruction. A half a day spent exploring the huge caves, breakaways and overhangs of Bungalbin East, the area of the proposed open cut mining will convince even the most ardent economic rationalist to the need of preservation. The endless array of plants, some species unique to the range, the wildlife and the power of ancient aboriginal connection to the land will be forever imprinted on the soul of the visitor."	Noted.
302	356	The PER places no value whatsoever on alternative uses or development of H&A Range such as tourism, recreation or scientific research.	MRL is unable to provide value-judgements in respect of alternative uses or development of the Helena-Aurora Range. Please refer to the response to Issue 294 in



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			relation to tourism.
303	356	The submitter questions the visual impact photographs as they appear to be obscured by vegetation.	The visual impact photographs document what can and cannot be seen from each site that was assessed, whether obstructed by vegetation or not. MRL selected viewpoints biased towards the better glimpses of the ranges along the frequented access tracks and on local and regional high points. The majority of viewpoints within the MMHARCP have views completely obscured by eucalyptus woodland vegetation and these were not photographed.
304	357	The submitter contends that the area is an extremely low priority tourism and visitation area and receives a small number of visitors each year (approx. 340 vehicles p.a.), generally in the cooler months (DPaW vehicle count, 2015). Annual visitors are estimated to be approximately 1,800.	Noted. MRL agrees that the area appears to be a low priority tourism area.
305	357	 The submitter reiterates the statements in the PER that the Proposal will directly affect the remote, natural setting but public access will be maintained throughout the life of the operation. 1. Noise (and blasting in particular) will be heard during operations; 2. Diversion of Marda Track to the north of J5 using existing exploration track (no clearing); and 3. Visual impact of mine pits, open voids and waste rock landforms from certain vantage points. 	Noted.
306	357	The submitter states that the proponent works closely with Parks and Wildlife to ensure access is continued for	MRL notes the submitter's positive attitude towards the Proposal and recognition of MRL's willingness to work



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		4 wheel drivers and campers to areas where mining activity is not ongoing. At J4, for example, a section of the Marda track between Marda and the Helena-Aurora Range has been sensitively re-aligned to allow vehicles to by-pass the mining area. The Marda track will also be diverted to the north of J5	with public sector agencies and community to ensure visitor access during and after mining and to provide enhanced opportunities for tourism in the area.
		to allow continued access to Pittosporum Rocks to the north and the Koolyanobbing and Mt Dimer Tracks to the south and east, respectively. The tracks on top of Bungalbin East will be permanently closed for public safety. The proponent is working with DPaW to investigate improving visitor access and facilities within the Mt Manning and Helena-Aurora Ranges Conservation Park.	
		Access to the HAR is only possible because of historic and newer exploration tracks that have been sympathetically aligned to facilitate mineral exploration of the area since the 1960s.	
		The proponent will work with stakeholders to identify which haul roads, service roads and tracks should or should not be retained following the completion of mining to facilitate tourism.	
		Some members of the Southern Cross community have suggested that parts of the Carina Village be retained after mining is completed and used as a tourism facility. This can be considered and will require Parks and Wildlife's commitment.	
307	ANON-TWYQ-WPZJ-Z	The HAR is a prominent and striking landforms on an otherwise fairly flat and open woodland. The area which is of great value to tourists and visitors will be destroyed	MRL advises the highest and most prominent portion of the HAR will not be removed by the Proposal. This particular part of the Helena-Aurora Range occurs to the



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		by the Bungalbin East pit which will remove that highest and most diverse landscape form and replace it with a scared industrial appearance for the future. The benches left after mining will be visible anywhere south of the HAR. The images photographic images presented in the PER are taken from either long distances or behind vegetation which obscure the view, and do not reflect that visitors don't stay or camp on the tracks but drive up to and on or around the range, and the impacts would be impossible for visitors to miss either during of post mining. It is unclear as to how, as claimed in the PER, the Bungalbin East pit will not be readily visible to visitors to the area given that the pit will occupy about 20% of the contiguous part of the HAR and will also remove the highest and most prominent part of the HAR.	south of the Proposal, outside the area of disturbance. The photographic images are taken in accordance with the accepted methodology for visual impact assessments in WA. Please refer to Appendix 10-B of the PER for further details.
308	ANON-TWYQ-WPZJ-Z	The PER does not recognise the and visual amenity of the HAR. No one would suggest that Koolyanobbing Range or Windarling Peak, both now being mined, have any value as a tourist or visitor destination. Tourism has an economic life of centuries whilst mining at the HAR would only have an economic life of 10 to 15 years. The statement in the PER that a no development option is not a sustainable proposition does not recognise the value to society and the environment of leaving the HAR intact. National parks are good examples of sustainable non development.	MRL is unable to comment on the potential future economic value of tourism associated with the Helena- Aurora Range.
309	ANON-TWYQ-WP2D-J	The submitter considers that the area has potential for	Please refer to the response to Issue 294.

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	ANON-TWYQ-WPF5-Q ANON-TWYQ-WPFW-S ANON-TWYQ-WP1C-G	tourism, including for ramblers, birders, wildflower's ecotourism and 4x4 adventures. The economic benefits would bring benefits to Southern Cross for Southern Cross for hundreds of years as opposed to 15 years of mining.	
310	BHLF-TWYQ-WP1A-E	The submitter considers that instead of mining there is an opportunity to develop a four wheel drive tourist trail between Hyden and Menzies, similar to the Granite and Woodlands Discovery Trail between Hyden and Norseman. National Park status and basic camping facilities would make the HAR a centre point of this route, which would follow existing tracks, taking in Hyden, Marvel Loch, Southern Cross, the Sculptures at Lake Ballard, Menzies and other natural formations and gnamma holes along the route. From Menzies, travellers can continue on to the Great Central Road, or to Wiluna, or return via Kalgoorlie, improving tourism opportunities throughout the region.	Please refer to the response to Issue 294. MRL is willing to explore arrangements with Government to facilitate tourist trails such as that proposed by the submitter, where the Proposal is viewed in a positive way as an example of how mining can co-exist with conservation.
311	ANON-TWYQ-WPZJ-Z ANON-TWYQ-WP2D-J	The proposed track closures around J5 and Bungalbin East will have a direct impact on tourism and visitor access. The Marda track has been closed by the proponent around the existing J4 mine with no prior warning and the track diversion to the north is substantially more difficult to traverse, unfamiliar and unable to GPS the submitters considers that if the same approach is adopted for the current proposal visitation to the area will be difficult.	MRL advises that the diversion track around the J4 mine was constructed in accordance with the Ministerial Statement and under site-supervision from DPaW. MRL's regular "Yilgarn Flyer" newsletter published in the Southern Cross "Crosswords" newsletter was used to advertise the changes to track layout. MRL is committed to working with stakeholders and the community to ensure that access arrangements during and after mining are acceptable.
312	ANON-TWYQ-WP2D-J	The submitter considers that the proposed haul road would run north east to the Range and cut a major scar	The haul road will likely be visible from certain vantage points on top of the range.



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		through the Woodland to the Range and be clearly visible from the summit of the Range.	The haul road will be rehabilitated following mining unless DPaW wishes to retain the road for its own purposes.
313	ANON-TWYQ-WP2D-J BHLF-TWYQ-WP1A-E	The submitter is concerned that the Range and some of the tracks will be closed to visitors removing the right to traverse the area, climb the Range, view the wildlife and take in the overall beauty of the views and native plant species. The landform and public amenity elements of the HAR are exceptional. Should the proposal go ahead the public will be excluded from the area for at least 15 years, this is considered unacceptable.	MRL advises that the range will not be closed to visitors in its entirety and that the public will not be excluded from accessing areas within the MMHARCP that are outside active mining areas. Section 10.3.2 and Figure 10-3 of the PER detail the continued access through the MMHARCP and to the HAR during operations. Refer also to the responses to Issues 281, 289 and 294 addressing this misconception.
314	ANON-TWYQ-WP18-5	The HAR attract visitors for their landscape and scenic values, because of the stunning juxtaposition of BIF outcrops on a backdrop of wider eucalyptus woodland. Overall, the ranges currently comprise a relatively unmodified wilderness area that encourages low-impact visitor activities such as wilderness camping that depend on the areas landscape values. Despite the claims within the mining proposal that visitor access to the area will not be modified, it is inevitable that mining disruption that modifies the landscape values of the ranges and reduces the sense of wilderness will discourage visitor access.	MRL acknowledges that the Proposal will modify a portion of the range and some of the access arrangements thereto.
315	Toodyay Naturalists Club	The serenity of the area and the fact that it does not have high visitation rates are drawcards for most of the stakeholders consulted, as is the relative ease of access to the MMHARCP from Perth". HAR is the most prominent feature in the area (having the highest peak,	Noted.



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		at 692AHD)	
316	Toodyay Naturalists Club	Image 4-2b (Site 26a) in the PER, Appendix 10-B, shows vegetation screening the Bungalbin East Pits and WRL. A recent (September 2016) image from the same site taken on the opposite side of the Koolyanobbing Track clearly shows the whole of the HAR. The vegetation screening in the photo obscures the view has does not appear to reflect the situation on ground. Mining will be visible.	MRL is unable to respond as September (2016) image referred to by the submitter has not been provided, and the attributed source for this image as per the footnote has been redacted. From MRL's photographic record from this location the whole of the HAR cannot be seen, particularly the north- eastern portion of the range that contains Bungalbin East, as it obscured by the portion of the range in the foreground – middle distance.
317	ANON-TWYQ-WP1Q-X	The submitter does not support the claims in the PER that Visitors can still experience the remote and natural environment of the MMHARCP at the same time that mining is occurring in areas of the MMHARCP (including areas at lower elevations) that do not have a clear line of sight to the Proposal.	Noted. Please refer to the response to Issue 294.
		Noise emissions from mining will be audible and affect the entire HAR (section 10.3.3, Figures 10-4 to 10-6) as it stands noise emissions from iron ore haulage from the current J4 mining operation are audible at night at the foot of the HAR range.	
318	BHLF-TWYQ-WP1A-E	The submitter considers that the PER makes a strong argument not to proceed with the proposal and retain the landform integrity and public amenity based on the purpose and values of the MMHARCP as state in the Executive Summary page i, Table E6 page xv.	Noted. MRL considers that the PER presents the Proposal and its potential environmental effects in a balanced manner.
319	BHLF-TWYQ-WP1A-E	The submitter does not support the comparison of the disturbance footprint of the Proposal with the larger	Please refer to section 6 and section 10 of the PER for further detail on the impact of the Proposal on landform



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		MMHARCP rather than with the specific Helena Aurora Range landform (PER page xv). This does not recognise that the landform integrity and public amenity of the Helena Aurora Range will be permanently impacted by the disturbance footprint of the proposal.	integrity and amenity relative to the Helena-Aurora Range landform.
320	BHLF-TWYQ-WP1A-E	The submitter consider that the following claims in the PER misleading: a number of tracks currently provide access to the MMHARCP and it is expected that most of these will remain open to public access during the life of the Proposal; and limited local track closures will occur to ensure public safety" (PER p. xv) While there are other tracks in the MMHARCP these might be tens of kilometres away from the HAR. Access to the HAR will be restricted as a resulted of the proposal with access from the south on the Koolyanobbing track is likely to be compromised there will be no track access to the range at all.	MRL reiterates that access through and around the HAR and the MMHARCP will not be impeded other than in the immediate vicinity of the mines themselves, as detailed in the PER and in the responses to Issues 281,289, 294 and 313. In particular, the access along the Koolyanobbing track to the south will not be affected in any way.
321	BHLF-TWYQ-WP1A-E	The submitter does not consider that the proponent has adequately addressed the impacts to visual amenity as required by clause 47 of the ESD. While the PER describes the current situation it does not appear to address the impacts.	The PER addresses the impact of the Proposal on visual amenity in section 10.3.1. Further detail is provided in Appendix 10-B to the PER.
322	Toodyay Naturalists Club	In describing the environmental values in Section 6.3.3: Data provided in the PER indicate that the HAR has a similar range of elevations compared to the Mount Manning, Mount Jackson and Die Hardy ranges and there are other similarities between the HAR and other	Noted.



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		BIF landforms in the region. In terms of visual impact, it's like comparing cheese with chalk (or Everest with Kilimanjaro).	
323	Perth Bushwalkers Club (Inc)	The submitter notes that the conservation park is managed by the Department of Parks and Wildlife for the primary purpose of public recreation that is consistent with natural, archaeological, historic and scientific interests and values.	MRL notes the position of the Perth Bushwalkers Club (Inc) and appreciates its submission on the PER.
		The beautiful and accessible Helena Aurora Range (Bungalbin) is located in the Great Western Woodlands of W.A. about 300km NE of Perth. The Range is known to wildflower groups, bird people, bushwalkers, conservationists, 4WD groups and the tourism sector. It has previously been recognised as warranting future National Park status.	
		Member comment: "The Helena and Aurora Range offers A1 bushwalking. It ticks all the boxes. It is spectacular and has amazing landforms and endemic species that make the place unique."	
		The Club identifies the distinctive recreational opportunity in an ancient, banded ironstone range landscape. We consider there are no other comparable opportunities.	
		Impacts on Walking Environment Values	
		The proposed disturbance will destroy the distinctive	
		character of the banded ironstone landscape. It will	
		further impact on native plants, animals and ecosystem	
		processes some of which are distinctive to the area.	
		Significant Aboriginal heritage sites, which are of	



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		substantial interest to Club members, will be de-valued. The mines would have enormous visual impact that would be irreversible on a landscape scale. The current pristine values will be replaced with deep mine pits and extensive waste rock dumps (unfortunately described in the PER as 'landforms').	
		Position of Perth Bushwalkers Club The position taken by the Perth Bushwalkers Club is that should the proposed project proceed, then the significant outdoors recreation experience values of the Range will be substantially damaged for this and future generations.	
		It is the view of the Club that these long-term values significantly exceed the short-term economic and social values that the proponent claims will be generated by the proposed project.	
		The EPA has previously recommended this area become an 'A Class' Nature Reserve protected from mining (EPA Bulletin 1256, 2007). The Club supports this recommendation of the EPA.	
8. Heritag	e		
324	Department of Aboriginal Affairs (DAA)	The DAA is aware of 12 reported Aboriginal Heritage places that may meet the definitions of section 5 of the AH Act that are located in close proximity to the proposal. The DAA is also aware that 19 rock shelters are located within the proposal area. Based on current available information, archaeological assessments of these rock shelters to date have not identified any cultural material within these rock shelters. However it	MRL agrees with DAA that impacts to Aboriginal heritage are able to be managed through the provisions of the AH Act.



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		 is DAA is aware that investigations to evaluate whether cultural deposits exist within the subsurface deposits of the rock shelters are ongoing. On the 17 October 2016 and 20 October 2016 the proponent lodged notices under section 18 of the AH Act to undertake mining and infrastructure and construction within the areas set out in the PER. DAA consider that impacts to Aboriginal heritage are able to be managed through the provisions of the AH Act. 	
325	CPC	The proponents PER document states that five 'Other Heritage Places' would be removed by the proposal and no longer accessible. The loss of such places appears to be significantly problematic from a Conservation and Land Management Act 1984 (CALM Act) perspective. Under the CALM Act, in preparing a management plan for any land (and waters) the CPC, as the responsible body for the land (and waters), shall have the objective of conserving and protecting the value of the land (and waters) to the culture and heritage of Aboriginal people (see section S6 of the CALM Act). Although a management plan is not in place for the area, if the heritage values of the area are destroyed as identified by the proponent, then the CPC's ability to ascertain and protect the value of the land to fulfil its function for the preparation of management plans under s19 of the CALM Act would be significantly impaired.	Over approximately a decade, MRL has worked closely with the recognised Traditional Owners and knowledge holders of the land at which the J5 and Bungalbin East proposal is situated. The heritage places of this land are well known and recognised by the Traditional Owners and knowledge holders and MRL. The Traditional Owners and knowledge holders have shown support for the heritage places to be disturbed for exploration drilling and mining operations, and understand that access to those within the proposed pit domains will no longer be accessible. Archaeological investigations of caves within the pit domain at Bungalbin East are scheduled for the first quarter of 2017. This will be undertaken under supervision of the Traditional Owners and knowledge holders, and any materials of heritage significance identified will be recovered and either left in situ or relocated to a place determined by the Traditional Owners and knowledge holders for safe keeping. Only the heritage places located within the proposed disturbance areas will be removed. MRL disagrees with the Commission's conclusion that this disturbance will



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			significantly impair the Commission from fulfilling its function in respect to management plans under s19 of the CALM Act. The Commission is not precluded from meeting the objective of conserving and protecting the value of the land to the culture and heritage of Aboriginal people by virtue of disturbance to some heritage places. There are a number of other heritage places located outside of the disturbance areas, so the heritage value of these assets shall be retained in perpetuity, and will enable the Commission to fulfil its function under s19.
326	Parks and Wildlife	 There appears to be additional investigations relevant to addressing the Heritage factor that require resolution during the assessment of this proposal (specifically 21 rock shelters/caves have not been investigated to determine if they contain evidence of human usage or cultural material). Parks and Wildlife would appreciate the opportunity to be kept informed on any developments in relation to this aspect as Parks and Wildlife has responsibilities for the conservation of Aboriginal heritage and cultural as a key purpose the MMHARCP consistent with the 2012 amendments to the CALM Act. Specifically, the recent amendments to the CALM Act: provide established legal frameworks to enable joint management of lands and waters between the department and other parties; allow for customary activities to occur; and have introduced a new management objective to protect and conserve the value of the lands and waters to the culture and heritage of Aboriginal 	MRL commits to informing the Department of Parks and Wildlife of the timing and findings of the archaeological surveys of two Other Heritage Places and 19 caves within Bungalbin East pit. It is also a condition of the granted Regulation 4 permit under the auspices of the <i>Conservation and Land Management Regulations 2002</i> to advise the Regional office of the intent to undertake the works for specific instructions. Through the development of the mining proposal, should it be approved, MRL does not intend on restricting access to heritage places outside of the mine developments, so that Aboriginal people can continue to carry out their customary activities and maintain their connection to the land. MRL is supportive of assisting the Traditional Owners and knowledge holders in the ongoing management of the lands surrounding the proposed mining areas, further enhancing the connection with that land. Due to the extensive number of archaeological and ethnographic surveys that have been undertaken by MRL and other proponents before them. MRL is



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		people. The ability to carry out customary activities is an important part of Aboriginal culture that defines Aboriginal people's fundamental connection to the land, as it "expresses the vital linkage of [Aboriginal] people to their country, reinforces their spiritual beliefs governing their existence and responsibility for their land, and provides a means for passing on social and cultural knowledge to their children" (Law Reform Commission of Western Australia, 2006, page 301) ⁹⁶ . The highest concentration of Aboriginal heritage places in the conservation park is located on the HAR. It is possible that there are other heritage sites, places and values that are not recorded on the Aboriginal Heritage Inquiry System. The DAA and Department of the Premier and Cabinet's Aboriginal Heritage Act Due Diligence Guidelines (2013) ⁹⁷ identify landscape features that include "ranges and hill", "rock outcrops", "caves", "areas of bio-geographic significance", "permanent and semi-permanent waterholes", "some hill and mound foundations" and "areas with potential archaeological deposit, such as rock shelters, caves and other relevant geo-morphological features" as areas which may contain Aboriginal sites and "should therefore be approached with care" (page, 8). Given the area in and around the proposal area contains many of these features, there is the potential that yet to be	satisfied that all material heritage places are well known within and in the vicinity of the disturbance areas. However, as is the case for any development, there is an unlikely possibility that there may be low level artefacts or rock holes for instance that have not been uncovered. Given the extensive work completed to date, it is most likely any new discoveries would be immaterial in terms of heritage significance. Implementation of the Aboriginal Cultural Heritage Management Plan will ensure appropriate actions are taken in the event of such further discovery. As noted by DAA above, impacts to Aboriginal heritage are also able to be managed through the provisions of the AH Act.

⁹⁶ Law Reform Commission of Western Australia (2006) *Aboriginal Customary Laws The interaction of Western Australian law with Aboriginal law and culture Final Report Project 94*. Perth, Western Australia.

⁹⁷ Department of Aboriginal Affairs and Department of the Premier and Cabinet (2013) *Aboriginal Heritage Act Due Diligence Guidelines*. Perth, Western Australia.



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		identified sites, heritage places and values of these may be adversely affected. It is noted that there are a number of caves that require further investigation.	
327	BHLF-TWYQ-WPPA-D	In Table 11.6 (page 11-13 and 11-14) the proponent commits to the investigation and recording of sites 18723 and 18732 under the supervision of the Ballardong People. However, it is of concern that the Ballardong People have not been further consulted regarding these two sites or notified that the proponent intends to carry out archaeological investigations of a further 19 caves at Bungalbin. The Ballardong People have been acknowledged by the DAA as knowledgeable in regard to Aboriginal Heritage of the Bungalbin Region.	This matter has been resolved, and a letter signed by Reginald Yarran on 5 October 2016 recognising they have been consulted by MRL on their intent to undertake archaeological investigations. The letter was provided to OEPA via email on the same day, an accompanied a s16 application to the Department of Aboriginal Affairs for archaeological investigations of the two OHP's and the 19 caves.
328	BHLF-TWYQ-WPP8-4 ANON-TWYQ-WPHK-F 5; 87; 99; 109; 143; 250; 313 ANON-TWYQ-WP4N-X ANON-TWYQ-WP4N-X ANON-TWYQ-WPZ7-D The Subaru 4WD Club of Western Australia Inc ANON-TWYQ-WPFD-6 ANON-TWYQ-WPFD-6 ANON-TWYQ-WPF6-R ANON-TWYQ-WP4E-N ANON-TWYQ-WP4M-W ANON-TWYQ-WPBA-Y	 The submitters object to the proposal and the impacts to heritage are unacceptable based on: the HAR has strong cultural significance to its Traditional Owners, the Kalamaia Kabu(d)n People yet only the scientists analysis of the land, the flora and fauna is considered in the PER documentation; Indigenous knowledge of the area has been ignored; the "removal" of 5 Aboriginal heritage sites is dealt with as a documentation process only; the concerns of Indigenous Australians are not adequately reported in the PER; the wishes of the Aboriginal people to not mine the area should be upheld; the large jasper reef at J5 is also of Aboriginal significance; 	The HAR is within the traditional lands of the Kelamaia Kabu(d)n People, the Kaparn People and the Ballardong People. Item 327 acknowledges that "the Ballardong people have been acknowledged by the DAA as knowledgeable in regard to Aboriginal heritage of the Bungalbin Region". MRL has consistently engaged with all three groups. It is incorrect to state that the PER is restricted to scientific analyses of flora and fauna. Chapter 11 deals with the consultative process relating to Aboriginal heritage. Accordingly, indigenous knowledge of the area has not been ignored. There has been ongoing consultations and discussion with the three groups regarding the Proposal and its potential impact on Aboriginal sites. However, the legislation requires MRL to also pursue what the
	WA Native Orchid Study	a number of indigenous sacred sites have been	submitters refer to as the "documentation process".



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	and Conservation Group Inc. ANON-TWYQ-WPBX-P ANON-TWYQ-WPBJ-8 ANON-TWYQ-WPBK-9 ANON-TWYQ-WPBK-9 ANON-TWYQ-WPBC-1 The Wilderness Society Toodyay Naturalists Club	 identified in this area, including a women's sacred site which has great ritual and spiritual significance; there is surface water at the base of J5, where water was collected, and Aboriginal artefacts surrounding the water. continuing use of bush resources for food, medicine and transmission of cultural knowledge is established; and a submitter contends that the trade-off for the loss of five OHPs and potentially one other site seems to be that Aboriginal groups would be involved in heritage surveys of country and ongoing management of their heritage and culture in the proposed area. The submitter is concerned that this process would be negative – that Aboriginal people would be involved intimately with their heritage area while it was being demolished over the mine's life. Not a "strengthening" of a cultural link – but rather cultural heritage being destroyed as they engage with it under the terms of the proponent the loss and/or disturbance of 5 OHP's and potentially site 252 will be a loss to Heritage values to future generations of Aboriginals. The submitter provided a statement from senior Traditional Owner for Bungalbin, Mr Brian Champion (October 2016) opposing the proposal. "Kapurn wangka Bungalbin Kutha Warninya. Kapurn people say, Bungalbin – Stop, don't touch, leave it alone." 	Since preparation of the PER one Aboriginal person has spoken publicly against the Proposal, his objections being based largely on matters of aesthetics and retention of natural beauty, rather than heritage. Others, including members or the group and family of the above person, have spoken in support of the Proposal. "The Aboriginal people" have not, as a group, expressed a wish to not mine the area. "The large jasper reef at J5" is the subject of a recommendation from the ACMC to the Minister. The ACMC has assessed the information regarding Aboriginal heritage in the Proposal area, has rejected a number of reported places and deemed them to be 'Stored Data-Not a Site", and has caused eight places to be registered as Aboriginal sites. The "surface water at the base of J5" is taken to be KY19, as there is a medium-density artefact scatter near it, although not "surrounding the water", as a track passes along its southern side. There will be no impact on KY19. Continuing use of bush resources for food, medicine, and transmission of cultural knowledge will continue undiminished in all areas save the mine and ancillary infrastructure. Aboriginal people will be involved, at all times, in heritage surveys and other heritage-related activities within and in the vicinity of the Proposal. If Site 252 is to be disturbed, s18 permit will be applied for and the Aboriginal people will collect their cultural heritage material and remove it to a place of safe



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			keeping, leaving bare earth behind. The heritage values will move with the heritage material. The Aboriginal Heritage Management Plan offers frameworks for minimising the loss of heritage values of other sites within the Proposal area.
			The opinion of the named Kelamaia Kabu(d)n elder is not shared by all other members of his family, his group, or the other relevant Aboriginal groups. In fact, his position on this matter has only recently been adopted. In 2000, July 2007, November 2007, August 2009 and September 2014, the elder in question signed a number of statements approving the applications pursuant to Section 18 of the AH Act in respect of J5 and Bungalbin East (subject to certain conditions, which have been, or are being actioned).
329	ANON-TWYQ-WPFK-D ANON-TWYQ-WP45-5	The removal of Aboriginal heritage sites would appear to be an adverse impact as per the EPA's objective. The proponent has also not mentioned 'natural heritage' (an un-mined BIF range) in the PER except in the EPA's objective.	MRL has submitted s18 applications under the AH Act to use the land within which four Other Heritage Places will be disturbed. The Minister for Aboriginal Affairs will determine whether removal of these places is significant, and make a decision on whether to grant the s18 applications. Natural heritage was not a term defined in the Environmental Scoping Document requiring work for the Proposal, therefore has not been considered in detail by MRL in the PER.
330	Helena and Aurora Range Advocates Inc. ANON-TWYQ-WPHB-6 ANON-TWYQ-WPHW-U Track Care WA	The Kalamaia Kapurn People are opposed to mining on the HAR, Bungalbin as per Elder Kalamaia Kapurn Nation, pers. comm. (<u>https://youtu.be/1hljNjej5F0</u>). The submitter argues that the historical, cultural and natural heritage values would be significantly and irreversibly	The Kelamaia Kabu(d)n People, as such, are not opposed to the Proposal. However, MRL acknowledges the current views of one Kelamaia Kabu(d)n Elder as stated in the two youtube videos he has presented. It must be noted, that these are his personal views, and



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	Wildflower Society of WA	affected by the proposal. The HAR is historically a significant area to the Aboriginal People if the proposal is implemented how can they connect with their country. Our natural heritage and Aboriginal Heritage relies on areas being left intact as wilderness areas. Disturbance that destroys the very values of our natural heritage and Aboriginal Heritage is not compatible. They cannot coexist in the one place of significance without compromising the natural values of an area, and therefore the Aboriginal values (that includes both the natural environment and their culture). There are numerous such sites within the range that are still important to the Kalamaia descendants who still live in the Kalgoorlie area. For example, one such rockhole was important to Kalamaia people prior to white settlement and was important to the first white explorers who found this spot in 1864. Whilst not identifiable on a	not the views of the Kalamaia Kapurn People as a nation, and those views as stated in the videos do not describe the heritage significance of the proposal area, rather he goes on to suggest more generally that it is a beautiful place. Mr. Champion has been supportive of exploration and mining dating back to 2000 and has only recently changed his view, as defined by the youtube videos. As an example, in 2000, Heron Resources who held the tenure over the Bungalbin East prospect commissioned Ronald T Parker of Australian Interaction Consultants (AIC) to undertake a heritage survey of the Bungalbin area, covering the current proposal area. The Elder attended the field survey. In Section 8 of AICs report, the following statement is made: <i>'AIC recommends that the Gubrun people have not</i> <i>identified any impediment to exploration and mining</i>
		Barnard Clarkson and Charles Harper called it <i>Jimbine</i> . The whole range area is currently undergoing a Heritage Survey and it is noteworthy that the application for mining covers part of this area including an area of outstanding natural beauty which is also an area of special significance to Traditional Owners (heritage survey area, AHIS No. 20342).	on that account the project be allowed to proceed.' Additionally in July 2007, November 2007, August 2009 and September 2014 The Elder and others signed a number of statements approving AH Act section 18 applications over the J5 and Bungalbin East areas that are consistent with those defined in the PER. MRL assumes that the submitters are referring to the large rock hole listed under AHIS No 20336. MRL avoided this site when designing the layout of support infrastructure for the Proposal. MRL has no intention of disturbing this rock hole. The ACMC has assessed OHP 20342 (KY28) and concluded that it is not an Aboriginal site within the meaning of Section 5 of the AH Act.



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Issue No. 331	Submitter The Wilderness Society	 Submission and/or issue The submitter raises concerns for the direct and cumulative impacts to heritage values from the proposal. The BIF ranges of the Mid-west and Yilgarn are an essential and characteristic part of WA's natural, cultural and geological heritage. They are: very ancient and have great geological and geomorphological significance; visually and aesthetically highly prominent in otherwise subdued landscapes; of very high Indigenous cultural values and spiritual associations; biological islands and refuges and centres of endemism; and significant for European historal values, via early explorers and settlers to the regions beyond Perth. 	Response to comment As noted in the response to Issue 32, it is not the right or responsibility of MRL to assess the cultural values or significance of those values of the Proposal area; that is the duty and right of the Aboriginal Cultural Material Committee. Accordingly, the "indigenous cultural values and spiritual associations" of the Proposal area have been assessed by the ACMC and the outcomes of that assessment are detailed in Issue 29. The ACMC has made a recommendation to the Minister in respect of the Notice pursuant to Section 18 of the AH Act submitted by MRL. The Ministerial Response, currently, is awaiting decision pursuant to Section 45(7) of the EP Act. MRL therefore considers that the EPA's objective for this factor will be met.
		represented by what is left of our BIF ranges are worthy of protection. At some point a government is going to have to say that 'enough is enough' – every BIF range in the region has been mined, is being mined or has various forms of mining approval on them, e.g. granted tenements. No BIF range has been protected from mining. These ranges are a vital part of our natural and cultural heritage and outstanding ranges like HAR that remain intact should be protected. From EPA's Annual Report 2012-2013. <i>"The EPA remains deeply concerned about the cumulative impacts of development on the Banded Iron</i>	



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		Formation Ranges of the Goldfields and Midwest Regions (BIFs), and the need to achieve a balance between conservation and developmentRegrettably, the progress of conservation outcomes has not matched the pace of development - there are currently no BIF ranges protected from mining development through secure (Class A or National Park) conservation tenureAt least four of the development proposals recommended by the EPA for approval in the last seven years were recommended on the basis that an area of equivalent or greater conservation value would be conserved within a National Park or Class A Nature Reserve. None of these reserves have been established. Given the significant biodiversity values of the Helena Aurora Range, which has been confirmed in contemporary published research, the EPA is adopting a presumption against any further development for those parts of the range that are within the conservation park identified in the government's framework for the Mt Manning region [i.e. J5 and Bungalbin East]."	
332	233	Promote this area as a tourist region by supporting the local Indigenous people with the expertise required to be successful with this.	MRL is supportive of assisting the Traditional Owners and knowledge holders in the ongoing management of the lands surrounding the proposed mining areas, further enhancing the connection with that land.
333	82	There are great secrets within this land, to us newcomers. They are places with significant cultural heritage. They are not wildernesses as they are places of ancestral importance. The submitter recommends the total protection of this significant range – its values takes it beyond a region or nation; they are of great value to	MRL acknowledges the submitters statement.


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		the world as they are to the Kalamaia Gubrun people.	
334	ANON-TWYQ-WPZ6-C	The indigenous occupation of the area is evident. There is an imposing 'marker' tree in the current campsite. There were stone tool scatters almost everywhere, but most staggeringly, a site bigger than anything the submitter has seen (approximately the area of a football field) that was covered with flakes, cores, hammerstones, chips, tools - the indigenous people had obviously been using this place as a manufactory for millennia.	MRL cannot verify the submitter's statement as there are no coordinates provided of the heritage places the submitter refers to. The submitter could be referring to heritage places already identified by MRL or to heritage places outside of MRL's heritage survey areas (and therefore outside the Proposal area).
335	ANON-TWYQ-WPZY-F	To relinquish the responsibility of those that guard and protect this wildness is short sighted. The enrichment of the many, many people that will share this place is fundamental in satisfying, sacred place and belonging, important ingredients of a full life, strong connected community.	MRL acknowledges the submitters statement.
336	ANON-TWYQ-WPJG-D	While working in the vicinity of HAR in the 1990s doing ecological surveys, numerous ancient Aboriginal stone scatters and other obvious Aboriginal heritage sites were noted; some scatter sites were large and significant. There are likely to be many Aboriginal sites in the vicinity of J5 and Bungalbin East and the associated roads, waste disposal areas and railways etc that are not mentioned in the PER or perhaps not even known to the proponent. There are many gaps in the survey and assessment process of Aboriginal sites, allowing for many "lower value" sites to be overlooked or ignored and consequently destroyed, and this should be clearly recognised.	The Helena-Aurora Ranges have been extensively surveyed by MRL (Polaris) and other organisations that held <i>Mining Act 1972</i> tenure in the HAR prior to MRL. All surveys were completed by expert archaeologists and anthropologists accompanied by the Traditional Owners and knowledge holders. MRL is satisfied that all substantial heritage places are well known within and in the vicinity of the disturbance areas, however there is an unlikely possibility that there may be low level artefacts or rock holes for instance that have not been uncovered, and would be deemed immaterial in terms of heritage significance point of view.
337	357	The submitter reiterates statements in the PER that	MRL acknowledges the submitters statement.



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		cultural heritage places will be avoided where possible and otherwise carefully managed throughout the life of the operation – the proponent has excellent relationships with the Traditional Owners.	
		 5 heritage places will be disturbed and/or lost; and Further archaeological work progressing with regard to caves at Bungalbin East. 	
338	357	Submitter notes the proponent's Indigenous Engagement Policy 2010 with the objective to build strong relationships with Indigenous communities and local Traditional Owners.	MRL acknowledges the submitters statement. The Indigenous Engagement Policy has been revised in March 2016.
		In addition, the Company runs an indigenous apprentice program and an Indigenous Traineeship Program. In the 2014-15 year 24 trainees, about half from the Goldfields, undertook training. So far about half have been offered jobs with the Company and the placement process is still running.	
339	ANON-TWYQ-WPF5-Q	The submitter contends that the HAR contains unique values which include high indigenous significance.	MRL acknowledges there are heritage places of interest to the Traditional Owners and knowledge holders of those lands.
340	ANON-TWYQ-WP1C-G	The submitter objects to the proposal as the ranges are part of ancient cultural song lines. If part of a range or song line is gone, the oral history of that place become fractured. Consideration should be given to the stories and artefacts whose significance are attached to the site. A lot of sites and stories were generated and therefore exist within the context of the landscape and its ecology. Once the site, landform, setting or stage is lost (i.e. mined) their significance fades.	See responses to Issue 29 and Issue 340. It is acknowledged that much of Australia is traversed and covered by traditional Aboriginal story-lines and song- lines, some of which cover extensive areas. For example, the registered Aboriginal site Mongers Lake Waterway, stretches some four hundred kilometres through the Midwest; the Swan River and Collie River, for their entire courses, are registered Aboriginal sites. Any development planned to occur within these, and other similar large-area Aboriginal sites such as



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		The submitter considers that the registered Aboriginal sites should be protected and the stories of Aboriginal survival in the ranges maintained as a priceless tourism treasure.	registered Aboriginal sites 36942 and 36951, must be considered by the ACMC and must also be the subject of a Ministerial Consent pursuant to Section 18 of the AH Act, if it is to proceed lawfully. To suggest that the existence of such Aboriginal sites should preclude development within their bounds is to ignore precedent and also ignore the processes of the AH Act. As noted in Item 331, MRL has submitted a Notice pursuant to Section 18 of the AH Act to the ACMC and awaits the Minister's decision in respect of the recommendation of the Committee arising from that Notice.
			The "registered Aboriginal sites" to which the submitter refers are not, in fact, registered, but are currently listed as "Lodged" Other Heritage Places in the Register of Aboriginal Sites, as their status vis-à-vis Section 5 of the AH Act has not yet been assessed by the ACMC. That assessment is due to occur at the December 2016 ACMC Meeting and a recommendation in respect of the Proposal will then be made to the Minister by the Committee.
			In regard to "stories", there are two categories of stories which may be of relevance to the Proposal Area, as follows:
			 Stories regarding former usage of the area by the ancestors of the Kelamaia Kabu(d)n and Kaparn People, and by living elders of those people; and
			 Stories associated with myths which are alluded to, but not detailed in the October 2016 report on the Proposal prepared by Kado Muir, Heritage Consultant.



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			All of the above documentation is included in reports which have been submitted to the ACMC for consideration to assist the members in arriving at a recommendation which can be made to the Minister.
341	BHF-TWYQ-P1A-E	The loss of 5 of seven 'Other Heritage Places' and "potentially one other site will be disturbed and ultimately lost" (PER page xvii) is unacceptable.	Please see responses to Issue 29 and Issue 33. It should be noted that MRL (Polaris) has completed extensive archaeological and ethnographic surveys under supervision of the Traditional Owners and knowledge holders with Other Heritage Places and registered sites associated with J5 and Bungalbin East well known and listed on the Aboriginal Heritage Inquiry System managed by DAA. MRL has applied for the appropriate s18 approvals under the auspices of the AH Act to disturb those heritage places that are located within the disturbance area. All of this has been undertaken in close consultation with the Traditional Owners and knowledge holders and the Minister for Aboriginal Affairs will determine whether removal of these places is significant, and make a decision on whether to grant the s18 applications.
342	ANON-TWYQ-WP1K-R	The submitter contends that we have we learned nothing from the polluted air, soil and waterways, the problem of salinity and also the understanding of the significance of the land to the Aboriginal people and present day inhabitants of this land? The submitter is concerned about the spiritual, physical and mental wellbeing impacts to the Aboriginal people should the proposal be implemented? Being born from the soil of Western Australian I too am impacted by the desecration of what I value – the flora, the fauna, the	MRL can confirm that the Traditional Owners and knowledge holders of the proposal area have been extensively consulted on the proposal, and understand the significance of the land to those people. MRL also acknowledges the importance of the land to the submitter.



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		wilderness. I consider it to be my song line and my dream time.	
9. Rehabi	litation and decommissio	ning	
343	DMP Wildflower Society of WA ANON-TWYQ-WPBH-6	The DMP notes that further investigation on waste characterisation is required to determine whether the sulphide minerals present have been partially or fully oxidised. Additional information is required regarding operational controls to identify and manage material with residual sulphides.	Material characterisation is normally conducted on samples obtained in a drilling program. As access to the site has not been possible, no drilling has been conducted, thus the reason for a risk-based assessment in the PER. This assessment concluded that the risk posed by Acid Mine Drainage in waste materials was low. MRL will conduct a full AMD assessment when access to the site for a drilling program is granted.
344	DMP	DMP notes that the extent of backfilling has been confirmed and the PER states "Open pit voids will remain at both J5 and Bungalbin East; however backfilling and rehabilitation of the southern pit at Bungalbin East will reduce the extent of this impact." Further information is required to address the implications of backfilling or not backfilling the remaining pit voids which has not been considered in the PER.	A table will be added to the RMCP to ensure the implications of backfilling or not backfilling are clearly addressed.
345	DMP	The inferred static water level of 410 m at both J5 and Bungalbin East is based on groundwater levels at Carina and J4 and "some" drilling at J5. The groundwater level has a significant bearing on the assumptions made regarding materials characterisation, given the risk of intersecting and disturbing materials which may generate Acid Rock Drainage or Metalliferous Drainage is increased below the water table. Further hydrological information is required to demonstrate how the groundwater level was inferred	Refer to the Rockwater (2016) H1 Hydrogeological Assessment (Appendix F) for further information about the groundwater table. MRL has already committed to restrict mining to 3 m above the water table.



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		and the level of confidence in the materials characterisation.	
346	DMP	 The RMCP needs to be revised to be consistent with the intended land use as a conservation park and to address the requirements of the DMP and EPA (2015) Guidelines for Preparing Mine Closure Plans⁹⁸. Specific areas for improvement include but are not limited to: demonstrate that the post mining and use of a conservation park is achievable in the context of post mining land capability; demonstrate that the overall rehabilitated mine does not adversely impact the conservation use of the land; all completion criteria needs to be revised to be specific, measurable, achievable, relevant and time bound: 	MRL are committed to establishing a safe, stable, non- polluting and sustainable post-mine site (i.e. the four tenets of closure) that is consistent with the conservation status of the region. Whilst we acknowledge that mining will result in a disturbance of a portion of the Helena- Aurora Range (HAR), and that rehabilitation and not restoration will occur, the J5 and BE disturbance areas represent approximately 2% and 4% of the HAR, respectively. Given that over time, the rehabilitated mine sites will re-establish sustainable ecosystem processes and vegetation communities that are congruent with the pre-mine environment and supported by the post-mining land capability, it is considered that the J5 / BE Proposal will not impact on the conservation status, quality or use
		 the completion criteria does not address reconstructed soils and soil profiles (identification and profile reconstruction); 	With respect to the completion criteria, it is important to acknowledge that the DMP (2015) Mine Closure Guidelines states that at the Planning and Design /
		 completion criteria for physical and chemical stability, visual amenity, surface hydrology, ground water hydrology and biological values are unacceptable; 	Environmental Assessment Stage (i.e.at the PER stage), completion criteria should be qualitative, and will become quantitative at the Mining Proposal (and associated Mine Closure Plan) Stage. It is therefore
		 waste characterisation is based on an inferred ground water level. Further information on how the groundwater level was inferred is required; management of PAF material needs to include 	considered that the qualitative completion criteria provided in the PER is suitable for this stage of the Proposal, and MRL are committed to establishing Specific, Measureable, Achievable, Relevant and Time-

⁹⁸ DMP and EPA (2015) *Guidelines for Preparing Mine Closure Plans*. Perth, Western Australia



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		consideration of the volumes of potentially acid- forming and be supported by acid base accounting;	bound (SMART) completion criteria, in consultation with the DMP and DPaW for the Mining Proposal, which must be approved before this Proposal can commence.
		 the details of the monitoring programs need to be updated in line with the revised completion criteria; 	Although qualitative completion criteria are presented in the PER, MRL are well advanced in the development of quantitative criteria and interim criteria are presented in
		 closure costs need to consider sudden or unplanned closure, care and maintenance activities and all closure planning, monitoring and remediation costs; and 	the revised RMCP MRL has committed to only mining above the groundwater level for both the J5 and BE deposits. As mining will only disturb the weathered, unsaturated zone
		 clear commitments need to be provided rather than possible intentions. 	profile, the risk of intersecting large volumes of Potentially Acid Forming (PAF) materials is considered low as any previous sulphides would have oxidised during weathering and the reaction products leached. Previous drilling undertaken at the J5 and BE deposits clearly shows the presence of PAF materials only occurring below the pit floor (and water table) and an Acid Base Account (ABA) provided in Table12-4 of the PER highlights the significant excessive buffering capacity expected during mining of the weathered (rogolith) materials
			With regards to the closure costs, these will be reported in the Mine Closure Plan to be developed and submitted for approval by the DMP/EPA for implementation of the Proposal. Costs of closure and the environmental liability on a yearly basis will be kept to a minimum through progressive rehabilitation, where practicable, which has both environmental, as well as economic benefits to the Proposal. The actual costs of rehabilitation will be determined based on the Rehabilitation Liability Categories and Unit Rates



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			outlined in the DMP (2013) <i>Mining Rehabilitation Fund</i> – <i>Guidance</i> .
			Unplanned closure is addressed in the RMCP. Additional information has been added to the revised version accompanying the Response to Submissions.
			To reiterate, detailed, clear and scientifically valid completion criteria and monitoring programmes that measure the trajectory towards achieving those completion criteria will be further developed and documented in the Mining Proposal and Mine Closure Plan to be submitted for approval by the DMP and EPA. These criteria will set clear triggers or benchmarks to assess environmental impact and rehabilitation performance.
347	DER	Table 3-1 of the RMCP identifies that the Contaminated Sites Act 2003 (CS Act) is legislation applicable to the proposal, however the RMCP does not contain a clear commitment(s) from the proponent to meet the requirements of the CS Act at closure. Additionally the RMCP should provide information explaining how the requirements of the CS Act would be met during the operational life of the mine and through closure, such as pre and post-closure assessment of	The MCP is a preliminary plan that satisfies the requirements of a Part IV Environmental Protection Act 1986 approval process. Further revisions will be required throughout the life of the Proposal under the auspices of the Mining Act 1978. MRL commits to update the MCP to provide greater detail on aspects of managing potential contaminated sites and the requirements of the Contaminated Sites Act 2003 in its next revision.
		petroleum storage areas for example. The RMCP focuses mainly on landform restoration and revegetation of the site and does not adequately consider the potential for long-term environmental effects to be caused by soil contamination or emissions to air, surface water and groundwater from the site, even when the area has been fully revegetated. In particular,	MRL notes that the comment from DER implies a "comprehensive conceptual site model" should have been provided in the RMCP. This requirement does not appear in the Mining Proposal guidelines, the Mine Closure guidelines, the Environmental Scoping Document or DER's own guideline on "Mine sites and the Contaminated Sites Act 2003".



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		the absence of a comprehensive conceptual site model according to the requirements of the National Environment Protection (Assessment of Site Contamination) Measure has limited the extent to which contaminated sites issues have been addressed in the document.	MRL also notes the reference to pit lakes and advises no pit lake is proposed. See also response to Issue 346.
		The RMCP should provide additional information regarding proposed monitoring, recording, management and remediation of site contamination within the closure strategy for the site. It is understood that post-closure, potential contaminants may be contained on the site within constructed landforms or cells (e.g. waste rock dumps, pit lakes and landfills). It is therefore important that the closure plan identifies such potential locations of contamination and acknowledges the need for such locations to be documented during the operational lifetime of the mine to support appropriate classification under the CS Act post-closure.	
348	DER	Waste rock characterisation for the project carried out to date has relied' on information contained in geological drilling and assay data for the J5 deposit, and only limited information for the Bungalbin East deposit. The Risk-Based Waste Characterisation (Appendix 12-B), states that " <i>All collected samples were assayed for Total</i> <i>iron (Fe), Manganese (Mn), Phosphorous (P), Sulfur (S),</i> <i>Vanadium (V) and the oxides of Aluminium (Al203),</i> <i>Calcium (CaO), Potassium (K20), Magnesium (MgO),</i> <i>Silicon (Si02) and Titanium (Ti02).</i> " This is a very limited suite of analytes, which fails to identify the full range of potential trace metals and metalloids that may be present at the site, and which	Further information on these aspects will be gathered at the commencement of and through the life of mining, and appropriate risk assessments completed so that appropriate management processes can be implemented as required. MRL proposes a low risk staged approach to pit development, whilst resource drilling is undertaken in the first phases of mine development. Sampling from this drilling will enable further precise definition of any chemically or physically hostile materials and materials that may be problematic from a geochemical stability and AMD perspective. Further refinement of management strategies for mine waste will be





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		may pose a risk of adverse environmental impacts if mobilised through metalliferous drainage.	developed in consultation with and approval by the DMP as required.
		On the basis of this limited geological characterisation and the extrapolation of the test results obtained from other similar mine sites in the region, the proponents have argued that the risk of acid or metalliferous drainage discharging from the site is low. The PER provides only a preliminary assessment of the environmental risks posed by acid or metalliferous drainage, developed on the basis of sulfur content alone. It is anticipated therefore, that comprehensive leaching tests of the waste rock material will be carried out prior to and during the operational lifetime of the mine in order to support the development of appropriate management strategies for mine waste. Given the limited scope of the waste rock characterisation and risk assessment provided in the PER further information is required to assess the environmental risks associated with potential acid or metalliferous drainage at the site.	Within the first year of operation, MRL will commit to undertaking static and kinetic leach testing to further quantify the potential for Neutral and Acid Metalliferous Drainage to occur. The results from this testing will be presented to the DER, and appropriate management strategies developed to minimise the generation of and the impacts from any metalliferous drainage. See also responses to Issues 16, 17 and 141.
349	Parks and Wildlife	The proposal impacts on a highly significant conservation asset (the HAR in the MMHARCP), and there is little confidence or evidence that there would be successful restoration, rehabilitation or mitigation of those values impacted by the proposal. The PER states " <i>if the Proposal is implemented the</i> <i>standard of rehabilitation and decommissioning works</i> <i>completed will have an impact on the future value of the</i> <i>area for conservation and recreation</i> " (PER, page 12-2). The PER also states that "Permanent alteration of the <i>landforms is inevitable in the event of implementation of</i> <i>the Proposal. The extent of which other potential</i>	MRL contends that Parks and Wildlife may not be actively managing the MMHARCP. On two occasions (29 October 2015 and 14 September 2016) the Regional leader of the Kalgoorlie Branch of DPaW has openly stated that very little management will be undertaken in the MMHARCP until a decision is made on the mining activities proposed in the HAR. MRL does not agree that the development of the Proposal will have a significant impact on the conservation status of the HAR and MMHARCP, as the areas to be disturbed in the HAR are <7% for both the J5 and BE deposits and <0.5% for the MMHARCP. All



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		acceptable outcomes would be achievable or economic.	
		The PER includes a discussion on the "… <i>limited</i> <i>information available to review</i> …" from rehabilitation practices and the outcomes in similar environments in Section 12.2.5 (PER, page 12-7); however, little evidence has been provided in the PER to provide a basis for assessment of whether the completion criteria or outcomes would be relevant for the HAR or the MMHARCP and their associated values.	



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		The PER also identifies the RMCP (Appendix 12-D) as instrumental in demonstrating that the proponent can achieve acceptable rehabilitation in the area. The RMCP does not however ameliorate this uncertainty or provide sufficient confidence that this would be the case, as there are a number of uncertainties as identified within issue number 350.	
		The statements in the PER on the potential for successful rehabilitation are both equivocal and optimistic. Without an understanding of the specific habitat requirements for reestablishment of species' and associated communities, and without a previous example of success of restoration of restricted species and communities in a BIF environment (where the habitat landform is proposed to be removed), the proposed rehabilitation outcome appears on the basis of evidence to be highly uncertain with limited likelihood of success.	
		Appendix 5-G states "Successful establishment of post- mining rehabilitation that incorporates conservation significant flora taxa or communities has not been demonstrated to date within the industry" (Appendix 5-G, page 15). Parks and Wildlife agrees with this statement and suggests that there is currently no substantive evidence to suggest that conservation significant species and communities restricted to BIF habitats can be successfully re-established on affected sites after mining or successfully translocated elsewhere.	
		As the "rarer plant taxa (Threatened and P1) are restricted to the narrower, higher elevation zone near the HAR [Helena-Aurora Range] ridgeline, with a tendency	



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		for these taxa to prefer south-facing slopes and shaded areas" (PER, page 5-9); the removal of these areas by the proposed mining would result in a loss of critical habitat for restricted species that cannot be replaced or restored.	
350	Parks and Wildlife	 It is noted that the proponent has been unable to address some of the aspects that influence rehabilitation and closure in the PER. Specific areas where additional information would be required to address the applicable risk and uncertainty include the following: the presence of and management strategies for PAF materials needs to be determined; the geotechnical stability of the landform during operations and into perpetuity needs to be determined; there is a need to clarify the location of abandonment bunds, their specifications, whether they would be located within the proposed buffer (impact) zone of the mine pits and how they would restrict public access; there should be an assessment of whether the 3 m buffer proposed to be applied to the premining water table and pit design would be adequate in different climate scenarios to ensure that water would not pool for extended periods in the pit; the proposed approach to rehabilitation requires further consideration as the approach identified in Table 12-7 (PER, page 12-9) appears generic and incomplete (e.g. not including flora, vegetation, ecosystem function, amenity or 	PAF ManagementAs specified in Section 12 of the PER, mining of the J5and BE deposits will be restricted to the unsaturatedweathered zone and no mining below the water table willoccur as part of this proposal. This significantly reducesthe risk of PAF materials being present as theweathered profile has undergone appreciable oxidationand thus any sulphides that were potentially presentwould have been oxidised. In addition, an analysis of theavailable geological drilling data shows that PAFmaterials (as identified by Total S values >0.3%) arerestricted to below the mine pit floor and thegroundwater level. A highly conservative Acid BaseAccount (ABA) shows that there will be a significantexcess of buffering capacity in the waste materials to bemined, and thus a co-mingling approach to PAFmanagement will likely be adopted.During infill and blasthole drilling the actual distributionof any residual PAF materials will be identified by screentesting of the drill samples for pH, EC and pH _{ox} . Theseparameters are sufficient to identify problematicmaterials. The handling and utilisation of any residualPAF materials will be tracked to ensure that they are notconcentrated in the WRL profile, particularly in the nearsurface horizons.



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		 recreational tourism considerations for the waste rock landforms); the proposed approach to management and related procedures requires further consideration, as those in the PER are either generic or have not been developed (e.g. soil management); the section on the proposed staged approach to mining is unclear on how it would be occur and what specific parameters are proposed to inform the acceptability or otherwise of the 	<u>Stability of Landforms</u> The geotechnical stability of the mine pit/s will be managed by either backfilling of the mine pit or by enclosing the pit/s within an abandonment bund as specified in the DoIR (1997) <i>Safety Bund Walls Around</i> <i>Abandoned Open Pit Mines</i> Guideline. Further detail is provided in Attachment 1. For the WRLs there are no geotechnical considerations given the rocky nature of the waste material to be
	 stages; the likelihood, requirements, implications and appropriateness of utilising "an alternate topsoil resource" (PER, page 12-11) for the rehabilitation require more in depth consideration; 	MRL commit to undertaking Landform Evolution Modelling (LEM) over long time periods (>1,000 years) to inform the final design and this LEM will be validated using ground-based LiDAR or equivalent to ensure that the predictions are accurate and reliable.	
		• specific rehabilitation objectives and completion criteria that are achievable and suitable for the end land use should be developed rather than basing proposed completion criteria on vegetation supergroups. Criteria should take into account the potential requirements of flora and vegetation occurring on the HAR, including conservation significant taxa if possible. It is unlikely that, specific localised habitats and associated vegetation units can be replaced, but this could provide the basis of target outcomes for rehabilitation; and	Abandonment Bund The abandonment bund will be located, and constructed in accordance with the DoIR (1997) Safety Bund Walls Around Abandoned Open Pit Mines Guideline, as detailed in Attachment 1. It will be constructed using competent NAF waste (BIF) rock. An abandonment bund will be located in all cases where a void remains, including around any partially backfilled minepits. Ponding in the Pit and Groundwater Interaction
		 there should be clear information on the potential for ongoing management liabilities that would need be considered for possible transfer 	A 3m buffer zone has been selected to protect the groundwater system and prevent a pit lake from developing. This thickness is sufficient to prevent any



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		to the land manager at closure. Additional clarity should be provided on whether the likely closure outcome would be suitable as inclusion in a conservation reserve, as the end land use.	upward migration or capillary movement of groundwater, particularly as the permeability of the pit floor materials when dry (i.e. at or below field capacity) will be rate limiting; hence with a 3m buffer there is no risk of a groundwater fed pit lake forming. However, if ponding of surface water (i.e. significant rainfall and associated runoff into the pit) occurs, then the positive pressure head may force water into the pit floor and may eventually interact with the water table. It is important to understand that this is not a pit lake as it will dry during the summer period.
			Rehabilitation Approach MRL state that the purpose of the proposed rehabilitation approach provided in Table 12-7 of the PER (page 12-9), was to provide a summary of the more physical aspects to rehabilitation, instead of the biological components. As discussed previously, four provisional species seed mixes have been developed based on the pre-mine vegetation data, with each seed mix containing species that are suited to specific soil water conditions and ecosystem function. Prior to revegetation of the four domains shown in Table 12-7, the land capability of the reconstructed soil profile will be established, and this will be matched to the specific species mix that can sustainably be supported by that profile. Monitoring of progressive rehabilitation will be undertaken to provide feedback of the performance of the various seed mixes and to establish which species are returning and which ones are not. MRL will commit to undertaking seed ecology trials to



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			identify recalcitrant species and to establish what seed treatments are required to facilitate germination. In addition to the species in the seed mixes, additional selected species will be seeded to increase the biodiversity or species richness of the rehabilitation to ensure that the established species richness completion criteria are achieved.
			The final land use of the WRLs will be continually developed following consultation with the various stakeholders. This process and the final land use will be completed prior to submission and approval of the Mining Proposal and Mine Closure Plan by the DMP, in consultation with DPaW.
			Please also refer the response to Issue 349 for additional information.
351	ANON-TWYQ-WP19-6	The PER states (page 2-7) that " <i>Topsoil and vegetation</i> <i>is to be stockpiled in suitable locations</i> " These locations should be identified as well as any pre- treatment such as topsoil and subsoil removal for later use. Page 2-7 of the PER outlines that PAF materials would require disposal, but the does not provide the design requirements for such internal dump structures. Further to this there is mention of "other hostile waste rock" further information should be provided as to their lithology, or what makes them hostile. The PER states (page 2-11) that "coupled with appropriate landscape treatment post mining" but does not explain what treatment is proposed. Further information should be provided on the post-mining	Topsoil and other growth media (e.g. laterite gravels) will be recovered and stockpiled for later use. All stockpiles will be contained within the Proposal footprint. "Other hostile materials" relates to some materials identified in the waste characterisation that are erosion- prone. These materials will be scheduled to ensure they are not placed on the outer surfaces of the waste rock landform and that they are encapsulated with competent material. "Appropriate landscape treatment post mining" simply refers to rehabilitation, the approach for which is described in the PER and the RMCP. The proposal to use concave slopes is, on current advice, because these slopes offer greater stability.



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		treatments proposed. Further information is also required on the design of the WRL which proposes to use concave slopes as there are no natural concave slopes at Bungalbin.	
352	ANON-TWYQ-WP19-6	 The RMCP contains completion criterion (Table 6-1) of the PER, however the information provided under "Interim Completion Criteria" indicates that these are not completion criteria but evidence of compliance with regulatory guidance statements, compliance with non-existent design parameters, or normal/basic environmental management requirements. For example under Biological values the Interim Completion Criteria states that "<i>Rehabilitation is undertaken in each domain to a prescribed vegetation community composition</i>" this is not considered best practice in environmental management in the Australian arid zone. From experience in mine closure planning at least 10 years (of average to good rainfall conditions) is required to establish what species grow successfully and what species are recalcitrant. 	The RMCP has been revised, with more detail provided in respect of completion criteria. The revised RMCP is provided at Appendix H. MRL expects that the sustained establishment of vegetation post-mining may take some time and that lease relinquishment would not occur until agreed completion criteria are met.
353	ANON-TWYQ-WP19-6	Page 12-4 of the PER provides an account of how the gravelly soils from soil mapping units 1 and 2 exhibit optimal physical and chemical properties for both material handling and future rehabilitation. However, all the properties demonstrated are <i>in situ</i> , that is, the soils are in an undisturbed state. These soil materials will look nothing like this once they have been removed, and stockpiled, for future use. Further, these soils contain dispersive materials, have poor macro structural stability,	MRL acknowledge that the finer fraction in SMU 1 and 2 are structurally unstable, and slake rapidly and are dispersive. Although this is the case, these materials are dominated by a coarse fraction, which effectively stabilises the material as a whole as any mobilised fraction or surface water flows are impeded by the larger particles which favours the vertical infiltration of surface water. It is acknowledged that hardsetting may be an issue as a result of the slaking process, and this will



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		and the fines fraction (particles <2.0 mm) do not have <i>"good armouring capabilities"</i> , as noted in Appendix 12-A. It is only the medium to coarse gravels, and cobble, contents that have armouring potential.	result in a temporary surface of high soil strength. Seeding of the WRLs will occur when the surface soils are moist allowing the seed to germinate. If necessary, soil amendments can be used.
		Further, given the hard-setting nature of the fines fraction, these materials should be kept away from the surface of the waste rock dump.	The program has been developed with advice from rehabilitation specialists. The program will be adjusted according as additional information is collected.
		The PER explains how the proponent intends to use unsuitable materials on the flat (?) upper surface of the dump. Soils showing Class 2 dispersion can develop hardpans within the soil profile. Class 3 soils will demonstrate post compaction deflocculation, resulting in internal profile instability. The revegetation program, along with the proposed dump surface profiles and surface water management, should be reconsidered and based on science.	
354	ANON-TWYQ-WP19-6	On page 12-6 of the PER the proponent has identified hazardous materials, that includes the presence of both sodic and saline waste, which indicates that encapsulation within the waste rock dump becomes of even greater importance. The WRL design requires review to provide scenarios that provide confidence that such materials would be contained into the future. These hazardous materials do not exist now as a surface entity, and they should not be allowed to present an adverse environmental impact in the future.	It is important to reiterate that the actual presence of problematic (not hazardous) materials, such as saline and sodic materials has not been confirmed at the J5 and BE deposits, but based on experience from other sites, and from an understanding of weathering (regolith) profiles, there is a likelihood of these materials being present. The submitter is correct that if these materials are present in large volumes then the WRL design, and the handling and utilisation of the materials, needs to be carefully considered so that they do not impact on the surrounding environment or future rehabilitation. Problematic material will be identified and scheduled to ensure they cannot present an adverse environmental impact. MRL is aware that lease relinquishment will not be achieved should such conditions exist.



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355	ANON-TWYQ-WP19-6	Section 12.3.2 of the PER (page 12-11) discusses the WRL and backfilled void: reconstructed soil profiles. The term " <i>unfavourable waste rock and soil</i> " should be defined. Apart from PAF materials, what other materials are there that may be unfavourable? Dispersible soils must be regarded as " <i>unfavourable</i> ". How will these dispersible soils, known to be present in soil mapping units 2, be identified and treated during recovery and storage, or before replacement on the WRL?	For this Proposal unfavourable waste rock, in addition to PAF material, refers to saline, sodic and acidic regolith materials that could impact on the surrounding environment and/or future rehabilitation. These materials will be identified and delineated during infill and blast hole drilling so that they can be appropriately managed in the construction of the WRL. Any unfavourable or problematic material will be placed at depth in the WRL (i.e. below the expected root zone).
		What makes the rock " <i>favourable</i> "? How has this 'important' Tertiary surface been identified? What makes the Tertiary surface, and materials, important? <i>"Sub-soils from SMU-3 will be placed on the flat upper</i> <i>surface</i> " however, this is contrary to the PER which states that the dump surface would have a surface gradient of 5 degrees (8.8%). How is the dump going to be designed? It is also noted that soil mapping units 3 soils are not suitable for use on the dump surface. Why are they being proposed here? It is noted that gravelly soils from soil mapping units 1 and soil mapping units 2 would be placed to a depth of 0.8 m as a cover over all other materials at Bungalbin East. Further explanation is required to explain how the problems associated with mechanical segregation, due to particle density, will be resolved to achieve the best outcome from this important surface horizon. Further, the proponent needs to explain if these materials will remain segregated on the surface. If they are to be	In the context of the J5 and BE, favourable soil materials represent those that physically stable, non-erodible and have a sufficient fines fraction to facilitate the germination and early establishment of revegetation species. Whilst the submitter suggests that the Tertiary laterite is classified as "favourable", which MRL agrees with, its general lack of fines results in it having limited carrying capacity and thus its potential to support revegetation, and in particular germination and early establishment of revegetation species is limited. Whilst it is considered that the finer fraction in SMU 1 and 2 are dispersive, the high coarse fraction stabilises these materials and results in them being optimal for use on the WRL surfaces; hence they are considered "favourable" materials. These materials have been successfully applied to WRL slopes at the Carina deposit, and at Cliffs Asia Pacific Koolyanobbing, Mt Jackson and Windarling deposits, with little to no erosion.
		mixed to form a single surface soil unit, the proponent needs to explain how the revegetation programme would be impacted by a change in pH. The <i>in situ</i> pH profile	Whilst the level of detail on WRL design provided in the PER was preliminary in nature, specific design criteria will developed in consultation with and approved by the



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		indicates that surface soils (topsoils) tend to be acidic (strongly to moderate) and subsoils tend to be circum neutral to alkaline.	DMP/DER in the Mining Proposal and Mine Closure Plan, which must be approved before the project can commence. It is therefore considered that all of the
		Lack of clarity provided regarding the surface of the WRL. Will it be level or will it have a gradient towards the centre of the dump?	questions and uncertainties raised by Submitter ANON- TWYQ-WP19-6 will be addressed in the Mining Proposal and final RMCP.
		To suggest that "deeper ripping is not required, as these flat surfaces will not erode" assumes that the dump surface will always be level. This of course will not happen because of compaction variability during construction, and because of differential settlement post construction. Wind erosion will certainly occur.	
		The statement that <i>"Woody debris will be spread to reduce erosion"</i> is contrary to statement in the PER that the flat surface will not erode.	
		The proponent should review this section in-line with best practice for revegetation and mine closure.	
356	ANON-TWYQ-WP2B-G ANON-TWYQ-WP4N-X ANON-TWYQ-WP4G-Q ANON-TWYQ-WPZJ-Z ANON-TWYQ-WPF5-Q ANON-TWYQ-WPZJ-Z Toodyay Naturalists Club	The submitters lack confidence in the ability of the proponent <i>"to ensure that premises are decommissioned in an ecologically sustainable manner."</i> This is supported by the EPA's assessment, wherein it indicates that it does not believe that the HAR could be restored if mining were to take place ⁹⁹ . The PER contains vague rehabilitation targets, rehabilitation monitoring programs are short term, facilitating a steady downgrade in the quality of the on-ground rehabilitation. The PER does	MRL is not committing to restoration, rather rehabilitation. MRL recognise the distinction between restoration and rehabilitation and that restoration of a landscape following mining is scale-dependant and that at a local landscape scale restoration of the pre-mine ecosystem function will not occur. Although this is the case, rehabilitation does involve establishing a post- mine landform that is safe, stable, non-polluting and sustainable such that it has no impact on the

⁹⁹ EPA (2014) Statement of Reasons for Level of Assessment – Environmental protection Act 1986 – Jackson 5 (J5) Exploration program on M77/1095. Perth, WA.





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		and decommissioning can be undertaken in an ecologically sustainable manner. The submitters are concerned that the proponent "has no experience in rehabilitation and restoration associated with conservation-significant flora and communities" (Woodman Environmental quoted on page 5.54 of the PER). With regard to the proponent's corporate experience, the proponent has not previously sought approvals to mine in an environment where rehabilitation and restoration of threatened and conversation significant flora and communities was a requirement. Woodman Environmental also noted that within the broader BIF iron ore industry "successful establishment of post-mining rehabilitation that incorporates conservation-significant flora taxa or communities has not been demonstrated to date". (PER, page 5.55) Statements referring to rehabilitation are therefore not based of evidence	impact on landscape function as a whole. Also refer to response to Issue 35.
357	BHLF-TWYQ-WPP8-4 ANON-TWYQ-WPPX-4 ANON-TWYQ-WP1G-M Helena and Aurora Region Advocates Inc. ANON-TWYQ-WPHK-F Track Care WA Wildflower Society of WA ANON-TWYQ-WPBH-6	Rehabilitation of the mining activities, including the clearing of 700 ha of land for pits, waste dumps and haul roads, two hundred million tonnes of waste rock is dumped at the site and two million litres of aquifer water is used per day, back to their original condition would be impossible as the EPA has previously highlighted. It is not clear from the PER how the unique vegetation and landforms and cultural values can be rehabilitated. There is no compromise possible when the proponents' own visualisations show a 'rehabilitation' of spoil and exhausted excavations in the place of intact BIF.	MRL agrees that rehabilitation of mined landscapes is challenging. The objective of rehabilitation, however, will not be to return the features of the Proposal area "back to their original condition". This is not possible. However MRL commits to undertaking the necessary research, trials and consultation with subject matter experts and other stakeholders to enable the best outcome for rehabilitation in the HAR, and to meet the conditions placed on them. MRL can confirm that significant species such as <i>Banksia arborea, Stenanthemum newbeyi</i> and <i>Neurachne annularis</i> return to disturbed areas and



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	ANON-TWYQ-WPHW-U BHLF-TWYQ-WPJ3-S 9; 37; 39; 52; 109; 141; 216; 231; 264; 284; 318 ANON-TWYQ-WPZ7-D The Subaru 4WD Club of Western Australia Inc ANON-TWYQ-WPFT-P ANON-TWYQ-WPFU-Q ANON-TWYQ-WPF8-T ANON-TWYQ-WPF8-T ANON-TWYQ-WP48-3 ANON-TWYQ-WP48-3 ANON-TWYQ-WP48-3 ANON-TWYQ-WP48-3 ANON-TWYQ-WP48-3 ANON-TWYQ-WP48-3 ANON-TWYQ-WP48-3 ANON-TWYQ-WP48-3 ANON-TWYQ-WP48-3 ANON-TWYQ-WP48-3 ANON-TWYQ-WP48-3 ANON-TWYQ-WP48-9 ANON-TWYQ-WPB3-9 ANON-TWYQ-WP23-9 ANON-TWYQ-WP2C-H ANON-TWYQ-WP1C-G	The proponent is proposing to backfill the Bungalbin East pit by 40%, however this is still considered to be environmentally unacceptable as part of the range would have been removed, and backfilling would not restore the ecological function of Bungalbin East (for example the numerous cave along the top of the southern slopes would no longer exist, the <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> , <i>Lepidosperma bungalbin</i> , <i>Banksia arborea</i> would no longer be supported). Fauna habitat cannot always be restored through rehabilitation. It is unlikely that the 'constructed' landforms will support the baseline level of fauna. There are 20,000 deserted mine-sites in WA, resulting in billions of unfunded liabilities for rehabilitation.	rehabilitated landforms as identified in regrowth on exploration tracks and pads at J4 and J5 and in rehabilitation by Cliffs at J2 and J3. MRL is not able to provide further details of this rehabilitation as it does not have access to the relevant documentation (held by Cliffs).
358	ANON-TWYQ-WP4A-H ANON-TWYQ-WPBA-Y ANON-TWYQ-WPF5-Q ANON-TWYQ-WP18-5	Rehabilitation of disturbed landscapes to an acceptable standard that 'balances mining and conservation' is not possible. The mining industry continues to struggle with effective rehabilitation techniques and to deliver positive outcomes. There are very few examples of acceptable	MRL agrees that rehabilitation of mined landscapes is challenging. MRL commits to undertaking the necessary research, trials and consultation with subject matter experts and other stakeholders to enable the best outcome for rehabilitation in the HAR, and to meet the



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	BHLF-TWYQ-WP1A-E Toodyay Naturalists Club	rehabilitated landscapes, and as the proponent acknowledges they have very little experience in this critical mining process. Therefore the community has no confidence that expected high standard of rehabilitation for this proposal can be achieved, and that the EPA's objective for Rehabilitation and Decommissioning cannot be met.	conditions of approval. Please also refer to the response to Issue 41.
		 This uncertainty is echoed by the proponent in the PER document with statements such as: "Rehabilitation will seek to restablish flora and 	
		 vegetation of conservation significance" (PER p.v) "Rehabilitation will achieve a level of habitat restoration."(PER p.v) 	
		• "Effective rehabilitation of the WRLs will facilitate the return of some ecological functon to these new landforms" (PER p.6-52).	
359	ANON-TWYQ-WPB8-P	PER Section 12.3.2 states that during the operation of the mine the waste rock land forms will occupy a vast area of land further diminishing the ecological functionality of the area and its aesthetics. Their rehabilitation will not recreate the existing ecology.	MRL acknowledges that recreating the pre-disturbance ecology is not possible. However, it is MRL's objective that the WRLs will be safe, stable and non-eroding, and that they will support local native vegetation after rehabilitation.
360	ANON-TWYQ-WP4S-3	Concerns regarding the health of the flora that are uniquely adapted to the BIF ranges particularly the Federally listed <i>Leucopogon spectabilis</i> and <i>Tetratheca</i> <i>aphylla</i> subsp. <i>aphylla</i> and the 13 priority species. It is noted in the Referral of a Proposal by the Proponent to the EPA under Section 38(1) of the EP Act' that the proponent is working jointly with Curtin University on predictive modelling of assemblage distributions which is ongoing and is intended to be integrated to the EIA	The work Curtin has undertaken will add significant value to assisting MRL in determining suitable sites throughout the HAR and on reconstructed landforms for translocation/rehabilitation of the various significant species as may be required. Please also refer to the responses to Issue 35 and Issue 53 in respect of offsets and habitat modelling



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		<i>process</i> '. This statement does not indicate if the research would actually be useful and helpful to the rehabilitation process . Yates <i>et al</i> (2011) discuss the difficulties of 're-establishing the BIF endemics that occupy the cracks in massive BIF. Ecological preferences for individual taxa of conservation significance will need to be considered in detail when planning and implementing rehabilitation works'.	
361	ANON-TWYQ-WPBA-Y	The proponent refers to a \$7 million grant from the Australian Research Council for developing an integrated research training programme for mine rehabilitation. This seems to be a case of putting cart before the horse.	 MRL is a proud partner organisation of this unprecedented ARC co-funded Industrial Transformation Training Centre for Mining Restoration. Research outcomes from this initiative will inform MRL's rehabilitation for the Proposal duringthe first five years of mining whilst the ITTCMR is functional. The ITTCMR aims to establish industry-integrated research-training positions that specifically address industry requirements for achieving restoration targets. The thematic research disciplines of the ITTCMR are: restoration genetics seed technology and enablement restoration ecophysiology rare and recalcitrant species management mining industry policy extension The ITTCMR brings multiple mining companies together for a more coordinated approach to achieving restoration outcomes. It thereby enables the most efficient use of scarce resources to get maximum benefit to the nation, the industry and the environment by the mining process.



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			The suggestion that research outcomes of the ITTCMR should be included in the Proposal is idealistic. The involvement of industry partners such as MRL is vital to the ITTCMR. It is an innovative program enabling progressive restoration research within a strong applied science setting that is defined by current and future mining industry restoration requirements.
362	WA Native Orchid Study and Conservation Group Inc	Whilst efforts can be made to remove and rehabilitate orchid species, this process is rarely successful in the long term. Once orchid habitat is disturbed it cannot be restored to the original biodiversity.	Orchids will continue to be well-represented in unmined areas. There is potential for orchids to re-establish on rehabilitated areas through topsoil recovery and application.
363	Wildflower Society of WA ANON-TWYQ-WPBH-6	Table 12-2 Summary of soil resources at J5 and Bungalbin East– a summary or soil resources is provided for the Project – however there is no inventory and no mention of how much material will be required for Rehab.This section states that soil resources from SMU1 (Soil management Unit) and SMU2 are non-dispersive and structurally stable. Section 4.2.2.1 of the soil report says that the finer soils of SMU1 slake rapidly and that some dispersion may occur when soils are excavated during mining. The finer fraction of SMU2 soils were also described as structurally unstable in section 4.3.3.1.There is a comment that minimal soil is available, which contradicts section 12.2.2 of the PER which states that there is enough soil for 45/80 cm cover on the WRL.Closure criteria Physical stability – erosion rate of 10t/ha/yr is set. Industry recommended target is 5t/ha/yr.A lot of the criteria would be impossible to measure and	A soil inventory was provided in the Soil Characterisation report (PER Appendix 12-A). This report showed, based on current waste rock landform (WRL) designs, that there was sufficient resources of SMU 1 and 2 soil materials to cover the J5 WRL to at least 47cm and the BE WRL to 90cm. Both of these depths are considered sufficient to maintain stability of the land surface and to provide a sufficient depth to facilitate germination and early establishment of the revegetation species. It is correct that the <u>finer fraction</u> of both SMU 1 and 2 are dispersive and are structurally unstable due to the dominance of kaolinite in the clay mineral fraction and low to very low salinity; hence, even though these soils are classified as sodic (i.e. ESP>6%) the low salinity restricts the degree to which flocculation of the finer fraction occurs and thus it remains mobile. Although this is the case, the abundance of the coarse (>2mm soil) fraction results in the material overall being structurally stable as surface water movement and sediment



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		monitor. Not enough information is provided to give confidence that the criteria could be achieved. <u>Section 10 - Financial provisioning for closure</u> The proposed approach for the financial provisioning assumes that works will be undertaken by mining contractors and does not allow for the use of specialist closure contractors. It is questionable if it is appropriate for mining fleet to be undertaking closure works at this project given the highly sensitive location. It is unclear if this meets the Australian Accounting Standards Board 137 (Provisions, contingent liabilities and contingent assets), especially in the context of unexpected closure (and as has been confirmed at several mining projects within Western Australia in recent years). It is assumed that financial provisioning has been completed on the basis of the waste dump design presented in the RMCP as opposed to the PER.	transport is limited, with vertical infiltration of rainfall favoured. Any surface water or sediment transport that does occur only travels a short distance (i.e. centimetre- scale) before its movement is intercepted by a coarser fragment slowing its velocity, which facilitates the suspended solids to settle-out of the water column and results in the vertical infiltration of water into the soil profile. It is therefore considered that overall both SMU 1 and 2 are structurally stable and resistant to erosion and sediment loss. <u>Closure criteria</u> It is correct that a surface erosion criterion of 5t/ha/yr is currently used by the regulatory agencies to establish whether a land surface is stable or not. However, assuming a sediment bulk density of 1.8t/m ³ this equates to a soil loss depth of just 0.3mm over a hectare (or 2.78m ³ /ha), which as rightly pointed out is impossible to measure. It is for this reason that a higher erosion criteria value was set. It is considered that even a criteria of 10t/ha/yr, which equates to 5.6m ³ /ha or a soil loss depth of 0.56mm, is still problematic to measure. MRL believe that an erosion criterion of around 30- 40t/ha/yr is more realistic for the ridge and slopes, as this equates to 16.7-27.8 m ³ /ha or a soil loss depth of 1.67-2.78 mm. At this depth, ground-based LiDAR would detect a difference in the land surface and would provide meaningful measurement of soil erosion and sediment loss.



		Response to comment
		Financial provisioning The use of mining fleet costs for financial provisioning purposes does not necessarily mean that that is the intent. MRL uses this approach to ensure it has a value that reflects the likely costs.
364 BirdLife WA The car The ecc with pro- env fau Ap los It is and imp and "It tern The spec Go via loc Stri	he natural values and ecological functioning of HAR annot be rehabilitated if they are destroyed. The mining proposal cannot rehabilitate HAR in an cologically sustainable manner. Given that HAR lies within a conservation park, with the purpose of "the roper maintenance and restoration of the natural nvironment, the protection of indigenous flora and auna", this proposal is environmentally unacceptable. Approving this mining proposal will result in permanent bass of BIF habitat and ecological functioning at HAR. Is not possible to reconstruct BIF ranges. BIF habitats and their ecosystems cannot be rehabilitated if they are mpacted or destroyed. The Department of Environment and Conservation made this clear in 2007 (DEC 2007): It is unrealistic to consider mining development to be a emporary disturbance to banded ironstone ecosystems. The option of re-establishment of the rare and endemic pecies and communities found in many Midwest and Goldfields BIF areas proposed for mineral development, ia minesite and waste dump rehabilitation (or any other bocation other than their normal habitat), is a high risk trategy that has yet to be demonstrated as achievable in a sustained manner. A previous rehabilitation attempt	MRL acknowledges that recreating the pre-disturbance ecology through rehabilitation is a difficult target to achieve, however commits to undertaking the necessary research, trials and consultation with subject matter experts and other stakeholders to enable the best outcome for rehabilitation in the HAR, to meet the conditions placed on them. Please refer to the response to Issue 41 for further details in this regard.



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		the priority flora Regelia megacephala initially colonizing rehabilitated areas, but it was quickly out-competed by other species better adapted to the modified soils.	
		In DEC's view, this option is unlikely to be a successful means of achieving conservation of rare and endemic species or communities in natural self-sustaining populations or occurrences. Before reestablishment of species and associated communities could be considered successful, the sustainability of the species would need to be demonstrated over several generations. Relying on this option for proposals currently under assessment would be in the absence of sound scientific evidence regarding likelihood of success."	
		Little has changed since 2007.	
		Establishment of many BIF-plant species, including rare and endemic species, on post-mining rehabilitation sites has had, at best, limited success (Kingsley Dixon, Professor and Director, ARC Centre for Mine Restoration, Curtin University, pers. com).	
		The proponent are merely proposing to revegetate some areas of disturbance with plants that will become established or adapt to a vastly-altered landscape.	
365	ANON-TWYQ-WPJN-M	Whilst today's mining activities generally have to adhere to various environmental regulations these are in general quite tokenistic and rarely return the landscape processes that mining disrupted back to the pre-mining state. Furthermore, whilst there are attempts to revegetate mined landscapes, in an arid environment, the submitter is yet to see any rehabilitation that does	MRL recognise the distinction between restoration and rehabilitation and that restoration of a landscape following mining is scale-dependant and that at a local landscape scale restoration of the pre-mine ecosystem function will not occur. Although this is the case, rehabilitation does involve establishing a post-mine landform that is safe, stable, non-polluting and



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		not mask the scar of mining, nor fully reinstate landscape function.	sustainable such that it has no impact on the surrounding environment and it does not detract or impact on landscape function as a whole.
366	Toodyay Naturalists Club 356	The proponent has no historical experience in rehabilitation and restoration associated with conservation significant flora and communities, the submitter finds this concerning given rehabilitation results for Tetratheca paynterae (Paynter's Tetratheca). Portman Resources NL began mining the former BHP Koolyanobbing leases around 1993, and expanded their operations into the Windarling and Mount Jackson Ranges. When the Windarling leases were to be mined, a condition was to form a Community Reference Group to monitor the population of Tetratheca paynterae ssp. paynterae (a Threatened Species) that is growing in the mine area. The submitter has closely followed the results of a Cliffs' trial plot in both maintaining the existing population and establishing new Tetratheca plants. This has shown a steady decline in the total live plants from 928 in 2011 to 832 in 2015 (rainfall influence does not correlate with the decline). The number of dead plants over that period has	MRL acknowledges the submitters statements. Without a specific reference, it is difficult to provide comment on the data presented.
367	The Wilderness Society	gone from 189 to 322. Submitter expresses concern regarding the inadequacy of the proponent's rehabilitation plans as set out in the PER. Basic information such as species composition is inadequate or missing. The submitters supports previous statements from the EPA: EPA Depend 4507 (2045)	Refer to MRL's response to Issue 35 and 41.





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		demonstrate rehabilitation of landforms and flora and vegetation to an acceptable standard such that the proposal will meet the EPA's objectives.	
		Ine proponent claims in it's PER that successful implementation of rehabilitation is 'challenging but achievable' and that the EPA's objective for rehabilitation and decommissioning can be met. However, they have in no way demonstrated that this is the case, based either on their achievements or those of other BIF mines in the region. Given the sensitivity of this environment, application of the Precautionary Principle requires that the proponent's assertions, and the mining proposal, are rejected.	
368	356	Submitter expresses concerns about the impact of mining. The continual expansion of the open cut pits and waste dumps to a point that the area is unrecognizable pre-mining. The constant fragmentation of the land with construction of haul roads, service tracks and broad scale clearing for operational areas. No matter how stringent environmental regulations may be a mining operation by its nature is always destructive. No amount of rehabilitation will restore a landscape that has taken hundreds of millions of years to form.	MRL acknowledges the submitters statement and agrees that the immediate area of the mines will be significantly altered.
369	356	The PER states that the over 6 square kilometres of disturbed area is "small". There is little reference to the clearing, fragmentation and other impacts of the construction of haul roads. The proponent rejected an agreement with another mining company to utilize an existing haul road instead, constructed their own which further added unnecessary	Impacts associated with linear infrastructure and management of those impacts are well considered in the PER by MRL.



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		fragmentation to the land.	
370	357	In developing the proposal the proponent has applied the EPA's mitigation hierarchy to avoid, minimise, rehabilitate and offset environmental impacts. The Company is confident that its application of the mitigation hierarchy can ensure a successful balance between mining and conservation in the Helena-Aurora Range.	MRL acknowledges the submitters statement.
		All mining changes the landform but the waste rock landforms, infrastructure and haul roads have all been positioned away from the more sensitive areas of the Helena-Aurora Range;	
		 Site disturbance has been minimised to only that which is necessary for safe development and operation; 	
		• Operational impacts will be minimised through implementation of an Environmental Management System, including management plans prepared for rehabilitation and mine closure, surface water, amenity and conservation significant species and communities;	
		 Careful rehabilitation will be undertaken of all disturbance including backfilling and rehabilitation of the southern pit floor at Bungalbin East; 	
		• A range of proposed offsets of impacts on flora and vegetation including surrender of group exploration tenure over the remainder of the Helena-Aurora Range and implementation of translocation programs for conservation	



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		significant flora; and	
		There will be no loss of rare or priority flora at the species level (endemic or otherwise). Indeed, no species of flora are predicted to be lost as a result of the Proposal.	
		Mine rehabilitation and closure studies have commenced, including characterisation of soil and waste rock based on field survey and existing drilling data.	
		 Low risk of metalliferous drainage and of encountering problematic waste rock e.g. Potentially Acid Forming (PAF) material; 	
		PAF disposal strategy in place based on worst case scenario;	
		 Rehabilitation of WRLs and other areas to target suitable local plant species from the Helena-Aurora Range, recognising that restoration is not practically achievable; and 	
		• Further work to be undertaken on translocation of T. aphylla subsp. aphylla and L. Bungalbin.	
371	ANON-TWYQ-WPF5-Q	The submitter does not have confidence in the proponents ability to undertake successful rehabilitation in view of the fines issued in 2015 for two separate environmental breaches (releasing hypersaline water onto public land, and discharging hypersaline water onto a waste rock dump at the Carina mine site).	MRL acknowledges the submitters statement.
372	ANON-TWYQ-WPF5-Q	The submitter considers that a 50 year commitment for rehabilitation activity post-mining by Mineral Resources, or an adequate and sufficient bond or bank deposit to fund others to do so if the company is unable or	MRL acknowledges the submitters statement. The EPA will consider the conditions for the Proposal should it be recommended for approval. The Proposal will also be subject to the Mining Rehabilitation Fund administered



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		unwilling, is necessary should the proposal proceed.	by DMP.
373	Toodyay Naturalists Club	The submitter notes that the PER Section 2.3.4 notes that 30km of haul roads are required and 1.25km ² of vegetation will be cleared. In view of the above it is noted that the Mine Closure Plan does not mention how compaction of the haul roads will be alleviated.	Any compacted surfaces will be alleviated through deep ripping. It is expected that some roads may be retained for post-mining land uses, at least in part.
374	ANON-TWYQ-WPF5-Q	The submitter considers that the proponent should be required to undertake a long-term restoration research project to demonstrate that they can successfully re- create a resilient, self-sustaining ecosystem containing Threatened and Priority Flora identical to what was present before mining, on disturbed land before any disturbance is allowed to occur to the Helena and Aurora Range BIF formation as proposed in this PER. Listing what is proposed to be done, what the completion criteria are and what monitoring will be undertaken is no substitute for actually having done these things and demonstrating that that this can be, has been, and will be done successfully.	MRL acknowledges the submitters statement. MRL will draw on experience from outside the company to address its rehabilitation requirements. The EPA will consider the conditions for the Proposal should it be recommended for approval.
375	ANON-TWYQ-WPF5-Q	The submitter contends that rehabilitation and revegetation are difficult, complex tasks and does not consider that it is possible to recreate geologically and topographically complex, untouched, pristine environment such as the HAR BIF formation. Successful recreation of an existing ecosystem has not been done, although in some cases we are getting close (e.g. Alcoa bauxite mines in the Darling Ranges). The Gondwana Link project shows that we still cannot, even after almost 15 years of using best practice,	MRL agrees that rehabilitation of mined landscapes is challenging for any proponent in any environment. Full restoration of a landscape following hard rock mining will not be possible; however MRL commits to undertaking the necessary research, trials and consultation with subject matter experts and other stakeholders to enable the best outcome for rehabilitation in the HAR, and to meet the conditions of approval. Please also refer to the response to Issue 41 for further



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		adaptive management and continual improvement on a topographically and geologically relatively simple landform, recreate a highly species biodiverse, highly spatially variable ecosystem that is similar to the pre- existing situation using current techniques. To do so will take ongoing commitment and the presence of the owner(s) of the project sites, remedial or in-fill actions and new initiatives entailing activities such as regenerating fire, over the next 50 years.	details in this regard.
376	ANON-TWYQ-WPF5-Q	The submitter considers that the rehabilitation data from	Rehabilitation success and revegetation species
		of Threatened Flora and Conservation Significant Flora and Community Management, Rehabilitation and Restoration Practices in Appendix 5 are inadequate to demonstrate successful rehabilitation for the following reasons:	MRL acknowledge that past examples of successful rehabilitation in the iron producing areas of the Yilgarn, and more broadly across the mining industry in Western Australia, are limited and that only a small number of sites have been fully closed through to tenement relinquishment.
		• Appendix 12C does not provide adequate detail of the success of rehabilitation, quoting few specific data and making many broad statements;	The rehabilitation review undertaken by Soilwater Consultants in 2009 clearly documented the reason for this limited success and MRL are committed to ensuring that all aspects of this review are adopted in the
		Appendix 12C does not detail what species are included in the Completion Criteria;	planning and implementation of rehabilitation. MRL will take an ecosystem function approach (this is
		• the rehabilitation activities described do not re- create the landforms, especially the massive, contorted, voids, aesthetic, banded rock formations that are characteristic of, and so valued in, BIF formations;	different to /Landscape Function Analysis) to rehabilitation to ensure that the revegetation species used are selected based on the land capability or carrying capacity of the reconstructed soil profiles. MRL acknowledges that this is the only way to achieve
		• for several mining projects that have been in existence for some time, no details on rehabilitation/revegetation success are available at all, indicating inadequate	sustainability in rehabilitation and closure. To this end, MRL have identified three provisional species seed mixes (Appendix H), based on baseline





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		transparency of operation, reporting and oversight by approval authorities;	quadrat monitoring, that will likely be used in rehabilitation. These species seed mixes cover the
		 the documents examined in Appendix 12C have not been externally peer reviewed or had an 	range of likely soil water dynamics and function to be experience in rehabilitation across the Proposal.
		external independent assessment of the success of rehabilitation;	Prior to any rehabilitation, MRL will commit to characterising the soil water dynamics across a
		 many of the documents indicate the requirements, strategies and methodologies of what is proposed without describing what has 	landform or domain to ensure that the limiting properties to revegetation success are identified and considered in the selection of species to be used in rebabilitation. For
		been achieved;	example, in shallow gravelly soil profile areas, where
		 rehabilitation has been commenced too recently in all cases, or have not yet even commenced, for results to be available to be able to 	water availability is limited, then only thin-leaved, shallow-rooted, low transpiring revegetation species (i.e. those species specified as Ridge specialists) will be
		determine whether they have been successful, or will be a long-term success;	selected as they are highly drought tolerant. If higher transpiring species were to be used, with larger surface
		 more than 5 years of management and monitoring is needed post initial revegetation/rehabilitation to address on-going changes to and issues with the rehabilitation 	area leaves and deeper root systems then it is likely that they will run out of water during the summer period and be water stressed resulting in poor rehabilitation success.
		areas, but are not required under nearly all environmental approvals for the sites examined;	Plant-water dynamics and habitat preferences of plants will be considered together with seed ecology research
		 where there is apparent compliance with completion criteria, there is no evidence of long term fitness and restoration success beyond that of population establishment and survival of 	to identify recalcitrant species and to address knowledge gaps associated with seed dormancy. Please refer the response to Issue 41 for further details in this regard.
		individual species to demonstrate that the	In addition, the differentiation of species into geosporous and bradysporous will occur so that the relative
		evolutionary processes that provide long term	importance of topsoil (or seed store), in addition to
		resilience, persistence and functional integration, which is required for a self-sustaining ecosystem;	seeding, can be quantified – MRL understand that to get high species richness in rehabilitation both seeding and good topsoil management is required to return both
		 the proponent does not have experience in 	geosporous and bradysporous species. MRL will also


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		research, trials or any attempted to propagate or revegetate areas with any of the Threatened or Priority Flora known to exist in or near their mineral leases;	commit to revegetation trials as part of the progressive rehabilitation, in order to provide feedback and inform future rehabilitation works.
		 A recent paper (David Lamb, Peter Erskine and Andrew Fletcher, Widening gap between expectations and practice in Australian minesite rehabilitation, Journal of Environmental Management and Restoration, 16(3), 186-195, September 2015) indicates that rehabilitation success for mining projects in Australia is poor, and there are very few examples of post-mining rehabilitation having reached a successful conclusion. A general comment was that while rehabilitation requirements were probably acceptable (though on the low end of what was desirable), and there were plans and an intent to undertake rehabilitation works, the implementation, follow through, funding, on- going commitment and independent oversight or assessment by approval authorities were inadequate or lacking in practice. Completion criteria Typically, completion criteria set by approval authorities and targeted by mining operations are inadequate in terms of species (e.g. only 40-70% of reference sites or pre-existing environments). They focus on those species that are common, easy to propagate, possible to germinate from seed and obtainable from commercial suppliers They typically do not consider/include: 	Aesthetic and functional value of BIFs MRL acknowledge that it is not possible to return the massive, contorted voids that are characteristic of BIF formations – as these formations formed over many millions of years. It is important to reiterate, that whilst the aesthetic value of the BIFs cannot be restored, the Proposal represents only 2.2 and 4.3% of the HAR, respectively, and only 0.17% and 0.24% of the MMHARCP. It is therefore considered that this small disturbance area will not detract from the aesthetic value of this area and will not impact on the ecological function or land capability of the area. Drivers to undertake rehabilitation The implementation of the Mining Rehabilitation Fund (MRF) approximately three years ago is the catalyst to undertaking quality rehabilitation, and the Rehabilitation Levy paid each year for all non-rehabilitated areas is not refundable (unlike the previous unconditional bonds) and thus there is an economic incentive to undertake rehabilitation and get areas signed-off. The MRF therefore prevent mining companies from delaying rehabilitation and divesting the liability at a later stage. The MRF therefore provides a more reliable, transparent and robust mechanism to achieve rehabilitation
		 small shrub and herb species; 	งนเองกายอ สอเบออ เกษ เกินนอน y.



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		 rare, localised and hard to propagate/germinate species; Threatened and Priority species which are of the highest conservation significance and concern, or only some; or target species that are restricted to complex habitats, such as intact massive rock formations. 	Completion criteria MRL acknowledge that revegetation of disturbed areas principally involves the re-establishment of more common species and potentially species that dominate ecosystem processes. Whilst MRL will also adopt a similar strategy to assist in stabilising and 'kick-starting' the rehabilitation process, MRL understands that in order to return the 'true' biodiversity of the disturbed areas, considerable work is required to re-establish small shrub and herb species, rare and recalcitrant species and Threatened and Priority species to rehabilitation. MRL will commit to conducting trials to re-introduce these less dominant and 'unique' species back into rehabilitation, in addition to the more comment species. The funding to be committed to these trials forms part of the financial provisioning for rehabilitation and mine closure, as set out in the RMCP (Appendix H). A specific funding amount cannot be provided at this stage of the assessment. These trials will be developed in consultation with DPaW as the land manager and in recognition of its expertise in the management of threatened and priority flora.
377	Toodyay Naturalists Club	The submitter contends that permanent alteration is inevitable in the event of implementation of the proposal. The extent to which other potential impacts can be managed will determine the final land use once mining is complete. Failure to manage these impacts will result in landforms requiring long term maintenance and could	MRL commits to undertaking the necessary research, trials and consultation with subject matter experts and other stakeholders, including DPaW, to enable the best outcome for rehabilitation and mine closure. The RMCP has been substantially revised for improved consistency with the EPA and DMP (2015) Guidelines

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		lead to degradation of adjoining undisturbed areas. Successful rehabilitation and closure will result in landforms supporting comparable vegetation to that existing in undisturbed areas and that are of potential scientific and recreational interest.	for Mine Closure Plans. Please also refer to the response to Issue 41 for further details in this regard. of approval.
378 10. Offsets	ANON-TWYQ-WP18-5	The submitter contends that statements in the PER that "successful implementation is challenging but achievable and that the EPA's objective for rehabilitation and decommissioning can be met" are not supported by the evidence provided in support which comprise a literature review of four cases, two of which show limited restoration success. Open cast mining removes an entire BIF range, with minimal BIF remaining. Plant species living on BIF are adapted to the specific structure and properties of BIF, for example the availability of water in the type of cracks found in the rock substrate. Experiments at Kings Park have demonstrated that post-mining habitat reconstruction and subsequent success restoration for BIF dependent and endemic plants once no BIF is available is poor due to their high requirement for intact BIF. Success rates and methodology for restoration of areas of moderate disturbance of BIF remain poorly known and success is poorly demonstrated. Mining is unacceptable as it will result in the removal and disturbance of BIF with poor certainty for restoring their unique plant communities.	MRL does agree that rehabilitation of mined landscapes is challenging for any proponent in any environment. With regard to existing BIF operations, many are immature and are yet to have the opportunity to demonstrate successful rehabilitation. MRL commits to undertaking the necessary research, trials and consultation with subject matter experts and other stakeholders to enable the best outcome for rehabilitation in the HAR, and to meet the conditions placed on them. MRL is a proud partner organisation of an unprecedented ARC co-funded Industrial Transformation Training Centre for Mining Restoration. Information gathered from this will assist MRL and industry across Australia with achieving better outcomes from rehabilitation. Information from this initiative will feed in to MRL's rehabilitation plans for the J5 and Bungalbin East Proposal over the first five years of mining whilst the ITTCMR is functional.
379	DEE	If impacts from the proposal to EPBC Act listed flora species are deemed acceptable, then the residual	MRL proposes an offset to undertake rehabilitation of historic exploration disturbances within the MMHARCP





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			 "More precisely assessed population size, distribution, ecological requirements and the relative impacts of threatening processes" through the Flora and Vegetation surveys reported in Appendix 5-A of

¹⁰⁰ Department of Sustainability, Environment, Water, Population and Communities (2012). *Environment Protection and Biodiversity Conservation Act* 1999 *Environmental Offsets Policy*. Commonwealth of Australia, Canberra.

¹⁰¹ Threatened Species Scientific Committee (2008). *Commonwealth Conservation Advice on <u>Tetratheca aphylla</u>. Department of the Environment, Water, Heritage and the Arts, Commonwealth of Australia, Canberra.*

¹⁰² Threatened Species Scientific Committee (2010). *Commonwealth Conservation Advice on <u>Leucopogon spectabilis</u> (Ironstone Beard- heath). Department of the Environment, Water, Heritage and the Arts. Canberra, ACT: Department of the Environment, Water, Heritage and the Arts, Commonwealth of Australia, Canberra.*



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				the PER. The known populations of <i>Tetratheca aphylla subsp. aphylla</i> now stands at 87,921 compared to the 900 plants known at the time of publication of the conservation advice.
			•	"Undertaken survey work in suitable habitat and potential habitat to locate any additional populations/occurrences/remnants" through the work of ecologia's extensive targeted surveys in suitable habitat and also Divirgilio et al (2016) where landform and environmental variables have been used to identify suitable potential habitat along the HAR that is not presently populated by <i>Tetratheca</i> <i>aphylla subsp. aphylla</i> .
			•	"Undertaken seed germination and/or vegetative propagation trials to determine the requirements for successful establishment" through the work of BGPA (2010) which demonstrated that <i>Tetratheca</i> <i>aphylla subsp. aphylla</i> can be readily grown from seed and cuttings under greenhouse conditions.
			•	"Identify populations of high conservation priority" through the Curtin Univerity genetics work reported in Appendix 5-E.
			•	"Minimised adverse impacts from land use, including mining, at known sites" through the measures to reduce the proposed mining footprint from 780 ha to 575 ha and impacts to <i>Tetratheca aphylla subsp.</i> <i>aphylla</i> from 29.8% to 19.7%.
			•	"Investigated formal conservation arrangements, management agreements and covenants on private land, and for crown and private land investigate inclusion in reserve tenure ifpossible." through



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			 MRL's proposal to surrender exploration tenure within the MMHARCP in favour of a section 19 reserve. "Raised awareness of Bungalbin Tetratheca within the local community" through release of the PER and associated supporting data to the public and 2 community information evenings in Southern Cross and Kalgoorlie.
			 "Maintained liaisons with private landholders and land managers of land on which populations occur" through ongoing consultation with DPaW.
			DPaW has also implemented some of the actions by:
			 "Controlling access routes to suitably constrain public access to known sites on public land" through closing the public camping ground located on top of the HAR in 2016.
			Similar progress has also been made by MRL on the approved conservation actions for <i>Leucopogon spectabilis</i> . Further work on these actions, other actions in the approved conservation advice, and new actions will likely form part of the Interim Recovery Plan.
			MRL considers that appropriate offsets to counter balance significant residual impacts of the Proposal can be developed to meet State and Commonwealth requirements and notes that the Offset Policy is not a legislative requirement and must be applied flexibly with
			regard to the circumstances of the particular case. MRL looks forward to the opportunity to discuss an appropriate offset package for this Proposal with the DEE, in due course.



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380	Parks and Wildlife	 The direct and indirect level of impact of the current proposal on conservation values would place the viability of a number of species and vegetation communities at risk; have a permanent impact on the HAR landform and amenity; and permanent impact on recreational tourism in the MMHARCP. The proposal would also likely incur additional management liabilities for Parks and Wildlife; and there is a high level of uncertainty as to the success of the proposed management, mitigation and offset measure. As such, Parks and Wildlife is not in a position at this time, to support the proposal or comment formally on the proposed offsets plan. BIF ranges in general are distinct from each other and from other habitats and ecosystems and are not considered replaceable though rehabilitation. As a result, significant impacts on particular BIF ranges, their associated species and communities, cannot be mitigated by actions over alternate ranges. Mitigation efforts that achieve no net loss or a net environmental gain are not feasible in this type of scenario. The offset 1: Rehabilitation and relinquishment of exploration tenure in the MMHARCP. Offset 1: Rehabilitation and relinquishment of a research plan and an IRP for <i>L. bungalbin</i>. The following are general (high level) issues identified by Parks and Wildlife with respect to the proposed offsets plan: 	The significance of the Proposal's residual impacts and options to offset those impacts defined in the PER is now a matter for the EPA and DEE to consider. MRL has undertaken preliminary consideration of potential environmental offsets, with reference to EPA and DEE policy and guidelines and outlined a potential offset package in the PER. In this regard, MRL has attempted to engage with OEPA and DPaW (Kalgoorlie Regional Office & Environmental Management Branch) on a number of occasions to discuss appropriate offset options for the Proposal. These agencies have been reluctant to engage on these matters until the residual significant impacts of the proposal are better understood, as acknowledged in this submission "Parks and Wildlife is not in a position at this time, to support the proposal or comment formally on the proposed offsets plan." MRL therefore considers that the offsets it has proposed are an appropriate starting point for further discussions on how the significant residual impacts of the Proposal can be best counter balanced. Furthermore, MRL is open to considering other options for offsets with the relevant government agencies, once the Public Environmental Review assessment process has progressed and the significant residual impacts are determined by the EPA and DEE. MRL looks forward to the opportunity to discuss an appropriate offset package for this Proposal with government in due course. Further, MRL has adequately addressed the requirements of the Environmental Scoping Document set for the Proposal. In doing so, the baseline



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	• The PER considers the proposal to only have a significant residual impact on the flora and vegetation factor. Parks and Wildlife is of the view that in addition to significant flora and vegetation, the proposal would have a significant residual impact on landform, amenity and the MMHARCP, and may also have a significant residual impact on invertebrate (subterranean and SRE) fauna and	environment has been well defined, the key characteristics of the Proposal are well defined and this has enabled a rigorous environmental impact assessment by MRL and its supporting experts to clearly define the Proposal significant residual impacts. In this instance MRL believes those to be associated with Flora and Vegetation Factor, in particular to <i>Tetratheca</i> <i>aphylla</i> subsp. <i>aphylla</i> .
	 heritage. The proposed flora and vegetation offsets only relate to <i>T. aphylla</i> subsp. <i>aphylla</i> and <i>L. Bungalbin</i>, despite there being significant residual impact to other conservation significant species and vegetation. 	DPaW states there to be other significant residual impacts over and above those defined by MRL yet do not provide any evidence of the impact assessment undertaken to make those assumptions. MRL welcomes further discussion with OEPA and DPaW on these matters.
	• The proposal in the PER for relinquishment of exploration tenure "Subject to suitable conservation tenure arrangements to afford protection being in placein a manner satisfactory to DMP and DPaW" (PER, page 13-3), is lacking clarity as to the nature and scope of the proposed activities, proposed conservation tenure arrangements or how security of long term protection might be achieved. The process of creating a reserve (including changing tenure) occurs through Parliament and requires input and support from a range of Ministers and government agencies as well as suitable measures to address the requirements of the Native Title Act 1993. Such commitments made by proponents or as part of an assessment process have proven difficult to implement in the past and there has been limited.	Please see other MRL responses to OEPA issues 50 and 51 to address DPaW comments on tenure relinquishment and exploration rehabilitation. MRL acknowledges the uncertainty of success around the translocation target of 10% for <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> and that is why it is not proposed as a formal offset, but rather an objective for mine closure. MRL's contribution to the Industrial Transformation Training Centre for Mining Restoration is potentially an indirect offset.



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		formal conservation reserve for the protection of threatened flora may limit the future development of a mineral or petroleum resource. Exploration tenure does not preclude the creation of a formal conservation reserve or conversion of a reserve to class A status.	
		• The rehabilitation of land subject to exploration tenements in the MMHARCP, is either already the company's responsibility (for areas they have disturbed) or recognised industry best practice (addressing inherited liabilities on tenements); and the additional benefit of such work as an offset is therefore not considered proportionate to the impacts on values.	
		• The preparation of a formal species IRP or recovery plans by a development proponent for approval at the State or National level is no longer considered appropriate. It may be acceptable for a proponent to prepare a research and conservation plan with a defined objective for conservation of the species in geographic areas defined within the approval conditions or to contribute funding for preparation of such plans by government. This would need to be discussed further prior to consideration of approval.	
		• The specific details of proposed recovery actions are "to be determined" (PER, page 13-4). Without details, it is unclear what action could or would be likely to be attempted as part of the proposed recovery plans or whether there is a significant likelihood of success in improving or mitigating the impact of the proposal on species viability in the	



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		 wild. It appears that translocations are being considered for threatened flora, however there is no assessment on whether there is suitable areas of adequate, unoccupied habitat existing on which to attempt translocations to replace the numbers of individuals or area of occupancy proposed to be removed for either <i>T. aphylla</i> subsp. <i>aphylla</i> or <i>L. bungalbin</i> available. Previous work on translocations of <i>T. paynterae</i> subsp. <i>paynterae</i> at Windarling over approximately 10 years have failed to successful establish a new population on the small scale. Translocations of <i>T. aphylla</i> subsp. <i>aphylla</i> subsp. <i>aphylla</i> is considered a high risk strategy which, based on <i>T. paynterae</i> subsp. <i>paynterae</i> experience and Yates <i>et al.</i> (2011)¹⁰³, does not provide any level of confidence or evidence that the likely outcome for <i>T. aphylla</i> subsp. <i>aphylla</i> would be successful. 	
		• The level of confidence in success for <i>L. bungalbin</i> is similarly limited, as the company has not attempted works with threatened, rare or habitat restricted species restoration/rehabilitation previously.	
		• It is understood from the recent interagency briefing that the proponent is not proposing translocation of sufficient numbers of individuals to replace (or better) either <i>T. aphylla</i> subsp. <i>aphylla</i> or <i>L.</i>	

¹⁰³ Yates, Gibson, Pettit, Dillon and Palmer (2011). *The ecological relationships and demography of restricted ironstone endemic plant species: implications for conservation.* Australian Journal of Botany **59**: 692–700.





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		<i>bungalbin</i> as part of their offsets and mitigation, because that would not be achievable.	
		• A review of the scope of activities to achieve the offsets cannot be made as these details are lacking and are being deferred. Appendix 13A states "A program can be developed and works conducted immediately following project commencement" and "Scoping and development of the Plan can commence immediately following project approval".	
		 An assessment on the level of funding proposed to achieve the offsets cannot be made as these details are absent. Appendix 13A states the funding "Depends on extent of agreed program" and is "To be advised". 	
		 The proposal for an "…ongoing financial contribution to the consortium of mining companies and academic institutions implementing a \$7 million Australian Research Council grant." (PER, page 13-5) does not clearly identify how this would mitigate impacts and would appear to require further detailed consideration in relation to possible alignment with the Western Australian Offsets Policy and Guidelines¹⁰⁴. If research is proposed the potential outcomes of such activities for conservation of biodiversity assets and other values affected by this mining proposed should be identified as a minimum. 	

¹⁰⁴ Government of Western Australia (2011) *WA Environmental Offsets Policy*. Perth, Western Australia. Government of Western Australia (2014) *WA Environmental Offsets Guidelines*. Perth, Western Australia.



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381	Parks and Wildlife	The PER states that "Some success has been achieved in translocating threatened flora" (PER, page 12-7). No details are provided on what is considered successful (e.g. germination rates, survival after first year or reproductive success). Without clarification, this success rate should not be accepted as an indication of the long term success of establishing a viable, self- sustaining population of either <i>T. aphylla</i> subsp. <i>aphylla</i> or <i>L. bungalbin</i> . Parks and Wildlife does not consider the translocation trials at Windarling for <i>Ricinocarpos brevis</i> and <i>T. paynterae</i> subsp. <i>paynterae</i> , to be demonstrably successful as a recovery action, due to the poor germination levels of both species. Information provided to the then Department of Environment and Conservation, indicates that only eight of the 800 <i>T. paynterae</i> subsp. <i>paynterae</i> seeds germinated and were alive in 2009 at Windarling from a translocation done in 2004-05; equating to a success rate of 1%. In 2014 an additional 3,200 <i>T. paynterae</i> subsp. <i>paynterae</i> seeds were placed in natural and artificial cracks at Windarling, but no germinants have been recorded yet. For <i>Ricinocarpos brevis</i> , as of 2014, only one individual from the initial trial of 96 seedlings had survived. A trial was initiated in 2014, but only six plants from 2200 seedlings have survived. It is too early to assess the results of	MRL has in no way implied that the findings of the literature review DPaW refers to suggest that the successful translocation of threatened species has indicated a self-sustaining population. The statement merely implies that a proponent has demonstrated <u>some</u> success in translocation and that threatened flora species can be grown from seed under natural conditions. MRL notes that despite DEE guidance material claiming that translocation is unlikely to be successful and the examples from Windarling that DPaW sites; translocation is a significant component of the offsets recommended by the EPA in for the recent 2016 Iron Hills and Koolyanobbing F deposit assessments. Counter to the previous low success rates, MRL understands that significant research and trials conducted by Kings Park BGPA is likely to result in improved success rates in the more recent translocations. Translocation is not presently proposed by MRL as an offset. If DPaW can offer other solutions to offsetting the proposed impacts to <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> , MRL is very willing to consider them. MRL looks forward to the opportunity to discuss an appropriate offset



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		2015 trials.	
		The work by Yates <i>et al.</i> (2011) ¹⁰⁵ on four threatened	
		<i>Tetratheca</i> species ¹⁰⁶ indicates that the biology and nature	
		of habitat of Tetratheca species growing in rock fissures	
		precludes the use of seedlings in translocations and using	
		seeds is also an "inefficient and high-risk strategy".	
		This study indicates that there is no easy method for	
		determining which rock fissures would be suitable for plant	
		establishment and the "highly specific habitats of the BIF	
		<u>Tetratheca</u> limit the options for conservation	
		reintroductions". The results from the two previous <i>T</i> .	
		<i>paynterae</i> subsp. <i>paynterae</i> translocation trials at	
		Windarling Range and the discussion in Yates et al.	
		I rial establishment of <i>I. aphylla</i> subsp. <i>aphylla</i> or <i>L.</i>	
		DED notes and previously been attempted. While the	
		PER notes preliminary investigations by the Botanic	
		subsp. anbulla can be readily propagated, this does not	
		subsp. aprivita can be readily propagated, this does not	
		of a self-sustaining viable population in the field over the	
		long term	
		in general for BIF specialist taxa, translocation is	
		impacts on threatened flora and in this situation the	
		impacts on threatened flora and in this situation the	

¹⁰⁵ Yates, Gibson, Pettit, Dillon and Palmer (2011) *The ecological relationships and demography of restricted ironstone endemic plant species: implications for conservation.* Australian Journal of Botany **59:** 691-699.

¹⁰⁶ *T. aphylla* subsp. *aphylla*, *T. harperi*, *T. paynterae* subsp. *cremnobata* and *T. paynterae* subsp. *paynterae* from BIF ranges in the Mount Manning area.



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		proposal to translocate plants within the mining tenements raises possible doubts about potential long term security and protection for the translocated individuals. It is also worth noting that establishment trials and translocations are starting points, but there is no evidence to date that they would result in stable viable populations of either of these species (i.e. have a lasting benefit). It is premature to suggest that the proposed work would balance the loss and replacement of reproductively mature plants.	
382	CSIRO	 The PER proposes that the residual impacts of the proposal would be: removal of 6.3% of a priority ecological community; and effects on taxa of conservation significance. The offsets proposed involve: recovery plans and associated actions to offset direct impacts on populations of two threatened species; and works to clean up historical damage (prior to the proponent's tenure) from mining-related activity on the proponent's tenements within the MMHARCP. Clean up of historical damage is a potentially valuable option, but a quantitative analysis is needed to demonstrate that these offsets, if effective, are actually adequate to offset the expected losses. Relevant to such an analysis is the poor historical record of success of offset or restoration actions. A recent study in WA showed that between 2004 and 2015, at best only 	MRL is committed to working with the relevant stakeholders to define a suitable offset package that incorporates direct and indirect offsets. Whilst direct offsets may be appropriate for certain residual impacts, MRL notes that there will be some impacts that cannot be directly offset. In this instance, well designed comprehensive indirect offsets will serve as a suitable surrogate for conservation initiatives in areas such as the Great Western Woodlands, and would serve greater purpose over broader areas than perhaps direct offsets may in a restricted section of a relatively unknown range The rehabilitation of historical disturbance within the MMHARCP is only part of a comprehensive offsets package. It does not wholly offset the impact of the Proposal.





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		43% of the past and current offsets were partly effective, on a trajectory to be effective, or effective, in delivering their planned outcome (May 2015 ¹⁰⁷). On-ground management options (which represent the type of offsets proposed in the PER) were found to be only 7% effective. Consistent with this, a report by the WA EPA from the similarly semi-arid Pilbara region to the north (EPA 2013 ¹⁰⁸) notes that 'best practice rehabilitation in the Pilbara often achieves a return of less than 15 per cent of the pre-mined biodiversity values', and that 'currently, there is a lack of confidence that even the most common plant species can be restored in the Pilbara, potentially raising the prospect of significant residual impacts.' Further, the work of Yates et al. (2011) ¹⁰⁹ suggests reintroductions of rare and threatened plant species do not present a viable management option, and more generally, Maron et al. (2012) ¹¹⁰ conclude that 'many of the expectations set by current offset policy for ecological restoration remain unsupported by evidence'.	
383	Helena and Aurora	Due to the significant conservation and landform values of this range to all WA including the Traditional Owners,	MRL has proposed environmental offsets in relation to flora and vegetation to offset significant residual impacts

¹⁰⁷ May (2015) What happens after assessment? An evaluation of the effectiveness of environmental offsets in Western Australia between 2004 and 2015. Masters Thesis, School of Plant Biology, University of Western Australia.

¹⁰⁸ Environmental Protection Authority (2013) *Environmental Protection Authority 2012—13 Annual Report.* Perth, Western Australia.

¹⁰⁹ Yates, Gibson, Pettit, Dillon and Palmer (2011). *The ecological relationships and demography of restricted ironstone endemic plant species: Implications for conservation*. Australian Journal of Botany 59, 692-700.

¹¹⁰ Maron, Hobbs, Moilanen et al. (2012) *Faustian bargains? Restoration realities in the context of biodiversity offset policies*. Biological Conservation 155, 141-148.



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	Range Advocates Inc. ANON-TWYQ-WPBP-E 325 ANON-TWYQ-WPZX-E ANON-TWYQ-WPFD-6 ANON-TWYQ-WP4G-Q ANON-TWYQ-WPBC-1	there are no Offsets that could provide due compensation such that they " <i>counterbalanced any</i> <i>significant residual environmental impacts</i> " The offsets proposed are vastly insufficient to compensate for the environmental damage. The limited set of offsets proposed are negligible in comparison with the residual ecological impacts of the proposal, and cannot be considered in any way to be compensating for these residual effects, even if offset multipliers were used in the calculations, and all offsets were successful in their entirety – an unlikely outcome at best (Gardner et al. 2013; Gibbons and Lindenmayer 2007; Maron et al. 2012; Walker et al. 2009).	associated with that factor. MRL acknowledges that "the requirement for any offsets is not determined by the EPA until the final stages of the assessment process" (EPA 2014). Consequently, MRL anticipates that discussions will flow from the PER and/or in subsequent stages of the assessment process. MRL considers that appropriate offsets to counter balance significant residual impacts of the Proposal can be developed to meet State and Commonwealth requirements. MRL expects that further details will become available on the offsets for this Proposal in due course. These details will include objectives and completion criteria, timelines and milestones, governance and financial arrangements, risk management and reporting. The proportionality of the proposed offsets is discussed further in the response to Issue 57. The adequacy of the proposed offsets is a matter for the EPA and DEE to consider after the environmental impact assessment is completed and the significant residual impacts have been determined.
384	ANON-TWYQ-WP42-2	The PER (Table E-1) states that two rare and endangered plant species would be removed and impacted, 29.4% (<i>Tetratheca aphylla subsp. aphylla.</i>) and 39.7% (<i>Lepidosperma bungalbin</i>) levels. No amount of offsets can replace them, therefore it is not clear how the offset proposed of a recovery plan for the plant which would be removed by the proposal would provide benefit.	Neither species is endangered. <i>Tetratheca aphylla</i> <i>subsp. aphylla</i> is currently listed as Threatened (vulnerable) whilst <i>Lepidosperma bungalbin</i> is Priority 1. In revising the Proposal, the combined direct and indirect impacts to <i>Tetratheca aphylla subsp. aphylla</i> <i>and Lepidosperma bungalbin</i> have been reduced to 19.7% and 8.3% respectively. MRL considers that appropriate offsets to counter balance significant residual impacts of the Proposal can be developed to meet State and Commonwealth requirements. In this



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			regard, an appropriate offset package will be determined by the EPA and DEE in negotiation with MRL.
385	CSIRO ANON-TWYQ-WP4P-Z	The proposed offsets do not account for loss of visual amenity and sense of wildness that are of value for ecotourism and human well-being; cumulative and cryptic impacts and impacts on temperate eucalypt woodlands.	MRL considers that appropriate offsets to counter balance significant residual impacts of the Proposal can be developed to meet State and Commonwealth requirements. In this regard, an appropriate offset package will be determined by the EPA and DEE in negotiation with MRL.
			However, MRL does not consider there to be a significant residual impact to the amenity factor requiring offset. If EPA and DEE reach a different conclusion appropriate offsets will be negotiated.
386	ANON-TWYQ-WP4W-7	Some of the plants growing on the HAR flower weeks earlier than their counterparts of the same species growing on the plain. This provides continuity in food resources for insects and birds. Proposing to establish rare plants in another location as an offset for the impacts caused by the proposal is just one example of oversimplification of the potential impacts of the proposal.	Since the PER was released for public review and comment, MRL has substantially reduced the pit disturbance area by 36 hectares from 147 to 111 hectares. Similarly this has resulted in significant reductions in direct and indirect impacts to vegetation particularly the HAR PEC and other significant species, please see Attachment 1 for further details of the revised Proposal. Therefore, impacts associated with plant life cycles have been reduced as plants/vegetation that were being disturbed are now being retained.
387	Wildflower Society of WA ANON-TWYQ-WPBH-6	The proponent mentions an offset with interim recovery plan for <i>Tetratheca aphylla</i> . This would not be necessary if the mine did not go ahead, This appears to be attempting to claim an ordinary management requirement as an offset.	The submitter is correct in that offsets would not be required if the Proposal is not approved.
388	BirdLife WA	The proponent cannot counterbalance the significant environmental impacts that would result from their mining proposal by applying offsets. Environmental	Through the Public Environmental Review process, the EPA and Minister for Environment will determine the environmental, social and economic acceptability of the



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		offsets that result in "no net loss" or a "net environmental gain" are not feasible for this mining proposal because the landform and biodiversity values of HAR are unique and cannot be replaced if they are impacted or destroyed (c.f. DEC 2007, EPA 2007). Therefore, the mining proposal is environmentally unacceptable.	J5 and Bungalbin East Proposal. The environmental offsets proposed by MRL have been done so without any guidance from government agencies and require review by these agencies to determine their appropriateness. MRL is committed to working with the relevant stakeholders to define a
		The environmental offsets that the proponent are proposing provide no consolation for the resulting loss in landform and biodiversity values at HAR:	suitable offset package that incorporates direct and indirect offsets. Whilst direct offsets may be appropriate for certain residual impacts, MRL notes that there will be
		 Rehabilitation of historical disturbance in the MMHARCP. 	some impacts that cannot be directly offset and that well designed comprehensive indirect offsets will serve as a suitable surrogate for conservation initiatives in areas
		2. An intention to relinquish all the proponent group exploration in the MHHARCP.	such as the Great Western Woodlands, and would serve greater purpose over broader areas than perhaps direct
		3. Preparation and implementation of Interim Recovery Plans for Tetratheca aphylla subsp. aphylla and	offsets may in a restricted section of a relatively unknown range.
		 Preparation and implementation of a Research Plan for Lepidosperma bungalbin. 	comment, MRL has substantially reduced the pit disturbance area by 36 hectares from 147 to 111 hectares. Similarly this has resulted in significant
		5. Ongoing financial contribution to an Australian Research Council grant.	reductions in direct and indirect impacts to vegetation particularly the HAR PEC and other significant species,
		There are five reasons:	proposed disturbances.
		 None of these offsets would restore BIF habitat at HAR. Even rehabilitation of historical disturbance cannot reconstruct the ironstone fissures and crevices and the plethora of microclimates that are such integral features of the range and key factors behind its vast biodiversity and ecological functioning (c.f. DEC 2007, EPA 2007). 	As a result of the reduced disturbances particularly to <i>Lepidosperma</i> (8.3% combined direct and indirect), MRL proposes to assist DPaW in the preparation of an interim recovery plan for <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> for which the particulars of that plan are yet to be determined, however will align with the research and management priorities defined in the Commonwealth



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		 "An intention to relinquish all the proponent group exploration in the MHHARCP" is only an intention, it is non-binding and it is conditional: "subject to suitable conservation tenure arrangements in a manner satisfactory to DMP and DPaW" (Page 13-4, PER): Preparation and implementation of Interim Recovery Plans for <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> and <i>Lepidosperma bungalbin</i> and a Research Plan for <i>Lepidosperma bungalbin</i> are irrelevant within the context of this mining proposal because the BIF range from which the plants will be removed will become vastly altered landforms that are uninhabitable to these species. These species do not grow on rehabilitated areas. <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> requires ironstone fissures and skeletal soils (Yates <i>et al.</i> 2008, 2011). <i>Lepidosperma bungalbin</i> requires steep mid-slopes on red loam soils with banded ironstone rock and gravel (Barrett 2007). The proponent's Interim Recovery Plans for <i>Tetratheca aphylla subsp. aphylla</i> and <i>Lepidosperma bungalbin</i> are, at best, ambitious, high risk, poorly thought out, and not supported by available evidence: The proponent anticipate that their plan for <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> would "include reproduction of plants through seed germination and from cuttings with a view to translocation of plants to suitable sites in the HAR or elsewhere within the MMHARCP. Plants 	Government Approved Conservation Advice for <i>Tetratheca aphylla</i> (Bungalbin Tetratheca), many of which had not been implemented prior to MRL's extensive investigations of the species. Furthermore, MRL is currently in discussions with BGPA to progress the work undertaken by Polaris in 2009 and 2010 on <i>Tetratheca aphylla subsp. aphylla</i> . This will involve seed collection, germination and translocation trials for Tetratheca. A proposal will be prepared to support applications for the necessary permits from DPaW. At this stage, translocation is not proposed as an offset for the Proposal, but rather forms part of MRL's rehabilitation plans.



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		occurring within the proposed Bungalbin East pit would be a particular focus prior to any ground disturbance. Some preliminary investigations into seed banks and seed collection, and establishment of plants from cuttings, has shown the species can be readily propagated (Botanic Gardens and Parks Authority, 2010)" (Page 13-5, PER).	
		Their plan for <i>Lepidosperma bungalbin</i> includes " <i>potential translocation to other suitable sites with the</i> <i>HAR</i> " (Page 13-5, PER):	
		a) The submitter has contacted the Botanic Gardens and Parks Authority, who told us that <i>Tetratheca</i> <i>aphylla</i> subsp. <i>aphylla</i> is only "moderately successful from cuttings, depending on quality of material and time of year" (Lesley Hammersley, Director, Horticulture and Conservation, pers. com.).	
		b) Yates et al. (2011) concluded that the "use of seedlings in reintroductions [of <i>Tetratheca aphylla</i> <i>aphylla</i>] is an option, but the observed high rates of mortality in [self-sowing] seedlings [approx. 75%] indicate that this will still be a risky strategy for conservation of the taxon." The high mortality of seedlings also poses a challenge for propagation from seed.	
		 c) The Botanic Gardens and Parks Authority has no experience with <i>Lepidosperma bungalbin</i>, but told us that propagating the <i>Lepidosperma</i> genus is "notoriously difficult, from both seed and cuttings" (Lesley Hammersley, pers. com.). 	
		 d) It is not clear if the proponent has estimated the amount of seed they will need to collect. Collecting large quantities of seed can be notoriously difficult, particularly when the amount of seed produced 	





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		varies significantly between years (Yates et al. 2011).	
		 It is not clear if the proponent have estimated the numbers of seed and seedlings they will need to plant to counteract the high mortalities. 	
		f) It is not clear if the proponent plan to bore holes into the ironstone and skeletal soils when translocating their seedlings.	
		g) It is not clear if the proponent plan to water their seedlings until the plants reach maturity. Yates et al. (2011) indicated that seedling desiccation was likely cause of death in <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> as moisture became more limiting with the onset of warmer, drier conditions.	
		 h) It is not clear which "suitable sites in the HAR" the proponent are planning to make their translocations. Most of the suitable sites at HAR are already occupied; there are limited opportunities to establish new and viable populations. 	
		 Translocating <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> "elsewhere within the MMHARCP" is not a viable option because, if successful, it will displace other potentially rare and threatened species and alter the ecology of these areas. 	
		So, it is unlikely that the proponent, who have " <i>limited</i> experience in rehabilitation and restoration activities	
		associated with conservation-significant flora and communities" (Page 12-12 PER) would be the first to	
		succeed in translocating large numbers of <i>Tetratheca</i>	
		aphylla subsp. aphylla and Lepidosperma bungalbin.	
		5. The level of effort and financial support invested in the Interim Recovery Plans for <i>Tetratheca aphylla</i> subsp. <i>aphylla</i> and <i>Lepidosperma hungalbin</i> and a	



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		Research Plan for <i>Lepidosperma bungalbin</i> are vague and non-binding: "Costs to be met by the proponent (over a particular time period to be determined)" (Pages 13-4 and 5, PER)".	
		The following statement is concerning: " <i>The proponent considers that the Proposal will have a significant residual impact on only one factor - flora and vegetation</i> " (Page 13-2, PER). Clearly, the proponent do not appreciate the unique and intact landform and biodiversity values of HAR, nor do they recognise the impact that their proposal will have on these values.	
389	The Wilderness Society 356	Submitter contends that there is nothing the proponent could do in any way to "offset" the impacts of its proposed mines. It is noted that the proponent are not proposing to relinquish ML 77 1096-I, which sits across the top of Bungalbin Hill.	MRL acknowledges the submitters statement, and can confirm that relinquishment of M77/1096-I is not proposed. M77/1096-I is utilised for the infrastructure at J5 and also hosts some mineralisation at Bungalbin Central. The mineralisation is understood to be thin, low grade and not of economic significance. Bungalbin Central does not form part of this proposal and MRL consider it highly unlikely that it will form part of a future mining proposal.
390	Toodyay Naturalists Club	The submitter notes that, in consultation with DMP and Parks and Wildlife, the proponent proposes to rehabilitate all disturbance on the proponent's exploration tenure within the MMHARCP, including pre- grant disturbance. The submitter is concerned that there is no guarantee that the proponent would uphold this if the lease is transferred or extinguished.	MRL would undertake the rehabilitation of historic exploration disturbances to the satisfaction of DPaW and DMP prior to relinquishing the tenure. If this was accepted by the Minister as an appropriate offset, it would form part of the Ministerial Statement under Part IV of the EP Act that MRL would be bound at law to comply with.



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11. Consu	Itation		
391	ANON-TWYQ-WPJG-D	The proponent claims that they have consulted with the local Aboriginal community and provides jobs and training to Aboriginal people across its operations. It does not mention the constraints and limitations of consulting Aboriginal communities for meaningful feedback but people in the industry know well it can be very difficult getting good representative input without sensitive and understanding approaches to consultation. Provision of financial incentives for selected people can distort community feedback, and Aboriginal people who have family members working for the proponent cannot be expected to speak out against the proponent cannot be expected to speak out against the proponent's proposals whatever their concerns. Kalamaia (Kabrunspeaking) people are not a big Aboriginal nation, they are represented by several family groups and are mostly town-based, spread between Southern Cross, Coolgardie, Kalgoorlie-Boulder, Perth and other centres. Many have lost traditional knowledge, though not necessarily through any fault of their own. Some Kalamaia people are worn out by the on-going mining/environmental issues, many are not confident speakers in public arenas (as with any members of the public), some have serious health issues with limited capacity to travel or sit in conference for long periods of time – all of which make it particularly challenging to gauge their views on the mining proposals and knowledge of traditional sites. The consultation process with local Kalamaia people is limited by imposed deadlines and faces many other constraints; it cannot be expected to provide sound, meaningful feedback from	For nearly a decade MRL (Polaris) has undertaken an extensive consultation programme with the traditional owners and knowledge holders of the lands associated with J5 and Bungalbin East. This consultation has most often been on their time and in accordance with their conditions, and MRL is sensitive to the cultural aspects associated with this, and has always accommodated their requests. For instance, surveys have been undertaken individually with each group (of which there are four) where there relationship sensitivities, at significant expense and time of MRL, however on each occasion the experiences and outcomes have been extremely positive for each party. MRL is fully committed to continue its consultation with the traditional owners and knowledge holders throughout the implementation of the Proposal. An example of this is demonstrated by current negotiations MRL is in with one of the recognised Traditional Owner groups to carry out a cultural awareness programme at its Yilgarn operations in 2017. This will raise the profile of the indigenous heritage associated with the lands in which MRL operates.



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		the Kalamaia people on the mining impacts to Kalamaia traditional country and their ancient sites.	
392	Wildflower Society of WA ANON-TWYQ-WPBH-6	 There has been more interaction with the proponent than outlined in Table 1.5 Stakeholder Consultation, Issues and Responses and the proponent has not accurately reported comments that have been made. At the meeting in Southern Cross on 13th May 2015 the Wilderness Society was represented as well as the local community and representatives of Cliffs Natural Resources. We requested Mineral Resources arrange with Cliffs Natural Resources a community visit to Windarling so the impact of mining a BIF range would be apparent. Mineral Resources said they would see if this could be done but we have heard nothing since. The proponent has not reported in detail the telephone survey done on 20th June 2016. In addition to giving Visitor numbers and details of trips we detailed the following: J5 and Bungalbin East are the most visited, both from the south side, and walking to the top and from the north side driving to the top. We are aware at least one wedding has been held at Bungalbin East as well as an Anzac dawn service. These sites are very special to the Southern Cross community as well as the community at large. Visitor numbers run to more than a thousand annually and this will only increase. 	 In regard to the arrangement of a community visit to Windarling, MRL advises that the submitter will need to liaise with Cliffs directly. MRL has met the stakeholder consultation requirements of the Environmental Scoping Document for the Proposal as set by the Environmental Protection Authority. MRL was required to provide evidence that the key stakeholders have been consulted on the project. The purpose of Table 1-5 is to provide a summary of the key correspondence undertaken with those stakeholders. It is not intended to be a comprehensive list nor provide the particulars of every conversation, meeting or presentation that has been undertaken with those stakeholders. In regard to the telephone conversation on 20 June 2016, MRL confirms that the submitter informed MRL that: J5 and Bungalbin East are the most visited, both from the south side, and walking to the top and from the north side driving to the top. at least one wedding has been held at Bungalbin East as well as an Anzac dawn service. These sites are very special to the Southern Cross community as well as the community at large.
393	ANON-TWYQ-WPPZ-6	A copy of the PER was not provided to the William Grundt library in Kalgoorlie.	MRL confirmed on 28 November 2016 with The William Grundt Memorial library in Kalgoorlie that a copy of the PER had been received and was still on public display at



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			that time.
12. Other			
394	Parks and Wildlife The Wilderness Society	Class A Nature Reserve The only BIF ranges currently located within the State's formal reserve system are the Mount Manning and HAR within the MMHARCP, and the Hunt Range within the Mount Manning Nature Reserve (neither are of class A status). These BIF ranges represent a rare and very important habitat type within the reserves, supporting specialist endemic species and their habitats that in terms of extent, comprise less than 5% of the total area of MMHARCP and the Mount Manning Range Nature Reserve. In 2004 the Minister for Environment requested advice from the EPA, under Section 16 of the EP Act, on the areas of greatest conservation value in the proposed extensions to the Mount Manning Range Nature Reserve and on other matters relating to protection of conservation values in the Mount Manning area. The MMHARCP, which includes the Mount Manning and HAR, was gazetted on 14 December 2005. The EPA subsequently released its public advice to the Minister in Bulletin 1256 in May 2007. Parks and Wildlife supports the EPA's advice in Bulletin 1256 (EPA 2007) that the 'Mount Manning Region' should be protected from mining by establishing an "A" Clase Nature Reserve	MRL notes the submitters' position in relation to conservation tenure in the Mt Manning area and that such tenure could be established in relation to the MMHARCP following mining. Decisions about the State's reserve system are ultimately made by the Western Australian government. To date, government has not thought fit to include the HAR in a class A nature reserve or national park.
395	Parks and Wildlife	It is noted that Table 1-1 in the PER lists mining lease M77/580 as required tenure for the proposal, however it is further understood that this proposal	Aurora Village is located on M77/580 and supports the J4 mine operation. MRL intends to construct a new accommodation village on L77/274 (granted)



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		does not include establishing a camp or using M77/580 for the proposed operations. The proponent should provide clarity around the listing of this tenement.	to support the J5/Bungalbin East operation. This village was approved pursuant to the J4 Ministerial Statement but was never built. It does not form part of the Proposal. Aurora Village, however, will be required briefly during the construction phase of the Proposal; hence its inclusion in the PER.
396	CPC	 <u>EPA's previous advice</u> The submitter supports the conclusions of the EPA's 2015 assessment particularly that: 1. the HAR is recognised as having the greatest landscape and environmental values in the Mount Manning Area; 2. due to its landscape and environmental values, the EPA considers the HAR to be a priority area for long-term protection from development; 3. the proposal would impact significant landform features in the HAR Conservation Park, which was created to facilitate recreational activities consistent with the conservation of flora and fauna, and the preservation of archaeological, historic or scientific features; 4. the HAR is one of the last large, intact BIF ranges with the highest biodiversity values in the Mount Manning Areas; and 5. any mining of the HAR would result in serious and irreversible impacts to the integrity of significant BIF landforms, and the loss of endemic, rare and 	MRL advises that the Proposal has been substantially revised since the EPA's 2015 assessment. Any conclusions reached by EPA at that time are irrelevant in the context of this revision. Further, EPA Report 1537 (an outcome of the EPA's assessment at that time) was successfully appealed by MRL and the Minister remitted the Proposal to the EPA with a direction to undertake a fuller and public assessment through the PER process. The EPA's 2015 assessment is therefore not a reliable basis for forming conclusions in respect to the Proposal and should be disregarded in its entirety. The conclusion that any mining of the Helena-Aurora Range "would result in…the loss of endemic, rare and restricted flora species" is not correct in respect of the Proposal. MRL advises that no flora species will be lost as a result of the Proposal



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		restricted flora species and critical habitat, which the landforms host.	
397	The Wilderness Society	The submitter supports previous EPA decisions for the HAR and the proposal. "The concentration of conservation values associated with the Helena and Aurora Range established that, for its size, this range is one of the more significant biodiversity assets in WA. <u>Recommendation</u> : Reserve [the] range as an 'A Class' Nature Reserve for the protection of high concentrations of endemic rare flora and priority ecological communities; exceptional landforms; threatened fauna habitats; mature eucalypt woodlands that are declining in the Wheatbelt; and Aboriginal heritage." (EPA Bulletin 1256, 2007) "The EPA considers that additional studies or detailed assessment of this proposal, in this location, would not lead to an outcome that would demonstrate that the EPA's environmental objectives for Landforms and Flora and Vegetation could be met[T]he EPA considers that the J5 and Bungalbin East mining proposal is environmentally unacceptable and should not be implemented. Protection of the Helena-Aurora Range from mining development is required in order to meet the EPA's objective to maintain variety and integrity of significant landforms in an important BIF area (Mt	For the reasons outlined below, MRL disagrees with the submitter's broad assertion that the PER does not respond to the stated findings of the EPA (2007; 2015) based on a scientific approach. In respect of EPA Bulletin 1256 and the EPA's recommendation to reserve [the] range as Class A reserve, MRL notes that the EPA " <i>does not hold a view that mining and development should be precluded from inside the HARCP</i> " ¹¹¹ . Indeed, it is open to government to establish such tenure over the balance of the park post-mining. To date, government has not thought fit to include the HAR in a class A nature reserve or national park. MRL has undertaken comprehensive baseline studies of flora and vegetation, fauna, landforms and heritage and has assessed the impact of the Proposal on these factors in accordance with EPA policy and guidance. Endemic rare flora, priority ecological communities and restricted vegetation types have been a particular focus of the assesment. The PER concluded that the impacts on these and other factors will not be so significant as to be unacceptable and that the EPA's objectives in respect of all factors can be met.

¹¹¹ Appeals Convenor (2015). Appeals in objection to the content of, or any recommendations in, an Environmental Protection Authority Report - EPA Report 1537: Jackson 5 and Bungalbin East Iron Ore Project, Shire of Yilgarn. Report to the Minister for Environment. Appeal Numbers 003 to 007 of 2015. Report of Appeals Convenor, Perth, Western Australia.



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		Manning). (EPA Report 1537, 2015). The EPA (2015) states, "The Department of Parks and Wildlife has advised that the Helena-Aurora Range has the highest flora conservation significance of any BIF range in the Yilgarn Craton. To date, 25 conservation significant flora species are known to occur on the Helena Aurora Range. Of those, 15 are 'BIF specialist' flora species; meaning distribution is centred on BIF ranges. Five of those species are endemic to the Helena-Aurora Range only; two are listed as Declared Rare Flora (DRF) – Leucopogon spectabilis (Critically Endangered) and Tetratheca aphylla subsp. aphylla (Vulnerable), and three are Priority 1 flora species." The PER does not adequately respond to the above findings based on a scientific approach.	In respect of EPA Report 1537, MRL notes that on appeal Report 1537 was overturned by the Minister for Environment, who requested the EPA to assess the Proposal more fully and more publically by way of a PER. The appeal determination effectively recognised the pre-judgement of the Proposal by the EPA in the absence of detailed information that would otherwise have been available to it as part of a PER process. MRL advises that the Proposal has been substantially revised since Report 1537 was published in January 2015. Any conclusions reached by EPA at that time are irrelevant in the context of this revision. Further, EPA Report 1537 was successfully appealed by MRL and the Minister remitted the Proposal to the EPA with a direction to undertake for more full and public assessment through the PER process. The EPA's 2015 assessment is therefore not a reliable basis for forming conclusions in respect to the Proposal and should be disregarded in its entirety.
398	The Wilderness Society Wildflower Society of WA ANON-TWYQ-WPBH-6 ANON-TWYQ-WPF5-Q Toodyay Naturalists Club	 <u>Object and principles of the EP Act</u> The object of the EP Act is to protect the environment of the State. The submitters do not consider that the proposal meets the Principles of the EP Act for the following reasons: 1. <i>the precautionary principle</i> - there are threats of serious or irreversible damage to the environment from this proposal, and there are serious doubts about whether they can be avoided or rectified by the proponent; 2. <i>the principle of intergenerational equity</i> – All aspects 	MRL notes that the submitters do not consider that the Proposal meets the Principles of the EP Act. These principles form part of the broader object of the EP Act to protect the environment of the State. As acknowledged in the EPA's 'Statement of Environmental Principles, Factors and Objectives' (2016), ' <i>The object</i> <i>and principles guide the overall application of the</i> <i>powers of the Act. The principles are matters to which</i> <i>the EPA is required to have regard as a condition of the</i> <i>valid exercise of its powers to assess and report on</i> <i>proposals and schemes under the Act.</i> ' Therefore, the





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		of this proposal would result in a significant diminution of the diversity and quality of the environment in which the proponent proposes to operate, with not one aspect enhanced;	principles are relevant considerations in decision making, but not requirements that the Proposal must meet or determinative of the outcomes of the Part IV EP Act process.
		3. <i>the principle of the conservation of biological diversity and ecological integrity -</i> Conservation of biological diversity and ecological integrity is not a fundamental consideration, for this proposal it is money and profit; and	In formulating the Proposal, MRL has considered each of the principles and this has guided the approach to environmental impact assessment, including the level of conservatism in the approach adopted, application of the mitigation hierarchy and MRL's particular focus on avoiding impacts to the greatest extent possible and the
		 principles relating to improved valuation, pricing and incentive mechanisms - This proposal would, if implemented leave a lease of a demaged 	precautionary mitigation and management measures proposed in respect to residual impacts.
		implemented, leave a legacy of a damaged environment that others, and other generations, would need to spend significant sums of public money to repair, while the proponent would have earned a relatively insignificant amount of money over a very short time frame for an insignificant resource, the equivalent of a few month's production	In respect of the precautionary principle, MRL advises there whilst there is always scientific uncertainty in EIA of complex proposals, there is sufficient information and knowledge of the impacts of mining in BIF ranges, and in the context of the Proposal, to make a decision on whether the Proposal should proceed.
		from the large iron ore mines in the Pilbara. The application of the above highlighted objects and principles set out in the EP Act should preclude any approval of the mining proposals on the HAR.	In respect of intergenerational equity, MRL disagrees with the submitters' assertion that "all aspects of this proposal would result in a significant diminution of the diversity and quality of the environment". This is a vague assertion without any supporting discussion from
		Conservation of biological diversity and ecological integrity	the submitters and cannot reasonably be concluded from the information presented in the PER.
		The proposal is in an area of such high conservation value both at a species level and as habit for flora and fauna that it needs to be preserved in its entirety. Other mining companies have looked at the area and then agreed with this comment and not proceeded any further. The offset which claims to conserve the DRF/T	The submitters' comparison of MRL's application of the precautionary principle with its consideration of alternatives to the Proposal, specifically the 'no-development' scenario, is misguided. In respect of the conservation of biological diversity and



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		flora is totally contrary to this principle. The destruction of the rock formations, cave and other features will put at risk other flora and fauna. The submitters does not support the claim that <i>the conservation of biological</i> <i>diversity and ecological integrity has then been a</i> <i>fundamental consideration throughout the development</i> <i>of the Proposal, which is consistent with the EP Act.</i> <u>Precautionary Principle</u> The proponent states (page15-1) "A precautionary approach has been adopted by MRL to the identification of management measures and controls that will be applied to mitigate potential environmental degradation <i>associated with the Proposal. The level of information in</i> <i>this PER document is therefore sufficient to assess the</i> <i>significance of the impacts of the Proposal on the</i> <i>environment. Accordingly, the Proposal is consistent</i> <i>with this principle of the EP Act</i> " this appears to be in conflict with the reasoning that "The 'no development' <i>alternative is not a realistic proposition for MRL due to</i> <i>the significant investment it has made in the Yilgarn</i> <i>region for the benefit of shareholders, employees, local</i> <i>communities and the State of WA.</i> " which benefits shareholders but not the environment through its residual impacts.	flora or fauna species, priority ecological communities or restricted vegetation units will be lost as a result of the Proposal. In respect of principles relating to improved valuation, pricing and incentive mechanisms, MRL re-iterates that it has no intention of leaving a " <i>legacy of a damaged</i> <i>environment that others…would need to spend</i> <i>significant sums of public money to repair</i> ". MRL will rehabilitate and decommission the site in accordance with its legal obligations under the <i>Environmental Protection Act 1986</i> , the <i>Mining Act 1978</i> , and the <i>Environment Protection and Biodiversity</i> <i>Conservation Act 1999</i> (Cth). A complete statement of MRLs's application of the principles of the EP Act is tabulated in Table 15-1 of the PER. Please also refer the response to Issue 61 on this matter.
399	Toodyay Naturalists Club	The submitter notes that the Conservation and Parks Commission does not support the proposal, and the 1004 public submissions received with regard to the level of assessment are evident that the proposal is not supported.	Noted, although the number of negative submissions on the referral of the Proposal does not indicate that the Proposal does not have majority support. Nor is majority support or opposition determinative of whether the Proposal should be permitted to proceed.
400	ANON-TWYQ-WPH1-N	Intergenerational Equity	



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	ANON-TWYQ-WP28-6	The submitters object to the proposal on the basis the	Mining of BIF ranges in the Yilgarn is undertaken in
	ANON-TWYQ-WP2F-M	unique wilderness values and floral diversity of HAR	accordance with relevant approvals and government
	ANON-TWYQ-WPPS-Y	should be preserved as an A Class reserve in perpituity	policy. As the submitters' acknowledge, it is for
	ANON-TWYQ-WPPX-4	for the benefit of current and future generations.	government to decide which landscapes should be
	ANON-TWYQ-WP2E-K	It seems that mining companies are 'cherry picking' the	On the subject of intergenerational equity, the submitters
	ANON-TWYQ-WP2Y-7	Zones of high-grade ore from the BIF ranges of the	On the subject of intergenerational equity, the submitters
	BHI F-TWYO-WPP8-4	removed from the regional landscape, or some ranges	may not share the same values as the present
		are being partly mined, destroying the integrity of the	generation.
		range.	The key point in relation to intergenerational equity,
		Such a 'selective' ore recovery policy may be acceptable	then, is that the next generation should be permitted to
		in terms of economics, but is not acceptable in terms of	exercise its own values in respect of the future of the
		the preservation of our natural history. There comes a	area, and be free from the value-laden judgements of
	ANON-TWYQ-WPPK-Q	point in time when society, and that includes	the previous generation when doing so.
	ANON-TWYQ-WP19-6	governments, must take stock of policies, and accept that	This ability of the next generation to exercise its own
	ANON-TWYQ-WPFK-D	the evolution of landscapes must be preserved for the	values may be considered lost if the deposits are mined
	ANON-TWYQ-WP17-4	benefit of future generations. The HAR is one such	dependent of the form of wealth creation and provision
	ANON-TWYQ-WPBM-B	example.	of the services (e.g. education, health) and facilities that
	ANON-TWYQ-WPBY-Q	It is unthinkable to mine part of the HAR - in the same	society requires to maintain its standard of living.
	ANON-TWYQ-WPBT-J	way as it would be unthinkable to mine part of the	The ability of the next generation to exercise its own
	ANON-TWYQ-WP43-3	Stirling Ranges or the Fitzgerald River National Park	values may be considered retained if the deposits are
	ANON-TWYQ-WP45-5	peaks. It is not acceptable. The proposed mines would	not mined now; however, if they are placed within a
	ANON-TWYQ-WPHK-F	affect more than 1/4 of the main range, and would also	Class A reserve then it becomes more difficult (although
	ANON-TWYQ-WPZ1-7	when one walks along the top	not impossible) for the next generation to mine these
	ANON-TWYQ-WP45-5	The proposed mines would not allow intergenerational	nurely for conservation, the current generation
	ANON-TWYQ-WP4,I-T	equity as described. Future generations would never	effectively forces its own value-iudgements onto the next
	ANON-TWYO-WP45-5	know this wild place as it has stood for thousands of	generation.
		years.	Intergenerational equity, as defined in the EP Act.
		The HAR should be left intact and undisturbed by mining	means that "the present generation should ensure that





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	ANON-TWYQ-WP2D-J		
	ANON-TWYQ-WP2C-H		
	ANON-TWYQ-WPFJ-C		
	ANON-TWYQ-WP13-Z		
	ANON-TWYQ-WP4D-M		
	Perth Bushwalkers Club		
	(Inc)		
	Toodyay Naturalists		
	Club		
	ANON-TWYQ-WPFW-S		
	BHLF-TWYQ-WP1A-E		
401	BHLF-TWYQ-WPP8-4	Submitters concerned with the environmental track	The majority of MRL's environmental infractions
	Track Care WA	record of the proponent. The proponent has been	occurred prior to 2013 and MRL has made significant
	BHLF-TWYQ-WPJV-V	investigated by DER and DMP and fined at least five	improvements to its Environmental Management
	141; 258; 327; 318	environmental regulations	improve environmental management across the
	ANON-TWYQ-WPZ7-D	While penalties and corrective actions are enforced, the	business, MRL has developed and is implementing an
	The Subaru 4WD Club	end result is typically large-scale ecological damage that	Environmental Management System consistent with
	of Western Australia Inc	can never be properly corrected. State government	ISO14001 and commits to having this EMS certified for
	ANON-TWYQ-WPFT-P	agencies are also well known to be under-resourced for	the Proposal within two years after the commencement
	ANON-TWYQ-WP4E-N	environmental monitoring and enforcement over WA's	Leadership' campaign has been rolled out to employees
	ANON-TWYQ-WP47-7		across all of the MRL project locations. The campaign
	ANON-TWYQ-WP4M-W	The Corporate Governance of the proponent is deficient	raised awareness of the Company's previous infractions;
	ANON-TWYQ-WP4N-X	management across its operations. Over the last three	why it is imperative to comply with all legislation, and
	ANON-TWYQ-WPJG-D	years, the proponent governed subsidiaries have	what management tools are available for employees to
	ANON-TWYQ-WPJU-U	received six prosecutions under the Mining Act 1972,	manage potential impacts on the environment from their
	ANON-TWYQ-WPBJ-8	two prosecutions under the EP Act 1986 and one prosecution under the EPBC Act. Four of these nine	



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	ANON-TWYQ-WPBK-9 ANON-TWYQ-WP4A-H Wildflower Society of WA ANON-TWYQ-WPBH-6 The Wilderness Society ANON-TWYQ-WP1Q-X BHLF-TWYQ-WPP8-4	 indiscretions were at the the proponent Yilgarn Carina project very near this proposal. How can the community have any confidence or trust that this organisation has the willingness or the capability to effectively balance mining and conservation in a pristine, biodiverse landscape? The proponent has shown to be a repeat offender in breaching its environmental conditions and undertakings. Conditionally offering to certify its EMS ("should the Proposal receive approval") is symptomatic of the current corporate approach to environmental management which has led to the dubious record. DER fines Between 16/08/2013 – 20/09/2013. Carina Iron Ore Mine. Dumping waste; s 49A(3) EP Act. Hypersaline water dumped onto land owned by the Department of Treasury and Finance. 26/08/2015. \$12,500. Between 16/08/2013 – 20/09/2013. Carina Iron Ore Mine. After method of operation causing emission s 53(1)(A) ep Act. Hypersaline water discharged onto a waste rock dump at mine site causing and emission. 26/08/2015. \$10,000. 	
		DMP fines	
		• On 10 October 2013, a fine of \$50,000 was imposed on Polaris Metals relating to their Carina Iron Ore Project for breach of environmental related tenement conditions (tenement # M77/1244).	
		On 17 July 2014, a fine of \$50,000 was imposed on Polaris Metals relating to their Carina Iron Ore Project for breach of environmental related tenement	



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		 conditions (tenement # G15/21). On 17 July 2014, a fine of \$60,000 was imposed on Polaris Metals Pty Ltd relating to their Poondano Iron Ore project for breach of environmental related tenement conditions (tenement #'s M45/1189 and E45/2723). 	
402	WESTERN AUSTRALIA 4WD ASSOCIATION INC	The submitter supports the findings and assessment made by the EPA in Report 1537, January 2015, on this Proposal and requests that its recommendations be implemented. The submitter contends that the proponent's J5 and Bungalbin East Iron Ore proposal for the mining, initial processing, and transport of ore is not consistent with the stated aim of the HARCP "to facilitate recreational activities consistent with the conservation of flora and fauna, and the preservation of archaeological, historic or scientific features". (EPA Report 1537). The submitter is of the view that ongoing access to a 'wilderness experience' in a relatively near location to major populations is a key to current and future generations' physical and mental well-being and a major quality-of-life component for Western Australians. The submitter further recommends that to maintain this 'wilderness experience' the HARCP is not developed in any manner, including not making any provision for camping or visitation facilities or signage. The submitter supports the EPA Assessment Report 1537 on this project but recognises that the Minister may decide to allow the project to proceed. In this case the submitter suggests the following to assist as much as	MRL notes the submitter would prefer that the Proposal does not proceed. In the event that it does proceed, MRL is committed to working with DPaW and key stakeholders, including the WA 4WD Association Inc, to facilitate recreational activities in the area.



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		possible to 'facilitate recreational activities' in this wilderness area.	
		 Adhere to the management and other plans outlined in the PER, Section 10, Amenity. 	
		 Report publicly at least annually on the achievement of those plans for Amenity and to include a report on any deviations in practice from those plans. 	
		 Not place any signage restricting access to the Mining Leases and Licence areas except where there are currenl hazardous operations or situations, and to remove these signs as soon as is practicable. 	
		4. Permit visitors to the area to cross haul roads which cut existing tracks (subject to appropriate signage)	
		 Not block any existing track by placing large water pipes on the surface across these tracks. 	
		 Restore existing tracks to their pre-mining condition as soon as is possible during the life of the mine and at its closure. 	
		 Restore the lookout at the old Bungablin East camp site as soon as possible or in consultation with other groups, EPA and Parks and Wildlife, construct a new lookout facility. 	
		8. Include recreational four wheel drivers and campers in consultation groups and any future operational consultations on this project.	
403	ANON-TWYQ-WP4A-H	Exploration of the Bungalbin East deposit was	Mineralisation supporting the Proposal
	ANON-TWYQ-WP4N-X	undertaken in the 1960's, there has been none since. The proponent has little understanding of the waste	The submitter is referred to the 14 May 2008 ASX


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	ANON-TWYQ-WPB8-P ANON-TWYQ-WPPZ-6 ANON-TWYQ-WPFS-N ANON-TWYQ-WP42-2 ANON-TWYQ-WPBC-1 ANON-TWYQ-WP1C-G 35	volumes, size of the deposit, ore impurities and under current economic conditions the life of mine stated cannot be confirmed, no guarantee that this project is economically viable. There remains significant project uncertainty in many areas at this stage of the approvals process which can only be resolved post approval. There is high risk that the potential economic benefits that the proponent states are unfounded or even exaggerated and that the project may end up with a significantly shorter mine life once resource definition drilling has been executed	announcement by Polaris Metals NL for details on the mineralisation supporting the Proposal. MRL does not claim that the Proposal is supported by a JORC Ore Reserve, and acknowledges that further work is required to delineate an Ore Reserve including reserve definition drilling. This work is proposed as the first stage of implementation should the proposal be approved. MRL's proposed staged approach detailed in Attachment 1 as well as its progressive clearing practices, ensures that clearing will only occur where
		Although economic benefits to the community have been claimed, the proponents have not made an economic case for the mines (ie The proponent has quoted multi millions of value but never stated the iron ore price which these figures were based on). There is no discussion of the actual size of the resource or how it compares with other mines? The statements on page 2- 10 that "ore from J5 will be blended with ore from	Economic Sustainability MRL's Yilgarn Operations have demonstrated that they can survive headline iron ore prices below US\$40/t (CFR 62% Fe). The December 2016 headline iron ore price is US\$80/t.
		compares with other mines? The statements on page 2- 10 that "ore from J5 will be blended with ore from Bungalbin East to achieve correct product specification" and "J5 will not be mined in isolation from Bungalbin East" implies that J5 is low grade ore. This means that a unique ecosystem and landform will be destroyed for a small short-term return. The proposal seeks to recover up to 65-115 million tonnes of iron ore. The proponents mining operations in the Yilgarn are forecast to deliver several hundred million dollars in royalties to the WA economy over the next 15 years. The submitter contends that 65 million tonnes of iron ore with a 5% "royalty value" would yield royalty payments to	 <u>Capital Expenditure of Proposal</u> This is a capital-efficient extension of mine life allowing further use of existing capability, capital, equipment and infrastructure. Existing infrastructure includes roads, camps, an ore processing facility, an airstrip, train loader, locomotives, rolling stock, rail and port infrastructure. The proposed capital works expenditure is projected to be about \$44M including: 30km of Haul Roads costing \$18.3M; Site Earthworks costing \$1.5M; Provision of site Office and Workshop costing \$3.5M;



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		the State of more than "several hundred million dollars" over the mine life. The economic benefit of the Proposal is overstated and it appears the proponent has combined its whole Yilgarn operations into the J5 and Bungalbin East Iron Ore Proposal to make the royalty numbers look larger.	 Residential Village costing \$10.7M; and Reserve Definition Drilling \$10.0M. These items are well within the funding capabilities of MRL's net cash reserves and no project finance is required.
		In relation to section 1.4 of the PER - destruction of an important environmental asset cannot be justified by the claimed 15 years of iron ore mining. It is noted that the proponent is imprecise in its estimation of the amount of iron ore that will be recovered. How can the company be viewed as competent when it says the recoverable amount could range from 65 to 115 million tonnes?	Economic Benefits - Substantial Direct Payments to Government The Proposal will see a significant contribution to the WA economy through jobs, services and annual payments to Government and Agencies in the form of taxes, charges, fees and Royalties.
		The submitter comments in relation to the objectives of the proposal as listed on page 1-11 of the PER document: There is no mention of an objective to make a profit for shareholders, nor the magnitude of the profit. The proponent is a listed company and may be expected to publish a profit forecast. The people have a right to know what the economic value of the environmental destruction is so that they can form a view on the justification, by means of cost- benefit analysis.	Several hundred million dollars in Royalties will be paid over the life of the proposed mines. Revenues to government are comprised of payroll and company taxes paid to the Commonwealth, Royalties and charges paid to the WA Government and rates paid to the Shire of Yilgarn. MRL is Fremantle Port Authority's (FPA) biggest customer by dollar value and volume with \$43.1 million paid in port fees during FY 2016. This payment is expected to continue annually if approvals for the Proposal are granted. In FY 2015-16 MRL generated annual payments to
		know whether you have succeeded, and nor does anyone else. The proponent initially has a figure of 1496 FTEs in	Government of \$66.9 million from the mining of iron ore in the Yilgarn including:
		operation later modified to a more realistic 260., the proponent does not state that the workforce will be FIFO	Port fees and charges \$43.1M;





Issue No.	Submitter	Submission and/or issue	Response to comment
Issue No.	Submitter	Submission and/or issue but this is certain so Southern Cross Shire will benefit little from their operation apart from some rates. The submitter contends that the main argument to proceed is is jobs generated, at construction, operation and movement of products. A pure economic argument to sell off a priceless natural asset, which will be irreversibly destroyed – in terms of biodiversity, future potential, landform characteristics and spiritual significance. The strategic review of BIFs found that the prospectivity	Response to comment State Royalties \$21.4 M; Local Government \$0.2M; Payroll tax \$0.8M; Company tax \$1.4M; Total \$66.9 M. Economic modelling undertaken in September 2016 by international engineering firm AECOM reveals estimates
		values of HAR, including Bungalbin East, are moderate, whereas the biodiversity values are high (Department of Industry and Resources 2007) ¹¹² . The figures on economic and social benefits of the proposal provided by the proponent in their PER are inconsistent (e.g. 585 direct FTEs stated for construction phase in fact sheet, 425 in executive summary), as are the implications ("sustainable contribution to the economy" versus limited lifespan of mine). Further, Australia-wide research shows that economic growth from mining tends to occur at the direct expense of other parts of the economy (Richardson and Denniss 2011). In addition, while some profits from mining do flow to the WA government, these are much smaller	 (below) that are in line with the above figures for the construction and operation phases of J5 and BE. <u>Economic Modelling Demonstrates Significant Economic Benefits</u> Data in this and the subsequent passages is based on economic modelling undertaken by AECOM in September, 2016. Employment multipliers are expressed in terms of jobs (full-time equivalent positions, or FTEs). The multiplier values for employment and expenditures used to calculate the impact of the Proposal on the WA and Australian economies are sourced from the Australian

¹¹² Department of Industry and Resources (2007) Strategic review of the banded iron formation ranges of the Midwest and Goldfields. Department of Industry and Resources & Department of Environment and Conservation, pp. 1-215





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		than purported when extensive tax deductions provided to the mining industry are taken into account (Richardson and Denniss 2011). Moreover, it has been	Bureau of Statistics (ABS) and use industry standard figures pertaining to the iron ore industry in WA ¹¹⁴ .
		found that earnings from mineral exports are almost entirely outweighed by corresponding declines in non- mining exports caused by adverse effects on the	Proposed Construction phase – Data Generated from AECOM Modelling
		exchange rate (Richardson and Denniss 2011). Other ways in which the mining proposal may negatively	Expenditure by MRL during the construction phase of its Yilgarn operations would:
		impact the local and state economy include: a) driving up the costs of labor for businesses in other sectors, and driving up the prices of raw materials and other services (e.g. concrete, construction) (Richardson and Denniss	 Generate an estimated \$71 million in direct economic output, with flow-on effects of \$102 million, giving an estimated total impact of \$173 million;
		2011) ¹¹³ . The proposal, if approved, is also likely to destroy the prospect of future developments in eco-tourism for the range. The range is prized for its scenic qualities owing to its complex geology, distinctive rock formations,	 Contribute to value added an estimated \$21 million directly, with flow-on effects of \$50 million, giving an estimated total contribution of \$71 million. This is the estimated contribution to Gross State Product (GSP);
		rugged ridgelines and contrasting vegetation patterns, and long-term, truly sustainable economic benefits could flow to the local community and state by developing this area as a world-class eco-tourism destination. However, the proposed mining activities would most likely destroy	 Generate household income estimated at \$11 million directly, with flow-on effects of \$24 million, giving an estimated total impact of \$35 million; and Generate State Government payroll tax payments of \$0.3 million115.

¹¹³ Richardson D, Denniss R (2011) Mining the truth: the rhetoric and reality of the commodities boom. Institute Paper, 7. The Australia Institute, Canberra, pp. 70

¹¹⁴ Financial multipliers are usually presented in terms of '\$ per unit of output'. Employment multipliers are expressed in terms of jobs (full-time equivalent positions, or FTEs). The multiplier values used to calculate the impact on the WA and Australian economies of the development of MRL's Yilgarn operations are calculated from WA input-output table 2008/09 (111 industries), derived by AECOM from ABS national input-output table 2008/09 and from ABS, Australian National Accounts: Input-Output Tables 2008/09, 5209.0.55.001, Table 5 (10 September 2012). Mining operations deliver indirect values of 3.6 and construction 7.9. Hence, jobs data derived on the basis of the modelling and multipliers are very conservative.



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		this prospect, if approved.	
			Proposed Operations phase – Data Generated from
			AECOM Modelling
			Expenditure by MRL during the operations phase of its Yilgarn operations after 2017 would:
			 Generate economic output, estimated to be \$340 million each year directly, with flow-on effects of \$270 million, giving an estimated total impact on the WA economy of \$611 million each year;
			 Contribute to an estimated \$190 million each year directly, with flow-on effects of \$128 million, giving an estimated total contribution of \$318 million each year to Gross State Product (GSP); and
			 Generate an estimated \$31 million each year directly in household income, with flow-on effects of \$65 million, giving an estimated total impact of \$96 million each year in household income in WA.
			The operations phase of MRL's Yilgarn operations after 2017 would:
			 Contribute \$21.8116 million each year to State Government royalty revenue (last year actual payment was \$21.4million); and.
			Generate from direct and indirect employment of 1496 FTEs State Government payroll tax payments

¹¹⁵ Adjusted to FY2017 prices using WA Average Weekly Earnings from June 14 to May 2016, and then WA Treasury Budget Wage Price Index for June 2016 to June 2017.

¹¹⁶ Adjusted to FY2017 dollars using WA Treasury Budget

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			of \$3.3 million each year117 .
			Significant Employment Benefits – Data Generated from AECOM Modelling The Proposal will make a strong and enduring contribution to WA's economy, including a significant number of both direct and indirect jobs, in the Yilgarn, Goldfields region and in the metropolitan area
			According to AECOM modelling, the construction phase (distinct from operations phase) will provide direct employment of 98 FTE positions, including a construction workforce of 70 positions for a six-month period. The estimated flow-on employment is 303 FTE positions, giving total employment impact of 401 FTE positions during construction.
			During the operations phase, the modelling forecasts, that the Proposal will provide employment for 1,496 direct and indirect jobs, with direct employment of 585 FTE positions beyond 2030. Currently 425 FTE positions are site-based employees, contractors, train drivers, Fremantle Port staff and support staff.
			<u>Current Employment – Work Force on Site</u> Over the past 12 months, MRL Human Resources have made three recruitment trips to Kalgoorlie for interviews with local candidates for a variety of roles across our

¹¹⁷ Adjusted to FY2017 prices using WA Average Weekly Earnings from June 14 to May 2016, and then WA Treasury Budget Wage Price Index for June 2016 to June 2017.

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			 sites. The actual direct FTEs currently on site or supporting the site number 425 and are comprised of the following categories: Yilgarn Operations Full Time Site Based Employees – 190; Yilgarn Full Time Site Based Contractors (Road Haulage, Drill and Blast) – 115; Rail staff of 26 including 10 Merredin based Train Drivers; Pacific National Perth Train Drivers and Contract Liaison – 18; Fremantle Port - 79; and MRL's Perth head office support staff dedicated to Yilgarn operations – 15.
404	35	The proponent's 2016 Annual Report page 17 statement on environmental management reads like a statement of hypocrisy. Identifying items of environmental significance, should not give them the right to destroy it all. This impression comes through very strongly in reading their PER. The submitter is not opposed to all mining and supports the principle of achieving a balance between mining and conservation, but this proposal is in an area where conservation should take precedence. The submitter believes that other mining proposals have been approved on the basis that other areas be set aside for protection, and that no such areas have actually been	MRL does not share the submitters' view in relation to the relevant section in the company's 2016 annual report. MRL considers that development and conservation of the Helena-Aurora Range need not be an 'either/or' proposition and that conservation outcomes can be achieved together with mining, as they have for other BIF ranges in the Yilgarn and Midwest.



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		set aside.	
405	Toodyay Naturalists Club	The submitter is concerned that the PER has stated in Section 2.6 of the PER with that "The 'no development' alternative is not a realistic proposition for the proponent due to the significant investment it has made in the Yilgarn region for the benefit of shareholders, employees, local communities and the State of WA. In any case, the significance of residual impacts of the proposal are not so great as to justify a 'no development' decision". The submitter does not support these statements as they consider that the local community has not greatly benefited from the proponent and the State of WA will not benefit greatly and for some time, particularly if its resources are being 'given away' to a foreign owned mining venture.	See response to issue 403 for the economic benefits of the Proposal.
406	ANON-TWYQ-WP27-5 ANON-TWYQ-WP2U-3 BHLF-TWYQ-WPP8-4 ANON-TWYQ-WPPP-V ANON-TWYQ-WP2E-K ANON-TWYQ-WP2Y-7 ANON-TWYQ-WPPF-J	This area is one of eleven international biodiversity hotspots and should be protected by law. Recently the Premier has announced a number of marine heritage areas and this area should also be given the same status so that it's value and heritage is preserved for all Western Australians. The submitters support the EPA's previous assessment (EPA Report 1537, 2015), that <i>"the proposal was</i>	MRL advises that there are 36 global biodiversity hotspots, 14 of which occur in the Asia-Pacific region. Of these 14 hotspots there are two that occur in Australia, one of which comprises the entire southwest of Australia, the other being the forests of east Australia. ¹¹⁹ The Australian Government, through the Threatened Species Scientific Committee, has identified 15 national
	ANON-TWYQ-WPPR-X	<i>environmentally unacceptable and should not be implemented</i> ¹¹⁸ . Submitters urge the EPA to	biodiversity hotspots, 8 of which occur in Western Australia and none of which are located in the vicinity of

¹¹⁸ Environmental Protection Authority 2015, *Report and recommendations of the Environmental Protection Authority: Jackson 5 and Bungalbin East Iron Ore Project. Report 1537,* EPA, Perth, WA.

¹¹⁹ www.cepf.net/resources/hotspots



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	ANON-TWYQ-WPP5-1	recommend uphold its previous decision and call for the	the Helena-Aurora Range.
	ANON-TWYQ-WPPK-Q	range to be recognised for its unique environmental	The critical point that is frequently overlooked by
	ANON-TWYQ-WP1N-U	values.	submitters is that Australia's national biodiversity
	ANON-TWYQ-WP1U-2	As previously documented by the EPA, the HAR has	hotspots are located in areas of substantial
	Helena and Aurora Region Advocates Inc.	massive ecological and biodiversity values. South- western Australia is one of a small number of globally recognised biodiversity hotspots, so it follows that "one	Areas where there has been relatively little human disturbance (e.g. GWW) have greater capacity to absorb
	ANON-TWYQ-WPH2-P	of the most significant biodiversity assets in WA" is of	the impacts of development without significantly
	ANON-IWYQ-WPHW-U	incredible international significance, beyond the	affecting biodiversity. This is particularly true in relation
	Gondwana Link	Other than Mount Manning Nature Reserve (C Class)	to mining, where impacts are highly localised, and has
	Track Care WA	which includes Hunt Range, though not Mount Manning	where biodiversity persists both during and after mining.
	BHLF-TWYQ-WPJV-V	Range and a proposed A Class Nature Reserve over a	
	BHLF-TWYQ-WPJP-P	small yet significant part of Die Hardy Range all	
	BHLF-TWYQ-WPJ5-U	conservations estate, vested and proposed, allows for	
	BHLF-TWYQ-WPJK-H	mining (Minister's statement in 2010). It appears that the	
	BHLF-TWYQ-WPJ2-R	mining interests are being looked after while	
	59; 69; 224; 233; 261; 320; 339; 343; 347; 353; 355: 356	considered to be a balance between mining and conservation.	
	ANON-TWYQ-WPJB-8	The submitters are concerned that the process intended to assess conservation and mineral prospectivity of BIF	
	ANON-TWYQ-WPZ7-D	in WA and make reasoned decisions on striking a	
	ANON-TWYQ-WPZ6-C	balance between conservation and development seems	
	ANON-TWYQ-WPZZ-G	to have only resulted in implementations of the	
	ANON-TWYQ-WPZ9-F	"development" end of that spectrum, and we still have no	
	ANON-TWYQ-WPZS-9	areas that have been designated solely for conservation	
	The Subaru 4WD Club	The HAR should be protected as a National Park with	
	of Western Australia Inc	the Traditional owners as joint managers.	
	ANON-TWYQ-WPP9-5		



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	ANON-TWYQ-WPPG-K		
	ANON-TWYQ-WPPQ-W		
	ANON-TWYQ-WPFC-5		
	ANON-TWYQ-WPF1-K		
	ANON-TWYQ-WPF9-U		
	ANON-TWYQ-WPF7-S		
	Bird Life Australia		
	ANON-TWYQ-WPFT-P		
	ANON-TWYQ-WPFV-R		
	ANON-TWYQ-WPFU-Q		
	ANON-TWYQ-WP4E-N		
	ANON-TWYQ-WP47-7		
	ANON-TWYQ-WP4M-W		
	ANON-TWYQ-WP4T-4		
	ANON-TWYQ-WP4S-3		
	ANON-TWYQ-WP4U-5		
	ANON-TWYQ-WP4N-X		
	National Malleefowl		
	Recovery Group Inc		
	ANON-TWYQ-WPBA-Y		
	ANON-TWYQ-WPBF-4		
	ANON-TWYQ-WPJE-B		
	ANON-TWYQ-WPJ7-W		
	ANON-TWYQ-WPJB-8		
	BirdLife WA		
	ANON-TWYQ-WPJC-9		

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	ANON-TWYQ-WPJT-T		
	ANON-TWYQ-WPJG-D		
	ANON-TWYQ-WPJN-M		
	ANON-TWYQ-WPJU-U		
	ANON-TWYQ-WPBJ-8		
	ANON-TWYQ-WPBK-9		
	Pew Charitable Trusts		
	ANON-TWYQ-WPBQ-F		
	ANON-TWYQ-WPJC-9		
407	ANON-TWYQ-WPH9-W	Submitters object to the proposal based on the	Please see response to issue 403 for a summary of the
	ANON-TWYQ-WP2B-G	environmental cost being too high and questioned why	substantial economic benefits of the Proposal. MRL
	ANON-TWYQ-WP2F-M	one of the few intact BIF ranges remaining in the GWW	acknowledges that the scale of iron ore mining in the
	BHLF-TWYQ-WPP8-4	Pilbara. There is enough iron ore being mined in other	Filgarn is 2 orders of magnitude smaller than that in the
	ANON-TWYQ-WPP3-Y	locations, and more plentiful, without having to mine	benefits of the project do not displace any economic
	ANON-TWYQ-WP1G-M	HAR. Iron ore from the Yilgarn is of low-quality	benefits of the Pilbara iron ore industry, but rather are
	Farmland Greens	compared to deposits in the Pilbara and given the	over and above those benefits. If the Proposal does not
	ANON-TWYQ-WPHU-S	current iron ore prices mining on the HAR does not	proceed, the economic benefits to the region and the
	ANON-TWYQ-WP4R-2		state will de lost.
	ANON-TWYQ-WPBZ-R	I he submitters contend that the amount of iron ore the	
	BHLF-TWYQ-WPJV-V	the proposal would be equivalent to about three months	
	ANON-TWYQ-WPFS-N	production from the major Pilbara mines.	
	15; 35; 39; 78; 79; 83;	Submitters cite iron ore production in the Yilgarn is	
	115; 117; 159; 228; 240;	minor, less than two per cent of that in the Pilbara,	
	308; 356	according to the HAR, Goldfields Environmental	
	The Subaru 4WD Club	Management Group Workshop Proceedings May 2014.	
	of Western Australia Inc	In 2014 Australia's demonstrated economic resources of	



Issue No.	Submitter	Submission and/or issue	Response to comment
	ANON-TWYQ-WPFT-P	economically extracted at current prices with existing	
	ANON-TWYQ-WPFD-6	technology) totalled 54 billion tonnes and ranked	
	ANON-TWYQ-WPFA-3	Australia first in the world (with 29%).	
	ANON-TWYQ-WPZA-Q	The business of iron ore companies is to remove large	
	ANON-TWYQ-WP4J-T	areas of earth in this particular proposal in a unique	
	ANON-TWYQ-P22-Z	iron ore for the purpose of short term financial gain.	
	ANON-TWYQ-WP2K-S	Unfortunately their targets are usually significant rocks,	
	ANON-TWYQ-WPPC-F	hill and mountains that rise above vast surrounding	
	ANON-TWYQ-WPPD-G	plains of flat country. It is does not appear compatible	
	ANON-TWYQ-WP2Q-Y	for a mining company to commit to looking after the	
	ANON-TWYQ-WP2W-5	Its core business is to remove and carry away that which	
	ANON-TWYQ-WP46-6	makes the site so significant in visual conservation and	
	ANON-TWYQ-WP2K-S	recreational values. In addition to creating mine pits	
	ANON-TWYQ-WPBE-3	there is the impacts of noise, dust, WRL, mining	
	ANON-TWYQ-WPBH-6	infrastructure and haul roads which would impact on the	
	ANON-TWYQ-WPBH-6	The submitters object to the proposed based on the	
	Wildflower Society of	following:	
	WA	we must put conservation of what little is left of our	
	ANON-TWYQ-WPBH-6	natural heritage first, before development and before	
	The Wilderness Society	mining. Once all the profits have gone overseas all we	
	ANON-TWYQ-WPFD-6	are left with is a hole and even less natural environment.	
	ANON-TWYQ-WPF6-R	What has WA got to show after two decades of	
	ANON-TWYQ-WPBA-Y	unprecedented boom times thanks to the resource sector? Record debt, cuts to public services, a fire sale	
	ANON-TWYQ-WPJB-8	of public assets, a downgrade in our credit rating. record	
		low rents. Preserving our unique flora and fauna should	
	Pew Charitable Truete	be our number one priority; and	
		the HAR belongs to all of us, and not just a few mining	



Issue No.	Submitter	Submission and/or issue	Response to comment
	ANON-TWYQ-WPJ9-Y ANON-TWYQ-WP2C-H BHLF-TWYQ-WP1A-E ANON-TWYQ-WP4D-M ANON-TWYQ-WP4D-M ANON-TWYQ-WP1K-R ANON-TWYQ-WPFJ-C ANON-TWYQ-WP13-Z ANON-TWYQ-WPZJ-Z	executives and shareholders. If the recent minerals boom had been of benefit to the state, we would not be wallowing in a debt hole headed for \$40 billion. Is digging up our natural heritage really the only way we know how to finance our lifestyles? The current production of iron ore out of the Pilbara from BHP, Rio and FMG combined is about 730 million tonnes per year. This contrasts starkly with the paltry estimated TOTAL reserves from this mine proposal; 13 to 32 million tonnes from J5 and 52 to 83 million tonnes from Bungalbin East, as defined in the proponent's PER documentation. So altogether, the total output from these two mines would be equal to about 1 to 2 months supply from the Pilbara. The proponent appears to have grossly overstated the economic value of these proposed low grade Magnetite ore mines. Bungalbin East and J5, if developed would export less than 2% of the Pilbara region in WA. The submittors contend that the current and long term intrinsic environmental value of the HAR, and its value for future tourism exceeds the one off economic value of a mining operation.	
408	ANON-TWYQ-WPH1-N ANON-TWYQ-WP2E-K ANON-TWYQ-WP2B-G ANON-TWYQ-WP2Y-7 BHLF-TWYQ-WPP8-4 ANON-TWYQ-WPPF-J ANON-TWYQ-WPPR-X	Among the BIF ranges in the Regional study area (defined by the OEPA), on the southern portion of the Yilgarn Craton, situated in the Coolgardie Bioregion and GWW, a total of 14 BIF ranges have been identified for the PER. Each of these BIF ranges has been targeted for exploration to some degree. Four are currently being mined for iron ore. It is noted that, once mining started on each of these four BIF ranges (i.e. Koolyanobbing Range, Mount Jackson Range, Windarling Range and	MRL advises that it is not aware of any commercially significant mineral deposits in the HAR other than at J5 and Bungalbin East. It has no plans to mine other parts of the Helena-Aurora Range beyond that described in the PER. MRL supports placing the balance of the Helena-Aurora Range post-mining into a more secure form of conservation tenure and has offered to surrender all MRL group exploration tenure within the MMHARCP



Issue No.	Submitter	Submission and/or issue	Response to comment
	ANON-TWYQ-WPPP-V	Carina Mine on Yendilberin Hills), proposals for	as an offset.
	ANON-TWYQ-WPP5-1	expansion (the development of new mine pits) have	
	ANON-TWYQ-WPPK-Q	been put forward and subsequently approved through	
	ANON-TWYQ-WPP2-X	the PER level of assessment by the EPA.	
	ANON-TWYQ-WP-FK-D	The result is that large portions of the BIF ranges are mined over time. While the life of individual mine pits is	
	Helena and Aurora	finite, dependent on the size of the ore deposit, the life of	
	Region Advocates Inc.	mining in the Regional study area and Yilgarn appears	
	ANON-TWYQ-WPHK-F	to be long term. From these trends the result can only be	
	ANON-TWYQ-WPHW-U	that all the significant BIF ranges will be mined and,	
	Gondwana Link		
	BHLF-TWYQ-WPJK-H	The PER does not provide any assurance that following implementation of the proposal that other parts of the	
	144; 318; 355	range will not be mined.	
	ANON-TWYQ-WPZ7-D	For this reason it is imperative that at least one of the	
	ANON-TWYQ-WPZA-Q	significant ranges within the Regional study area be fully	
	The Subaru 4WD Club	protected from mining. Submitters want a balance	
	of Western Australia Inc	between mining and conservation. The high	
	ANON-TWYQ-WPP9-5	conservation and landform values of HAR, warrants full	
	ANON-TWYQ-WPPG-K	protection as an A class Reserve/National Park.	
	ANON-TWYQ-WPPW-3	Submitters object to the proposal based on it will set a precedent for additional mining in the HAR and the	
	ANON-TWYQ-WPPQ-W	GWW. It is noted the proponent has other mine-sites in	
	ANON-TWYQ-WPFC-5	the area. Thus, any statements from the proponent	
	ANON-TWYQ-WPF1-K	about 'limited impacts to the range from mining' cannot	
	ANON-TWYQ-WPF9-U	be taken at face value. The long history of mining	
	ANON-TWYO-WPF7-S	approvals in sensitive areas in WA show that the claim	
		that only 2% of the range will be disturbed is unlikely to	

¹²⁰ Ecological Australia 2016, *Blue Hills Mungada East Expansion Public Environmental Review*, Prepared for Sinosteel Midwest Corporation, Perth, WA.



Issue No.	Submitter	Submission and/or issue	Response to comment
	Bird Life Australia	be the long term impact of approving access to the HAR	
	ANON-TWYQ-WPFT-P	for mining. The proponent cannot guarantee such claims	
	ANON-TWYQ-WPFV-R	and allowing the 2% mining area will result in future	
	ANON-TWYQ-WPFD-6	landscape loss and biodiversity decline. The proponent	
	ANON-TWYQ-WP4E-N	should be required to provide a life of mine envelope, i.e.	
	ANON-TWYQ-WP4M-W	the full extent of all plans for mining at Bungalbin and J5	
	ANON-TWYQ-WP4N-X	The proponent also has another mining lease at	
	ANON-TWYQ-WPBA-Y	Bungalbin Hill on the HAR and there is the risk that if the	
	ANON-TWYQ-WPJ7-W	HAR is opened up to mining, new mines and mine	
	ANON-TWYQ-WPJB-8	Midwest who are proposing to extend the Blue Hills	
	BirdLife WA	mining operation and are using the previous mining	
	ANON-TWYQ-WPJN-M	activity to justify their mine extension (that is the area is	
	ANON-TWYQ-WPJU-U	not considered intact or pristine).	
	ANON-TWYQ-WPBJ-8	History shows that many resource companies are quick	
	ANON-TWYQ-WPBK-9	to sell mine assets to mainstream mining companies once the appropriate clearances have been issued. Any	
	Pew Charitable Trusts	change in ownership would invite a range of	
	ANON-TWYQ-WPBQ-F	complications following on from the assessment and	
	ANON-TWYQ-WPJC-9	consultation process so far.	
	ANON-TWYQ-WPJG-D	Some of the submitters have stated that if approval to	
	ANON-TWYQ-WP4J-T	mine is given then the parts not mined must be placed in a Class 'A' reserve or similar, if not subsequent mining	
	ANON-TWYQ-P22-Z	will incrementally encroach the whole range.	
	ANON-TWYQ-WP2K-S		
	ANON-TWYQ-WPPC-F		
	ANON-TWYQ-WPPD-G		
	ANON-TWYQ-WP2Q-Y		
	ANON-TWYQ-WP2W-5		



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	ANON-TWYQ-WP46-6 ANON-TWYQ-WP2K-S ANON-TWYQ-WPBE-3 ANON-TWYQ-WPBH-6 Wildflower Society of WA ANON-TWYQ-WPZJ-Z ANON-TWYQ-WP1C-G ANON-TWYQ-WP18-5 ANON-TWYQ-WP2C-H		
409	ANON-TWYQ-WP2X-6 ANON-TWYQ-WP1Q-X	The proponent should note the Bullfinch Evanston is incorrectly depicted in figures 1-1, 1-2, 5-1 and possibly others. The road extends north from Bullfinch to the Diemals Menzies road rather than Koolyanobbing as displayed in the PER. This road is also mis-labelled on the figures in Appendix 6-A and Appendix 10-B in which the road is referenced in visual amenity assessments.	Noted. The figures have been corrected in the revised figures atlas included at Attachment 2. These figures will be published along with the final Response to Submissions at the same time as the EPA report.
410	BHLF-TWYQ-WPP8-4 ANON-TWYQ-WP2E-K ANON-TWYQ-WPPF-J ANON-TWYQ-WPPR-X ANON-TWYQ-WPPX-4 ANON-TWYQ-WPP2-V ANON-TWYQ-WPP3-Y ANON-TWYQ-WPP5-1 ANON-TWYQ-WPPK-Q	The submitters contend that the HAR/GWW should be protected in perpetuity as a Class A Reserve/National Park. Under the Federal Government's EPBC Act 1999, the Eucalypt Woodlands of the WA Wheatbelt have been declared to be 'critically endangered'. It should be set aside from mining and established as a bio- geological monument. The HAR has been recommended for protection for nearly 40 years by scientists, government agencies, WA Museum and the EPA itself (EPA Bulletin 1256, 2007). Approval of the current proposal would be in conflict with these	MRL advises that decisions in relation to Class A reserves, National Parks, and protection of minimum areas of land for conservation are the responsibility of government. MRL is unable to respond further in this regard. MRL is aware of the EPA's view of the Proposal as referred in 2014 and advises that the Proposal has been revised in response to this view as well as community and stakeholder consultation. This revised Proposal is provided as part of MRL's response to submissions on the PER.



¹²¹ Department of Conservation and Land Management (2006). Lesueur National Park: Information Guide. CALM, Perth, Western Australia.



Issue No.	Submitter	Submission and/or issue	Response to comment
	ANON-TWYQ-WPZX-E	The submitters disagree with the statement on page 2-9	
	48; 54; 59; 81; 116; 129;	of the PER that "the significance of residual impacts	
	149; 318; 355	are not so great as to justify a 'no development'	
	ANON-TWYQ-WPZ7-D	<i>decision.</i> " If the HAR is designated a National Park, then	
	ANON-TWYQ-WPZ9-F	accordance with that land use could preserve this area	
	ANON-TWYQ-WPZZ-G	for Australia and Australians in perpetuity.	
	ANON-TWYQ-WPZ6-C	The submitter likens this proposal to the proposal in the	
	The Subaru 4WD Club	1990's to establish a coal mine at Mount Lesueur. The	
	of Western Australia Inc	submitter states that the proposal at Mount Lesueur was	
	ANON-TWYQ-WPP9-5	rejected by the EPA and the Lesueur area is now	
	ANON-TWYQ-WPPG-K	protected by way of national park status. This HAR is	
	ANON-TWYQ-WPPQ-W	special and iconic for many reasons, particularly in	
	ANON-TWYQ-WPFC-5	And, it has, like previously Lesueur, long been	
	ANON-TWYQ-WPF1-K	recognised as having all the attributes for A Class	
	ANON-TWYQ-WPF9-U	reservation status.	
	ANON-TWYQ-WPF7-S	Protecting some of the most biodiverse and ecologically	
	Bird Life Australia	significant BIF ranges has long been a goal of the EPA –	
	ANON-TWYQ-WPFT-P	and has previously been signed off by the Department of	
	ANON-TWYQ-WPFV-R	of banded ironstone formations states that "the	
	ANON-TWYQ-WPFD-6	Government commits to the creation of Class A	
	ANON-TWYQ-WPFU-Q	nature reserves or national parks over the Helena-	
	ANON-TWYQ-WPFP-J	Aurora Range, Die Hardy Range and Mount Manning	
	ANON-TWYQ-WPF6-R	with an indicated pre-disposition against development of	
	ANON-TWYQ-WP4E-N	these ranges" (Department of Industry and Resources	
	ANON-TWYQ-WP47-7	2007). Since this time, other ranges have been mined –	
	ANON-TWYQ-WP4M-W	such as Mungada Ridge and Mount Karara. The	
	ANON-TWYQ-WP4T-4	proposal is a small iron ore deposit and the economic	



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	ANON-TWYQ-WP4V-6	arguments do not stack u	arguments do not stack up.			
	ANON-TWYQ-WP4N-X	The HAR is of similar size	and ecolo	ogical diversi	ty to the	
	ANON-TWYQ-WPBA-Y	Porongurup Range (See t	able 1). T	he notable		
	WA Native Orchid Study and Conservation Group Inc.	distinction between the two is that one is a national park and one is not. If the Helena Auroroa Range was in a less remote location, public sentiment would			nal park Is in a	
	ANON-TWYQ-WPJ7-W			ρυδαίδ.		
	ANON-TWYQ-WPJB-8					
	BirdLife WA	Table 1. Comparison of the characteristi	cs of the Helena A	Aurora Range and the	e Porongurups.	
	ANON-TWYQ-WPBC-1	Helena Au	irora Range	Porongurups		
	ANON-TWYO-WP.IN-M	Area 2913ha	1.1.25	2621ha	_	
		Elevation 692m		670m	_	
	ANON-TWYQ-WPJU-U	Fauna species 538		96	-	
	ANON-TWYQ-WPB3-H	Status Cons. Rese	rve (not class A)	National Park		
	ANON-TWYQ-WPBJ-8					
	ANON-TWYQ-WPBK-9					
	Pew Charitable Trusts					
	ANON-TWYQ-WPBQ-F					
	ANON-TWYQ-WPJC-9					
	ANON-TWYQ-WPJ9-Y					
	ANON-TWYQ-WPFD-6					
	ANON-TWYQ-WP4S-3					
	355; 356					
	ANON-TWYQ-WP48-8					
	ANON-TWYQ-WPFW-S					
	BHLF-TWYQ-WP1A-E					
	ANON-TWYQ-WP4D-M					
	ANON-TWYQ-WP2Z-8					

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	ANON-TWYQ-WPF5-Q ANON-TWYQ-WPZJ-Z Toodyay Naturalists Club BHLF-TWYQ-WP1A-E ANON-TWYQ-WPF5-Q		
411	12; 19; 22; 27; 51; 65; 85; 104; 111; 113; 127; 138; 145; 149; 160; 209; 230; 233; 244; 267; 298; 315; 319; 324; 337; 344; 347; 349; 352 ANON-TWYQ-WPZ7-D ANON-TWYQ-WPZG-W The Subaru 4WD Club of Western Australia Inc ANON-TWYQ-WPFU-Q ANON-TWYQ-WPFU-Q ANON-TWYQ-WPF6-R ANON-TWYQ-WPF6-R ANON-TWYQ-WP4E-N ANON-TWYQ-WP4E-N ANON-TWYQ-WP47-7 ANON-TWYQ-WP4N-X ANON-TWYQ-WP4N-X ANON-TWYQ-WP47-7 ANON-TWYQ-WP47-7 ANON-TWYQ-WP47-7 ANON-TWYQ-WP47-7	"The concentration of conservation values associated with the HAR established that, for its size, it is one of the more significant biodiversity assets in WA. Recommendation: Reserve the range as an 'A Class' Nature Reserve for the protection of high concentrations of endemic rare flora and priority ecological communities; exceptional landforms; threatened fauna habitats; mature eucalypt woodlands that are declining in the Wheatbelt; and Aboriginal heritage." (EPA Bulletin 1256, 2007). Submitters agree that the HAR needs to be reserved, the majority stating that it should be reserved as a national park and questioned the current status as being a potentially compromised conservation park that allows mining.	MRL notes the position of the submitters in respect of the conservation status of the Helena-Aurora Range.



Issue No.	Submitter	Submission and/or issue	Response to comment
	WA Native Orchid Study and Conservation Group Inc. ANON-TWYQ-WPBX-P BirdLife WA ANON-TWYQ-WPJU-U ANON-TWYQ-WPBJ-8 ANON-TWYQ-WPBK-9 Pew Charitable Trusts		
412	ANON-TWYQ-WPPS-Y ANON-TWYQ-WPPX-4	An examination of areas west of Menzies and south to Southern Cross where open cut mining has been conducted reveals areas of complete devastation with huge areas covered by overburden which has been left and no attempt at rehabilitation has been attempted.	Menzies and Southern Cross are more than 200 km apart, and mining occupies a very small fraction of the land between these two locations. The PER notes that the impacts of mining in respect of the Proposal are intense but localised, and this is also true of the areas described west of Menzies and Southern Cross. MRL is unable to comment on the progress of rehabilitation in these locations.
413	ANON-TWYQ-WPFK-D	Page 4-3 of the PER under 'relevant matters for consideration as part of the significance test' it seems that most of the dot points when considered, should point to a conclusion that the proposal is 'unlikely to meet EPA objectives'. The first word of these un- numbered points are values, extent, consequence, resilience, level, objectives, public.	The PER considers these matters in detail, but does not reach the conclusion that the Proposal is incapable of meeting the EPA's objectives. Further information is required against each of the relevant matters in order to respond more fully to the submitter's assertion that the Proposal is unlikely to meet the EPA's objectives.
414	ANON-TWYQ-WPP9-5 ANON-TWYQ-WPZ7-D 37 ANON-TWYQ-WPZA-Q	Submitters commented on witnessing mining encroaching into the area and changes attributable to mining evident in the area and surrounds. Comment on evidence of increased pressure from tourism. Comment that the approval of the proposal would contribute a	Please refer to the relevant responses to issues raised in respect of amenity, including tourism. MRL disagrees with the submitters' assertion that approval of the Proposal <i>"would be akin to the loss of Lake Pedder in Tasmania or allowing mining within the</i>



Issue No.	Submitter	Submission and/or issue	Response to comment
	ANON-TWYQ-WP4B-J	significant stress to the existing environment. Submitters contended that approval of the proposal would be akin to the loss of Lake Pedder in Tasmania or allowing mining within the Stirling Ranges.	Stirling Ranges." The submitters do not discuss how the Helena-Aurora Range is "akin" to Lake Pedder and the Stirling Range and it is beyond the scope of this response to provide such a comparison.
415	ANON-TWYQ-WP1E-J Goldfields-Esperance Development Commission Kalgoorlie-Boulder Chamber of Commerce and Industry Inc. Logistic Management Services Pty Ltd Wheatbelt Development Commission, Shire of Yilgarn and Shire of Merredin ANON-TWYQ-WPF6-R Chamber of Commerce and Industry WA Rockingham Kwinana Chamber of Commerce 357 McVerde Minerals Pty Ltd	 The submitters support the proposal based on: the proponent's track record of good behaviour environmentally in this region and their ongoing development of their EMS and adoption ISO 14001; possible for the proponent to expand their mining operations as intended, and still leave most of the wonderful beauty intact; proposal can be appropriately managed; the provision of dockside employment and the flow on economic impacts on the Fremantle Port and supporting industry sectors is significant; the provision of approximately 401 jobs during construction phase; the provision of approximately 1500 jobs during the operations phase; the continued operation of locomotives and haulage trucks to transport the ore; the proposal area is isolated with minimal visitors; proponent has developed links with leading WA research organisations, including biological research initiatives in partnership with Curtin University, including support for post-doctoral research programs with Curtin University to research the biodiversity of the HAR and the Australian Research 	MRL notes the supportive submissions.



Issue No.	Submitter	Submission and/or issue	Response to comment
		 ranges in the MMHARCP remain 99% undisturbed with 97% of the BIF within the MMHARCP remaining intact and unaffected by mining as a result of implementation of this proposal; 	
		 offset program has been proposed to counter the residual impacts which would be achieved through on the ground improvements and enhancements in other areas of the MMHARCP, including world class research to be undertaken that will drive an increased understating of the unique taxa of conservation significance in the area; 	
		 increase in State income through Royalties payments estimated to be several hundred million dollars; and 	
		 a boost to the economy of several hundred million dollars through wages, taxes, procurements and capital and operational investments. 	
		Opportunities for employment for residents of the Goldfields-Esperance region would have a benefit on the local economy.	
		It is also understood that the proponent currently invests in mining services, communications, transport and other sectors from the Goldfileds-Esperance area that there is likely to be additional economic benefits for businesses involved in the mine-site through the service sector supply.	
		Furthermore, through the extension of the mine-site the the proponent may investigate their long-term strategic business options and consider utilising the Esperance Port as a route to market.	



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		The proposal would provide environmental offfsets and state revenue that can be directed towards investment in broader conservation initiatives in the GWW. The Woodlands are a potential source of tourism income for the regional community and tourism, mining and the environment can complement each other. Cessation of the proponent's mining in the Yilgarn will lead to a reduction in economic diversity in the region and the loss of all jobs and economic benefits flowing from the proponent's Yilgarn iron ore operations.	
416	ANON-TWYQ-WPHG-B	The case put forward for the short term economic benefit of a mining venture at this location, is predictable, simplistic and incomplete. The case for mining is mainly a preferential argument to obtain a 'license to operate'. The current case for benefitting society (as opposed to the financial benefits for the mining project itself) would fall apart if the in-perpetuity opportunity-cost of the HAR value to the economy as a 'natural landscape asset' were properly taken into account. The notion of mining at the HAR effectively discounts all future potential economic value of this landscape feature.	Refer to Issue 403 for the economic benefits of the proposal.
417	The Subaru 4WD Club of Western Australia Inc	The submitter supports the preservation of the natural environment in the HAR for the purposes of passive recreation and the conservation of geoheritage and biodiversity.	MRL notes the submitter's position regarding preservation of the natural environment in the Helena-Aurora Range.
418	10; 30; 43; 44; 74; 101; 108; 115; 122; 135; 137; 140; 148; 150; 151; 155; 161; 172; 180; 183; 197; 206; 219; 227; 246; 247;	Submitters were concerned about climate change and loss of habitat and biodiversity, believing that there should be a greater emphasis on renewable energy and sustainable industries. Submitters contended that too much of the natural	MRL is unable to comment on government policy for renewable energy and sustainable industries. The submitters generalise that "too much of the natural heritage and environment is being destroyed and is irreplaceable" but do not discuss the contribution that



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	264; 265; 266; 281; 301; 304; 307; 310; 329; 334	heritage and environment is being destroyed and is irreplaceable.	mining and other forms of development have made to the overall standard of living in Australia.
	ANON-TWYQ-WP4N-X	By ignoring effects of climate change, considering these mines as isolated projects and making no allowance for interactions between species, the proposal underestimates the potential fragility of the ecosystem, both in the operation and revegetation stages. As Karl- Heinz Wyrwoll notes in Appendix 6-B "The report lacks an awareness of future climate events, both in terms of general climate 'states' and possible changes in frequency of 'extreme' events. Such projected changes may well be necessary considerations in projecting landform response, in addition to playing an important role in remedial landform design."	In terms of climate change, MRL addressed the comments of the peer reviewer and revised the Landform Impact Assessment report accordingly (PER, Appendix 6-A, section 5.5). These revisions to the LIA report in respect of climate change were acknowledged by the peer reviewer in the close-out report (Appendix 6-B, section 2.7).
419	ANON-TWYQ-WP1C-G	The submittor objects to the proposal on the basis that the biodiversity on the island like ridges should be given maximum opportunity to evolve and adapt to the rapidly changing climate. The HAR should be protected from mining, formally protected to allow the ecosystem to evolve without imposing additional stress on geographically limited populations and ecosystems.	MRL notes the position of the submitter and that biodiversity will still be able to evolve and adapt to climate change
420	38; 93; 169 ANON-TWYQ-WPFT-P	Submitters indicated that their vote would be swayed at the upcoming State election if the proposal was approved. In the EPA's Strategic Plan, 2016 – 2019 it is stated: The primary purpose of the EPA is to protect the environment for present and future generations through the provision of sound, robust and transparent advice to the Minister for Environment. While the Minister for	MRL is not able to comment on voter preferences in relation to whether or not the Proposal is approved. MRL advises that a final decision on the Proposal is not scheduled to occur until after the March 2017 WA state election.





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		Environment is the primary recipient of our advice, the beneficiary is the WA society as a whole.	
		As the EPA is the only agency with a formal mandate to advise the Minister on matters of environmental protection, the public ("Western Australian society") is heavily reliant on it to inform the Minister of its wishes and concerns regarding the HAR, particularly when these align with the EPA's own conclusions. Other avenues open to the public are direct representation to relevant Ministers and parliamentarians, and ultimately a protest via the ballot box. The former of these will be enhanced by an EPA recommendation against mining, and whilst the submitter is aware of many who will vote against parties which allow mining at J5 and Bungalbin, this may be too late to save the Ranges—something the submitter is sure the proponent is well aware of.	
421	229; 273 ANON-TWYQ-WPZA-Q	The cost benefits to Australia in real terms must be measured against the devastation of its land. Is the proponent based overseas? Will the proponent be using 457 visa holders for labour requirements? Will Australia be subsidising power and water requirements? If so there is little benefit to Australia, as profits are removed; employment not offered to Australians – no real benefit to Australia's economy; overseas mining companies don't pay taxes to Australia and claim capital costs for years before anything is even due. Why would we give our heritage away, to satiate	MRL is one of Western Australia's most successful local companies. It is listed on the ASX200 index and employs over 1400 people. It is based in Applecross in Perth and is majority Australian owned.

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		overseas entities that do nothing for Australia for their own benefit?	
422	356	The estimation of the number of jobs created by the proposed development(s) appears baseless with actual employment statistics of similar sized mining operations bearing no resemblance to the published figures. Economic benefits to local communities would be minimal with workers and services by passing towns. The proponent's mines currently active in the area operate at a loss.	Refer to response to issue 433 for a full description of the economic benefits of the Proposal. MRL's current mining operations are profitable and have demonstrated an ability to operate at iron ore prices as low as US\$40/t. The iron ore price at the time of writing is US\$80/t.
423	The Wilderness Society	Submitter raises concerns that all the regional BIF mines are either mined or available for mining.	The impact of existing disturbance and approved disturbance not implemented on regional BIF landforms is presented in Table 6-2 in Attachment 1. This table identifies that the Die Hardy, Dryandra, Hunt Range, Jonson Range Mt Manning Range and Helena Aurora Range are all >99% intact. It is true that mining is not prohibited on any of these ranges; however it is important to note that any mining proposal would be subject to a rigorous Environmental Impact Assessment under Part IV of the EP Act, including consideration of cumulative impacts.
424	356	The PER does not appear to recognise the published 2013 "Class A" National Park proposal for the HAR (Bungalbin).	MRL is aware of various proposals calling for the Helena-Aurora Range to become part of a Class A reserve, including the Wilderness Society's 2013 proposal.
425	357	Submitter contends that the Mt Manning/HAR has been recognised as a mining area for 140 years with much historical exploration and mining. Taking account of the area's well-known mineralisation, access for mining was	MRL notes the submitter's support for the Proposal.



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		re-affirmed in 2010 by the WA Government's announcement that the area surrounding J5 (a granted mining lease) and BE (a pending mining lease) would be retained as a lower level, dual use mining and conservation area, rather than declaring the area an "A- class" reserve.	
		The EPA has failed to adequately recognise this 2010 Government Policy relating to the area. The EPA has also previously overblown and made claims relating to cumulative impact that are not backed up by legislation, policy, science or by any mutually acceptable methodology of environmental assessment and practice.	
		Development of mines at J5 and BE is consistent with the West Australian State Planning Strategy 2050 and the Goldfields-Esperance Regional Investment Blueprint which promotes regional economic diversity.	
		This project is in alignment with the Central East Sub- Regional Economic Strategy, the Wheatbelt Development Commission's Wheatbelt Regional Investment Blueprint as well as the Merriden Economic Development and Implementation Strategy.	
		The economic modelling conducted by AECOM for this project shows that the mine life extension through J5 and BE to be consistent with the principal strategic goals of global competition through leveraging off Western Australia's strong market reputation and building upon current capability in mining, logistics and iron ore shipping.	
		The submitter contends that the community expects a significant and enduring benefit from mining activity and that mining activity should be conducted to a high level	



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		of environmental and human safety and in the interests of West Australians.	
		The company embraces the environmental approvals and governance process and continues to develop its environmental management systems for the Proposal to obtain certification to ISO 14001: Environmental Management Systems.	
		Submitter reiterates research initiatives and funding with Curtin University outlined in the PER and recognition by AMEC for this research partnership.	
		Submitter states that the proponent is contributing a \$7 million Australian Research Council grant focussed around a training centre for mining rehabilitation.	
		An independent Economic Impact Study conducted by AECOM in September forecast that the project will make a strong contribution to the WA economy and employment.	
		Proposed Construction phase – Data Generated from AECOM Modelling	
		Expenditure by the proponent during the construction phase of its Yilgarn operations would:	
		 Generate an estimated \$71 million in direct economic output, with flow-on effects of \$102 million, giving an estimated total impact of \$173 million; 	
		• Contribute to value added an estimated \$21 million directly, with flow-on effects of \$50 million, giving an estimated total contribution of \$71 million. This is the estimated contribution to Gross State Product (GSP);	

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		• Generate household income estimated at \$11 million directly, with flow-on effects of \$24 million, giving an estimated total impact of \$35 million; and	
		 Generate State Government payroll tax payments of \$0.3 million8. 	
		Proposed Operations phase – Data Generated from AECOM Modelling	
		Expenditure by the proponent during the operations phase of its Yilgarn operations after 2017 would:	
		 Generate economic output, estimated to be \$340 million each year directly, with flow-on effects of \$270 million, giving an estimated total impact on the WA economy of \$611 million each year; 	
		 Contribute to an estimated \$190 million each year directly, with flow-on effects of \$128 million, giving an estimated total contribution of \$318 million each year to Gross State Product (GSP); and 	
		• Generate an estimated \$31 million each year directly in household income, with flow-on effects of \$65 million, giving an estimated total impact of \$96 million each year in household income in WA.	
		The operations phase of the proponent's Yilgarn operations after 2017 would:	
		 Contribute \$21.89 million each year to State Government royalty revenue (last year actual payment was \$21.4million); and 	
		 Generate from direct and indirect employment of 1,496 FTEs State Government payroll tax payments of \$3.3 million each year. 	
		According to AECOM modelling, the construction phase	



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		(distinct from operations phase) will provide direct employment of 98 FTE positions, including a construction workforce of 70 positions for a six-month period. The estimated flow-on employment is 303 FTE positions, giving total employment impact of 401 FTE positions during construction.	
		During the operations phase, the modelling forecasts, that the Proposal will provide employment Support direct employment of 585 FTE positions each year, including 425 FTE positions for site-based employees, contractors, train drivers, Fremantle Port staff and support staff. The estimated flow-on employment is 911 FTE positions, giving total positive employment impact of 1,496 FTE positions per annum past 2030.	
426	357	The proponent's Carina Village has the only Civil Aviation Safety Authority (CASA) approved, operational airport in the area (East Jaurdi). It has a medium sized, jet-capable sealed runway. It is included in the RFDS data base as both day and night capable with the last evacuation flight conducted by the Royal Flying Doctor Service (RFDS) into East Jaurdi being in October 2013.	MRL notes the recognition by the submitter of the important infrastructure that exists in the region due to MRL's mining activities.
		This facility allows diverting and emergency response aircraft (RFDS) 24/7 access thus delivering outstanding connectivity for the region at all times. The proponent's strip is the only certified day and night jet capable airfield in the East Jaurdi area, with an available runway length of 1,900m and the ability to handle up to Code C aircraft12. In addition, the airport has a fully trained emergency team, providing the best level of safety	



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		response for all aircraft operations. East Jaurdi is the CASA certified day/night back up air strip able to be used if the strip at Kalgoorlie is unavailable. Jets as large as Boeing 737s can safely take off and land. The Village hospital is also well equipped and staffed by trained medics. These facilities are available for use in emergencies by government agencies and the RFDS. Campers and 4wheel drivers, in addition to neighbouring pastoralists and exploration crews benefit from having these vital emergency facilities in place. In addition, the proponent's recovery vehicles are on call to rescue stranded 4wheel drivers.	
427	356	The PER does not explain why the J5 ore must be blended with the ore at Bungalbin East. The two proposals should be assessed separately.	The mineralisation at J5 is of higher phosphorous content which is unsuitable as a standalone iron ore product specification. By blending with Bungalbin East, a marketable specification can be achieved.
428	The Wilderness Society	The submitter provided a timeline of government recommendations and approvals for the exploration and mining leases in the proposal area. In particular, the Minister for Environment's advice to 'refuse the grant' of ML1095 (J5) and M1096 (Bungalbin Hill). A recommendation has not been provided by the Minister for Environment on the pending M1097 (Bungalbin East)	Noted.
429	The Wilderness Society 356	The submitter contends that the proponent will sell the approved mine to another company and provides copies of the proponent's statements.	The submitter correctly identifies MRL's public position on the possible divestment of its Yilgarn Operations and the intention of MRL to continuing to operate the assets



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		It is the proponent's intention to divest itself of its mining subsidiaries and concentrate on what it is renowned for: providing quality services, cost-effectively." <u>http://www.mineralresources.com.au/corporate/mrl-</u> <u>structure-strategy.html</u> (Accessed 31 October 2016) "Case study – Yilgarn: MRL will look to monetise the product profit of the Yilgarn project but retain all the mining infrastructure services contracts for life of mine." <u>http://www.mineralresources.com.au/images/Bell_Potter</u> <u>Emerging_Leaders_conf_230316.pdf</u> (Accessed 31 October 2016)	as a contractor. Any approvals granted to MRL relate to the Proposal not the company and any potential incoming party must comply with the conditions of approval, just as MRL must.
	Environmental Defender's Office of Western Australia (Inc)	 The proposal broadly is the establishment of an iron ore mine with the intention of exporting the ore by ship. The scoping document states at page 4 para 1 line 4 "ore would be processed and exported via existing facilities at the Mount Walton siding on the Tran- Australia railway and Kwinana Port. And further on Page 4 Paragraph 2 "The developmentwould result in the extraction of an estimated 65-115 million Tonnes of iron ore over the 15-20 year life of the mines". It is clear that sole purpose of the proposed mine is to extract iron ore for the purpose of export by ship from a state based port. The transport and shipping arrangements in relation to iron ore extracted are an integral part of the proposal however the proponent has not addressed any potential risks to the onvironment than may be 	MRL advises that processing, transport and shipping arrangements do not form part of the Proposal as these aspects of the existing operation are already approved. MRL advises that the rail load-out and ore processing facilities were assessed by the EPA in relation to MRL's J4 and Carina operations and approved under Ministerial Statements 852, 957, and 988. Shipping-related activities at Kwinana port have already been assessed and approved by the Department of Environmental Regulation under a different part of the same legislation (i.e. Part V of the EP Act).



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		caused by these activities.	
		5. The proponent has not dealt with the issue of loading of the ore at all in it's PER. The closest it gets to the export of the iron ore is Section 2.1 paragraph 3 line 2 where it states "The processing facility dry crushes and the screens the ore to a suitable size for loading onto ore trains at the Mt Walton siding on the Trans-Australian railway line".	
		 The activities at the Kwinana Bulk Terminal (KBT) of Fremantle Ports have never been assessed by the EPA. 	
		 The loading of the iron ore at KBT has the potential to cause serious environmental harm to the waters of Cockburn Sound and have a detrimental effect on the health of residents in the vicinity. 	
		 As matters stand at present the environmental risks of the whole project have not been addressed in the PER. 	
430	ANON-TWYQ-WPB8-P	The proponent's PER Executive Summary makes claims about workforce numbers, economic investment and economic multiplier effects. Social and economic considerations are not considered by the EPA in its Part IV assessment process. Why have these been included when the environmental impact assessment process does not provide for the testing of the proponent's claims? The Executive Summary (page iii) makes the claim that there are no significant residual impacts, other than on vegetation and flora. This completely ignores the impact	MRL notes that economic considerations of proposals are not able to be taken into account by the EPA in its assessment of proposals under Part IV of the <i>Environmental Protection Act 1986</i> (WA). MRL provides this information for the purpose of context. It gives the reader a better overall understanding of the Proposal. It is open for anyone to test MRL's claims in this regard, although such information would not be considered by the EPA in the Part IV process. The economic considerations are of interest to Minister for Environment who takes such factors into account.



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		on landform.	The definition of the environment in the Environmental Protection Act 1986 includes social surroundings:
			Environment, subject to subsection (2), means living things, their physical, biological and social surroundings, and interactions between all of these (Subsection 3(1)).
			This means that, for the purposes of EIA, social surroundings is a part of the environment that may require consideration.
			However, the EP Act includes an important qualification in its definition of social surroundings:
			For the purposes of the definition of environment in subsection (1), the social surroundings of man are his aesthetic, cultural, economic and social surroundings to the extent that those surroundings directly affect or are affected by his physical or biological surroundings (Subsection 3(2)).
			In effect this means that, for social surroundings to be considered in EIA, there must be a clear link between a proposal or scheme's impact on the physical or biological surroundings and the subsequent impact on a person's aesthetic, cultural, economic or social surroundings.
			For further information please see the Environmental Factor Guideline for Social Surroundings.
			The matters of social surroundings are considered as part of Chapter 10, Amenity of the PER.
			The PER has not completely ignored the impact on landform, rather it has assessed the impact of the Proposal on the physical landform of the Helena-Aurora Range and concluded that it is not significant.



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431	ANON-TWYQ-WPJG-D	The submitter raised concerns of a conflict of interest with an ecological consulting firm involved in the environmental assessment of the J5 and Bungalbin East proposals with regard to close associations with mining companies and strong interests in the mining industry.	MRL advises that all of its consultants are professionals in their respective fields and that any allegations of a conflict are unfounded.
432	ANON-TWYQ-WPZJ-Z 356	The submitter contends that the proposal is of low value to the proponent as they are primarily a mining service company and the mines already operated by the proponent in the area operate at a loss. The proponent will not publish their JORC compliant ore reserves and resources which would disclose the quantity of ore that can be mined at J5 and Bungalbin East at a profit to the company. The submitter is concerned that the deposit has no economic value to the company other than the mining contracts. The proponent has disclosed to investors at the Bell Potter Emerging Leaders Conference in March 2016 that they intend to sell the mine but keep the mining infrastructure servicing contracts post approval.	Refer to responses 403 and 429.
433	ANON-TWYQ-WPZQ-7	 If the proponent facility located within the Kwinana Heavy Industrial Area (KIA) which employs 148 people directly within the KIA closed this would have negative economic consequences upon the City of Kwinana, our neighbouring local governments and Western Australia. The negative consequences of the direct loss of 148 jobs from the closure of Mineral Resources Limited within Kwinana would be dramatic: The closure of the Kwinana Workshop would lead to a loss of 192 direct and indirect jobs located within the City of Kwinana. This would be felt across a 	The submitter's support for the proposal is noted.

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		 range of industries; Around 33% or 64 of these jobs would be lost by residents who live and work in the City of Kwinana. This is because residents outside the City of Kwinana travel to the KIA for work; This loss in jobs would lead to a subsequent decline in the City of Kwinana's economy (Gross Regional Product) by the value of \$14.75m. This would have a -0.5% impact on the local economy; The closure would also impact on other areas of Australia. In total cumulative impact on the national economy (GDP) is estimated to be around \$22.85m (of which \$14.75m is lost from the City of Kwinana). 	
434	ANON-TWYQ-WP1K-R	In 1864 when Charles Harper and others explored between the York/Toodyay area and what became the Hunt Range at the eastern end of the Helena-Auroras he passed through "large belts of thicket composed of acacia (sic), casuarina and hakea, with occasional strips of forest (eucalypti)", Mercer (1958:26). The group also encountered large belts of dense thicket, and from the luxuriance of the vegetation he said they could almost imagine themselves in a tropical region. One could hardly say this now where most of the countryside has been cleared and much of it has succumbed to salinity. It appears to have been a year of minimal rainfall and by the time they reached their furthest destination, Mount. Hunt, they proclaimed the area not suitable for pastoral concerns. Having visited the range and viewed the area from the highest point I can only be delighted that it was not	The submission is noted.



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		found suitable for farming and grazing. It is one of the most pristine views I have seen, only spoiled by a few incursions brought about by mining.	
		Whilst at the Helena-Auroras the group made the discovery of a plant which amongst others is endemic to the range.	
I have no doubt that if he were alive today, he, would be horrified to see the wanton destruction of bushland and aboriginal sacred sites which has happened in the 20th and even now, where one would think we could be learning from our mistakes, continues into the 21 st century.			
435	ANON-TWYQ-WP1Q-X	The submitter is of the view that PER considers the impact of the proposal on a discrete factor by factor basis and erroneously concludes, in some instances in the absence of site specific data (groundwater, stygofauna) and in other instances by relying on incomplete or flawed data (landforms, vegetation and flora), that the EPA objectives can be met. The PER is considered deficient in (i) not describing or examining the substantial increment in cumulative impact on recognised regional environmental values; and in (ii) not addressing the binary consequence of irreversibly altering the status of an area with biodiversity and environmental values widely acknowledged as among the most significant in Western Australia from 'pristine' to 'impacted'.	The PER has been prepared in accordance with the ESD for the Proposal as well as relevant EPA and non- EPA guidance and policy. It includes assessment of cumulative impacts on a range of preliminary key environmental factors at both local and regional scales. MRL notes the submitter's position with respect to 'pristine' versus 'impacted' landscapes and acknowledges that the benefits of mining cannot be realised without affecting the stated biodiversity and environmental values. Importantly, however, these values are capable of co-existing with mining. Refer to the response to issue 60 in respect of the confluence of factors.
436	ANON-TWYQ-WP1P-W	Any resource project development must balance the benefits to the economy - local, state, and national (the	Refer to responses 401, 403 and 429.



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		"positive externalities") against the costs of the development upon the wider community (the "negative externalities").	
		In the case of this proposal, the negative externalities clearly, obviously and vastly outweigh the purported benefits of the Proposal for the following reasons each individually sufficient to justify disapproval;	
		1. Competence	
		The submitter has concerns regarding the capacity and competence of the proponent to undertake the proposed mining operation while observing proper environmental and sustainability standards, particularly in an ecologically sensitive and geologically unique area such as the HAR area.	
		The submitter contends that the proponent has a pattern of breaches of environmental regulations, including multiple investigations, and fines on least three occasions in the past two years.	
		2. Poor governance standards of the proponent	
		The submitter contends that the proponents' governance standards fall well short of best practice, and below even the moderate governance standards generally observed by the Australian resources sector.	
		The lack of clear reporting makes it impossible to properly assess the veracity of the proponent's claims in the PER. In seeking to justify the proposal the proponent asserts the following project benefits 3	
		 Estimated project life of up to 15 years Becovery of 65-115 million tonnes of ore 	
		Recovery of 65-115 million tonnes of ore	



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		 425 person permanent workforce It is not possible to verify these claims without the following additional information; 	
		 JORC reports for all of the proponent's iron ore operations; 	
		 3 years of audited financial statements of Polaris Minerals NL 	
		• Disclosure of the fiscal terms of the Mining Services Contracts between MRL group companies and Polaris and other entities owning iron ore assets.	
		The provision of JORC reports is standard resource industry practice, and is required under Chapter 5 of the ASX Listing Rules. The proponent does not comply on the basis that it does not consider itself a mining company, but a mining services company and is therefore exempt. A "mining producing entity" as defined in the ASX listing rules is an entity whose primary activity is extraction of minerals - "extraction" includes "developing the infrastructure needed to extract minerals".	
		The proponent makes this assertion despite the fact that it describes itself publically as "provider of mining infrastructure services" and even in the PER, on the following terms; "MRL has established itself as a medium sized West Australian iron ore producer with Operations in the Pilbara and Yilgarn areas of WA.	
		Moreover, 35% of the proponent's EBITDA is derived from mining activities. This is not the conduct of a socially responsible, transparent and well run public listed company.	



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		These governance issues are relevant to the PER because they call into question the proponent's institutional integrity, and thereby its capacity and intent to meet any undertakings given in the PER, or to stakeholders and the people of WA generally.	
		3. Transparency	
		The submitter contends that the failure to report JORC1 reports and audited financial statements for the proponent Polaris Minerals NL (a 100% owned subsidiary) do not allow a proper financial analysis of the viability of the proposal. The submitter contends that the Proposed mines will never deliver the purported fiscal and employment benefits suggested in the PER. The submitter contends that the lack of transparency is also evident in the PER as the proponent does not	
		acknowledge the unique values of the HAR; makes statements that the HAR is largely complete and in relatively good condition but is not pristine; the additional disturbance as a result of the proposal is small.	
		The submitter contends that the disturbance to the pristine condition is erosion arising as a result of tracks cut for exploration purposes. The proponent is taking the position that exploration activity has already degraded the HAR thus it should be permitted to further degrade it through mining; and this will likely extend to future mining proposals.	
		4. MRL Objectives	
		The proponent states openly that it intends to sell its Yilgarn resources (but retain the mining services	



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		contract).	
		Based on available information the submitter contends	
		that the proponent's Yilgarn iron ore activities are	
		unprofitable.	

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