


Health, Safety and Environment
BHP BILLITON IRON ORE
 resourcing the future

EASTERN RIDGE
Conservation Significant Fauna Species

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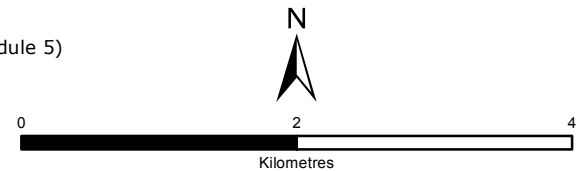
LEGEND

- Semi-permanent waterholes
- Proposed Eastern Ridge Development Envelope

Significant Fauna Observations

- *Liasis olivaceus* subsp. *barroni* (Pilbara Olive Python) (EPBC Act Vulnerable; WC Act, Schedule 3)
- Macroderma gigas* (Ghost Bat) (WC Act Schedule 3, DPaW Priority 4)
- *Merops ornatus* (Rainbow Bee-eater) (EPBC Act Migratory; WC Act Schedule 5)
- *Pseudomys chapmani* (Western Pebble-mound Mouse) (DPaW Priority 4)
- *Falco peregrinus* (Peregrine Falcon) (WC Act Schedule 7)

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6. Other Environmental Factors

An assessment of the environmental factors not considered to be key for this Proposal is provided in Table 13. The other environmental factors for the Proposal include:

- landforms;
- subterranean fauna (troglofauna);
- terrestrial environmental quality;
- terrestrial fauna (short-range endemic invertebrate fauna);
- inland waters environmental quality;
- air quality and atmospheric gases;
- amenity;
- heritage; and
- human health (noise).

Table 13: Other Environmental Factors

Aspects and potential impacts	Mitigation actions to address residual impacts	Proposed mechanism for ensuring mitigation
Landforms – To maintain the variety, integrity, ecological functions and environmental values of landforms.		
<p>Alteration of landform through creation of pits, overburden storage areas and overland infrastructure corridors.</p> <p>The suitability of soils at the Eastern Ridge mining operations as growth media during rehabilitation has been assessed as part of the WAIO Growth Media Atlas.</p> <p>Impacts to landscapes and landforms within the associated land systems in the Pilbara region have been assessed as negligible.</p>	<p>Reduce the requirement for overburden storage areas through disposal of waste rock within mine pits where practicable. Where this is not practicable, any required overburden storage areas will be designed to blend with the natural landforms.</p>	<p>Landforms will be managed by the Ministerial Statement and the implementation of the Eastern Pilbara Mine Closure Plan and the Condition Environmental Management Plan.</p> <p>BHP Billiton Iron Ore considers it will meet the EPA objective for this factor within the Proposal area.</p>
Subterranean Fauna (Troglifauna) – To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.		
<p>Troglifauna species within the Development Envelope have the potential to be impacted by pit excavation. The troglifauna community at Eastern Ridge has been found to be relatively widely distributed throughout the surrounding region (Bennelongia Environmental Consultants 2015b).</p> <p>Thirty-two troglifauna species are known from within the Development Envelope. Two of these species are only known from the proposed mine pits, however are considered unlikely to be restricted to the proposed mine pits areas (Bennelongia Environmental Consultants 2015b).</p>	<p>No mitigation action is proposed for this factor.</p>	<p>No regulatory mechanism is proposed; no mitigation actions are required as troglifauna species are not considered to be constrained to the proposed mine pit areas.</p> <p>BHP Billiton Iron Ore considers it will meet the EPA objective for this factor within the Proposal area.</p>
Terrestrial Environmental Quality – To maintain the quality of land and soils so that the environmental values, both ecological and social, are protected.		
<p>Potential to contaminate land and soils with waste materials and dangerous goods, through the mining of PAF material.</p> <p>It has been predicted that there is a low to negligible risk of AMD from stockpiles, and low risk of AMD from overburden storage areas and from pit walls (however there are small isolated hot in some pits) (SRK 2015a-2015g).</p>	<p>Leading practices will be implemented in accordance with the WAIO AMD Management Standard to minimise AMD generation and discharge.</p> <p>Pit walls with PAF hot spots will be managed in accordance with the Eastern Ridge Mine Closure Plan.</p>	<p>Terrestrial Environmental Quality post-closure will be managed by the Ministerial Statement and the implementation of the Eastern Pilbara Mine Closure Plan. BHP Billiton Iron Ore will also manage its operations in accordance with the specific requirements for the management of solid waste, which form part of the prescribed premises boundary operating conditions licensed under Part V of the EP Act.</p> <p>BHP Billiton Iron Ore considers it will meet the EPA objective for this factor within the Proposal area.</p>

Aspects and potential impacts	Mitigation actions to address residual impacts	Proposed mechanism for ensuring mitigation
Terrestrial Fauna (Short-range Endemic Invertebrate Fauna) – To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.		
<p>Eight potential short-range endemic (SRE) invertebrate fauna species have been recorded from within the Development Envelope. The direct impact of the Proposal is considered to be low to negligible for all potential SRE species and their habitats, as they have all been recorded beyond the Development Envelope throughout the local or wider regional area (Biologic Environmental Survey 2015a).</p>	<p>Existing infrastructure and facilities will be used and waste rock will be disposed of within mine pits where practicable to reduce the clearing requirements.</p> <p>PEAHR must be in place prior to land disturbance to minimise impacts to native vegetation through unauthorised clearing.</p>	<p>Terrestrial fauna will be managed by the Ministerial Statement and the implementation of the Condition Environmental Management Plan.</p> <p>BHP Billiton Iron Ore considers it will meet the EPA objective for this factor within the Proposal area.</p>
Inland Waters Environmental Quality – To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.		
<p>Dewatering is proposed to be used as an operational water supply. Surplus water generated by dewatering will be managed in accordance with the Eastern Pilbara Water Resource Management Plan (Appendix I). This plan will include the following hierarchy of management options for surplus water:</p> <ul style="list-style-type: none"> • re-used onsite in mining operations; • transferred to other nearby operations for use onsite; and • discharged via Ophthalmia Dam or the associated infiltration basins and recharge ponds. <p>The groundwater across the Proposal and adjacent Ophthalmia Dam area is generally fresh with salinity values typically below 2,000 mg/L TDS. The dewatering water quality is consistent with the regional groundwater quality and lends itself to be preferentially returned to the subsurface via recharge ponds and infiltration basins.</p> <p>Water and salt balance studies for Ophthalmia Dam and Ethel Gorge (RPS 2014) indicate that groundwater salinity has the potential to increase over time without the appropriate management.</p> <p>The subsequent seepage of elevated TDS into the shallow groundwater could impact the Ethel Gorge Aquifer Stygobiont Community further downstream, although 35 years of historical monitoring does not demonstrate an</p>	<p>Dewatering discharge will continue to be managed under the DER Operating Licence (L6942/1997/13), and through the implementation of the Eastern Pilbara Water Resource Management Plan (Appendix I) to manage water quality regionally and at a catchment level.</p> <p>Impacts and the potential risks from pit lakes to inland water quality will be managed through the triggers and thresholds for water quality outlined in the Eastern Pilbara Water Resource Management Plan (Appendix I).</p> <p>Potential impacts from water quality changes to the Ethel Gorge aquifer will be managed as outlined in the Eastern Pilbara Water Resource Management Plan (Appendix I).</p>	<p>Inland waters environmental quality will be managed by the Ministerial Statement and the implementation of the Eastern Pilbara Water Resource Management Plan.</p> <p>BHP Billiton Iron Ore considers it will meet the EPA objective for this factor within the Proposal area.</p>

Aspects and potential impacts	Mitigation actions to address residual impacts	Proposed mechanism for ensuring mitigation
<p>increase to the TDS in the shallow aquifer of Ethel Gorge.</p> <p>Water quality monitoring will be undertaken in accordance with the adaptive management approach outlined within the Eastern Pilbara Water Resource Management Plan to identify such conditions as they start to develop to allow timely mitigation to be implemented prior to any significant impacts occurring.</p> <p>Potential impacts to groundwater levels resulting from surplus water management is addressed under the Hydrological Processes factor in Table 10 and potential impacts to salinity resulting from post-closure pit voids is addressed under the Rehabilitation and Decommissioning factor in Table 12.</p>		
<p>Air Quality and Atmospheric Gases – To maintain air quality for the protection of the environment and human health and amenity, and to minimise the emission of greenhouse and other atmospheric gases through the application of best practice.</p>		
<p>Potential impacts to air quality and atmospheric gases through the excavating and handling of iron ore and overburden including blasting; wind erosion from iron ore stockpiles and overburden storage areas; and associated mining activities.</p> <p>There are no third-party operators in between the Proposal and the identified sensitive receptors. Current monitoring and modelling demonstrates that current mining activities contribute to the level of air borne dust in the Newman township.</p> <p>The Proposal is predicted to contribute minimal additional impact from dust emissions to current baseline conditions in the region.</p> <p>Greenhouse gas emissions from the Proposal are anticipated to be minimal, with an estimated 0.26% contribution to Western Australia's 2011/2012 greenhouse inventory.</p>	<p>Implement standard dust controls across operations to minimise dust emissions to reduce impacts at nearby sensitive receptors.</p> <p>Identify several opportunities to reduce greenhouse gas emissions through the implementation of 'reduction projects' across operations to be implemented where appropriate to support BHP Billiton's Public Commitment to maintain emissions at FY06 baseline by FY17 through the application of best practice.</p>	<p>Air quality and atmospheric gases will be managed by Part V of the EP Act (Environmental Licence to Operate), the <i>Clean Energy Act 2011</i> (Cwth) and the <i>National Greenhouse and Energy Reporting Act 2007</i> (Cwth).</p> <p>BHP Billiton Iron Ore considers it will meet the EPA objective for this factor within the Proposal area.</p>
<p>Heritage – To ensure that historical and cultural associations, and natural heritage, are not adversely affected.</p>		
<p>The Proposal will require land disturbance which has the potential to impact on known archaeological or ethnographical sites.</p>	<p>Existing infrastructure and facilities will be used and waste rock will be disposed of within mine pits where practicable to reduce the clearing requirements.</p>	<p>BHP Billiton Iron Ore works to avoid and mitigate impacts to heritage sites through the application of the Heritage Act. Where avoidance cannot be avoided,</p>

Aspects and potential impacts	Mitigation actions to address residual impacts	Proposed mechanism for ensuring mitigation
<p>The Development Envelope lies within the Nyiyaparli native title claim. Surveys have been conducted and sites have been identified within the Proposal area and surrounds.</p>	<p>PEAHR must be in place prior to land disturbance to minimise impacts to native vegetation through unauthorised clearing.</p>	<p>BHP Billiton Iron Ore will not disturb sites without obtaining proper approvals under the <i>Aboriginal Heritage Act 1972</i>.</p> <p>BHP Billiton Iron Ore considers it will meet the EPA objective for this factor within the Proposal area.</p>
<p>Amenity – To ensure that impacts to amenity are reduced as low as reasonably practicable.</p>		
<p>Modification of landforms and the presence of Proposal infrastructure, mine pit and overburden storage areas, have the potential to reduce visual amenity.</p> <p>Impact assessment concluded that the Proposal is unlikely to significantly affect the visual amenity values of Newman. At a regional landform and landscape scale, impacts are also considered relatively small given that only a fractional percentage of landscape and landform types may be affected.</p>	<p>There are no residual impacts which require mitigation.</p>	<p>No regulatory mechanism is proposed; no mitigation actions are required as there are no residual impacts.</p> <p>BHP Billiton Iron Ore considers it will meet the EPA objective for this factor within the Proposal area.</p>
<p>Human Health – To ensure that human health is not adversely affected.</p>		
<p>Creation of noise emissions which may have the potential to impact human health (hearing).</p> <p>Based on the worst-case modelling scenario, received noise levels in Newman are predicted to be above the 30 decibels (dB [A]) in isolation and the 35 dB (A) cumulative assigned noise level at a number of township receptors.</p> <p>The noise modelling assumes however, the use of three fleets at the Eastern Pilbara mining operations, worst case meteorological conditions and worst case noise source levels and location for mobile equipment. This scenario is unlikely to eventuate and it is likely that noise impacts will be below required regulations.</p>	<p>Implement standard noise controls and management across operations to minimise noise emissions and impacts at nearby sensitive receptors.</p> <p>Blasting is only undertaken during daylight hours.</p>	<p>Human health will be managed by the Ministerial Statement and in accordance with the <i>Environmental Protection (Noise) Regulations 1997</i> (EPA 2014b).</p> <p>BHP Billiton Iron Ore considers it will meet the EPA objective for this factor within the Proposal area.</p>

7. Principles of the Environmental Protection Act

The objectives of the EP Act and the principles of Environmental Impact Assessment have been addressed and the Proposal meets the criteria for an Assessment of Proponent Information (API) Category A as described in the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2012* (Administrative Procedures) (EPA 2012b). BHP Billiton Iron Ore proposes that the Proposal is consistent with the criteria outlined within Section 10.1.1 of the Administrative Procedures. Table 14 provides a summary of how BHP Billiton Iron Ore has considered the criteria for API Category A within this Referral Document.

Table 14: Consideration of Administrative Procedures

API Category A criteria	Consideration within the Proposal	Referral Section
(a) The proposal raises a limited number of key environmental factors that can be readily managed and for which there is an established condition-setting framework.	Yes; four preliminary key factors have been proposed (Flora and vegetation, Subterranean fauna [stygo fauna], Terrestrial fauna (vertebrate fauna) and Hydrological processes. The two integrating factors of Rehabilitation and decommissioning and Offsets have also been considered.	Section 5
(b) The proposal is consistent with established environmental policies, guidelines and standards.	Yes; the Proposal is consistent with relevant EPA guidelines and the environmental factors have been addressed in accordance with the <i>Offsets Guideline</i> (WA Government 2014).	Section 1.3 Section 4 (Table 5) Section 5
(c) The proponent can demonstrate that it has conducted appropriate and effective stakeholder consultation, in particular with DMAs.	Yes; appropriate consultation has been undertaken in relation to this Proposal and for Eastern Ridge mining operations.	Section 3 (Table 4)
(d) There is limited or local concern only about the likely effect of the proposal, if implemented, on the environment.	Yes; there have been no issues or concerns raised with regard to implementation of this Proposal.	Section 3 (Table 4)

The principles of Ecologically Sustainable Development are incorporated into the *Environmental Protection Act 1986* and EAG No. 8 (EPA 2015b). These principles are:

- the precautionary principle;
- the principle of intergenerational equity;
- the principle of the conservation of biological diversity and ecological integrity;
- principles in relation to improved valuation, pricing and incentive mechanisms; and
- the principle of waste minimisation.

Table 15 provides a summary of how BHP Billiton Iron Ore has considered the principles of Ecologically Sustainable Development for the Proposal.

Table 15: Consideration of Principles of the Environmental Protection Act

Description of Principle	Consideration given within the Proposal
<p><i>1. Precautionary Principle</i></p> <p>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</p> <p>In the application of the precautionary principle, decisions should be guided by:</p> <ul style="list-style-type: none"> • careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and • an assessment of the risk-weighted consequences of various options. 	<p>Baseline biological surveys and technical modelling (including air, noise and water) have been carried out. Specialist technical environmental impact assessments, including noise, air quality, water and visual impact assessments have been carried out to assess potential impacts and propose potential management strategies. The mitigation hierarchy has been applied to address residual impacts.</p>
<p><i>2. Intergenerational Equity</i></p> <p>The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.</p>	<p>BHP Billiton Iron Ore has prepared an environmental impact assessment to inform whether and how the Proposal should proceed. Technical studies and modelling have been carried out to inform this Referral Document.</p> <p>BHP Billiton Iron Ore has also updated the Eastern Ridge Mine Closure Plan with an overarching closure objective that mining activities should not impact future generations.</p>
<p><i>3. Conservation of biological diversity and ecological integrity</i></p> <p>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</p>	<p>Baseline biological surveys and technical modelling (including air, noise and water) have been completed. Technical environmental impact assessments have been completed. Standard industry management measures can be used or adapted to mitigate biodiversity and ecological impacts associated with implementation of the Proposal.</p>
<p><i>4. Improved valuation, pricing and incentive mechanisms</i></p> <p>Environmental factors should be included in the valuation of assets and services.</p> <p>The polluter pays principle - those who generate pollution and waste should bear the cost of containment, avoidance or abatement.</p> <p>The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.</p> <p>Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.</p>	<p>Environmental factors have been considered throughout the development of this Referral Document. Specialist technical studies have been carried out to inform detailed impact evaluations and management measures which aim to minimise pollution and waste.</p>
<p><i>5. Waste minimisation</i></p> <p>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</p>	<p>Standard waste management measures are a key element for the implementation of this Proposal. It is standard practice for BHP Billiton Iron Ore to apply the waste management hierarchy to all sites and this will be the case in relation to this Proposal (i.e. avoidance, reuse, recycling, recovery of energy, treatment, containment and disposal).</p>

8. Conclusion

Eastern Ridge has been operating in the Pilbara region since 1998 (initially at Orebody 25). BHP Billiton Iron Ore considers it has undertaken the required studies and impact assessments to support the Eastern Ridge Revised Proposal.

The Proposal will amalgamate the existing Orebody 25, Orebody 24 and Orebody 32 (Ministerial Statements 712, 834 and 1018) under one new Ministerial Statement which will also include the new satellite iron ore deposit at Orebody 25 West.

This Referral Document provides supporting information to the EPA in order to undertake an environmental impact assessment of the Proposal and to determine the Level of Assessment.

An environmental impact assessment has been completed for the Proposal. The summary of the key findings and supporting information is provided for the environmental factors in order to assess impacts associated with the proposed development at the existing Eastern Ridge mining operations. The document includes a framework summary to implement relevant environmental management components.

BHP Billiton Iron Ore proposes that the environmental factors can be adequately managed to meet the EPA's objectives for each factor, provided the proposed management measures continue to be implemented at Eastern Ridge.

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Appendices

Appendix A: EPA Referral Form

Appendix B: Justification for Key Characteristics Table

Appendix C: Eastern Ridge Flora and Vegetation Environmental Impact Assessment

Appendix D: Eastern Ridge Revised Proposal Stygofauna Assessment

Appendix E: Eastern Ridge Revised Proposal Vertebrate Fauna Environmental Impact Assessment

Appendix F: Eastern Ridge Revised Proposal Hydrological Change Assessment

Appendix G: Eastern Ridge Mine Closure Plan

Appendix H: Condition Environmental Management Plan

Appendix I: Eastern Pilbara Water Resource Management Plan

Appendix J: Proposed Ministerial Conditions

Appendix K: Offsets Form