Mesa A Hub Revised Proposal

Revised environmental offsets proposal

Prepared for Rio Tinto by Eco Logical Australia

March 2019

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1. INTRODUCTION

The Mesa A Hub Revised Proposal (the Revised Proposal) is a revision of the existing Mesa A/Warramboo Iron Ore Project. The Proposed Change includes extension of the existing Mesa A and Warramboo mine pits and development of new nearby deposits: Highway/Tod Bore, Mesa B and Mesa C. This document provides a revision to the offsets proposed in the Mesa A Hub Revised Proposal Environmental Review Document (ERD), in response to submissions received during the public review period and subsequent discussions with regulators.

1.1 WA Environmental Offsets Policy and Guideline

The WA Environmental Offsets Policy (Government of Western Australia 2011) and WA Environmental Offsets Guideline (Government of Western Australia 2014) provide guidance to proponents on the approach needed to determine offset requirements for proposals. The Environmental Offsets Guideline (2014) states that:

> "In general, significant residual impacts include those that affect rare and endangered plants and animals (such as DRF and threatened species that are protected by statute), areas within the formal conservation reserve system, important environmental systems and species that are protected under international agreements (such as Ramsar listed wetlands) and areas that are already defined as being critically impacted in a cumulative context. Impacts may also be significant if, for example, they could cause plants or animals to become rare or endangered, or they affect vegetation which provides important ecological functions".

The rate, scale and nature of current and future development, combined with the impacts of other land uses and threatening processes, have raised the Environmental Protection Authority's (EPA) concerns about cumulative environmental impacts in the Pilbara region (EPA 2017a). In particular, the EPA is concerned about the clearing of native vegetation combined with pastoralism, feral animals, weeds and climate change in the Pilbara, and the lack of reliable information on the extent and condition of native vegetation at a regional scale (EPA 2017a). The Pilbara is mostly Crown land and, as such, traditional land acquisition offsets are not possible in the region. In addition, tenure constraints including pastoral leases and mineral tenements make it difficult to implement on-ground conservation actions to deliver long-term protection of biodiversity (EPA 2014).

The EPA has determined that a proactive approach to compensating for the clearing of native vegetation in the Pilbara is required and has established a strategic regional conservation initiative for the consolidation and management of offset funds for the Pilbara; the Pilbara Environmental Offsets Fund (the Fund). The Fund is currently being established by the WA Government in response to recommendations from the EPA for a strategic, coordinated approach to the application of environmental offsets to achieve broad-scale biodiversity conservation outcomes.

The Fund pools environmental offsets for Pilbara resource and infrastructure projects approved under the EP Act which are conditioned in accordance with the WA Environmental Offsets Policy (Government of Western Australia 2011) and associated guidelines (Government of Western Australia 2014). Offsets contributed to the Fund will be used to implement conservation projects that counterbalance any significant residual impacts of those developments at a landscape level in the Pilbara.

The EPA notes that in establishing and implementing the Fund, the WA Government has committed to ensuring that the offsets implemented via the Fund will:

- Be relevant and proportionate to the values being impacted (Principle 3)

- Use sound knowledge and ensure the offset counterbalances the significant residual impact and delivers long-term environmental benefits (Principle 4)
- Be adaptive and be evaluated to ensure that it achieves the outcomes required (Principle 5) (EPA 2017b).

The EPA has been of the view that proposed offsets for similar projects to the Proposed Change with similar significant residual impacts (e.g. BHP's recent Mining Area C – Southern Flank Project) requiring a contribution to the Fund, will counterbalance those significant residual impacts (EPA 2017b). The projects implemented through the Fund will be approved by the Minister for Environment and project development will address matters including partnerships, scheduling, procurement, funding arrangements, performance measures and reporting requirements, which will be prepared in consultation with stakeholders.

Contributions to the Fund to offset the clearing of native vegetation considered in Good to Excellent condition has been used as the standard offset approach by the EPA and proponents in the Pilbara since 2012. Where there are other environmental values with elevated significance, a higher offset rate is applied to account for this greater environmental value.

Environmental aspects of the Proposed Change were assessed for potential significant residual impacts. The results of the assessment are presented in the following sections.

1.2 EPBC Act Environmental Offsets Policy

The Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy (DSEWPaC 2012) outlines the Australian Government's approach to the use of environmental offsets under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Offsets are measures that compensate for significant residual adverse impacts of an action on the environment. They provide environmental benefits to counterbalance the impacts that remain after the application of avoidance and mitigation measures. These remaining impacts are 'residual impacts.' For assessments under the EPBC Act, offsets are only required if the residual impacts of a project are significant.

The Fund is the mechanism for receiving offset payments and this is recognised in approval conditions applied to other projects in the Pilbara, in order to offset the significant residual impacts to Matters of National Environmental Significance (MNES). The use of the Fund for MNES offsets demonstrates that contributions to the Fund have been considered appropriate in terms of the EPBC Act Environmental Offset Policy. The current standard approach to MNES offsets in the Pilbara is the application of conditions to EPBC Act approvals that require either a contribution to the Fund at the rate of $3,000/ha of critical habitat cleared, $1,500/ha of suitable/foraging habitat cleared or an alternative but equivalent resourcing of an offset project that will provide direct benefits to the MNES in the Pilbara. The Proponent understands that discussions between the State and Commonwealth are progressing to ensure that contributions to the Fund provide the required outcomes for MNES and that this type of offset condition will continue to be used.

2. EP ACT

2.1 Assessment of significant residual impacts

The evaluation of potential impacts of the Proposed Change on the preliminary key environmental factors is detailed in Sections 5 to 12 of the ERD. This evaluation resulted in identification of environmental factors that may be subject to a significant residual impact. The Offsets Template as per the WA Environmental Offsets Guidelines (Government of Western Australia 2014) has been used to further examine the residual impacts of the

Proposed Change (Appendix A) in relation to each of the key environmental factors to determine which impacts may be significant and require offsets.

The Proposed Change will result in clearing of up to 3,000 ha of native vegetation. Following application of the mitigation hierarchy, the significant residual impacts that are relevant under WA legislation only have been identified as:

- Clearing of up to 8 ha of riparian vegetation
- Clearing of approximately 1,651 ha of the Priority 1 PECs, the Subterranean invertebrate community of pisolitic hills and the Subterranean invertebrate community of mesas in the Robe Valley region.
- Clearing of approximately 1,300 ha of native vegetation in Good to Excellent condition (in addition to the Good to Excellent condition vegetation within the PECs and areas of riparian vegetation).

The exact location of infrastructure within vegetation in Good to Excellent condition and within the extent of the PECs has not yet been finalised. Therefore, the impact areas outlined above are estimates only. The actual quantum of impact and offsets required will be determined through an Impact Reconciliation Procedure in accordance with EPA instructions.

Clearing of up to 3,000 ha of native vegetation may also impact MNES fauna habitats; the assessment of residual impacts to MNES habitats and proposed offsets are discussed in Section 3.1.

Consideration of the Residual Impact Significance Model in the WA Environmental Offsets Guidelines (Government of Western Australia 2014) indicates that the above significant residual impacts may require offsets (Appendix A).

2.2 EP Act offsets approach

In determining offsets, the Proponent has taken into consideration the six principles of the WA Environmental Offsets Policy which underpin the Western Australia Government's assessment and decision making processes in relation to the use of environmental offsets, as outlined below.

1. **Environmental offsets will only be considered after avoidance and mitigation options have been pursued.** As outlined in Section 2.2 of the ERD, avoidance and minimisation of impact has been included as part of the Proposed Change planning process. The Proponent considered various options in the development of the Proposed Change and has designed the Proposed Change to avoid environmental impacts:
    - Water supply, waste fines disposal and haul roads have been designed to minimise the total area of vegetation clearing required.
    - Where clearing of vegetation is required, the Proposed Change has been designed to avoid clearing of vegetation or habitat with higher conservation significance.
    - The selection of an in-pit waste fines disposal method in Warramboo also avoids impacts to the below pit floor troglofauna habitat that has been specifically retained at Mesa A.
    - The Mining Exclusion Zones (MEZs) have been designed to retain troglofauna habitat and avoid several significant environmental values including those associated with conservation significant fauna and cultural heritage.

    The application of the mitigation hierarchy for the Proposed Change (Section 14.2 of the ERD) has ensured that all practical avoidance and mitigation measures have

been considered, and pursued where appropriate. Offsets have only been considered for those significant impacts that are not able to be avoided or minimised.

2. **Environmental offsets are not appropriate for all projects**. The identified significant residual impacts are considered appropriate to be offset as they are not considered to be either minor (too minor to require an offset) or likely to be considered environmentally unacceptable regardless of offsets.
3. **Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted.** The Proponent considers the proposed offsets are cost-effective, relevant and proportionate to counterbalance the significant residual impacts of the Proposed Change to the identified environmental values.
    - The offsets for vegetation are considered appropriate in that the significant residual impacts identified are not related to one specific Threatened species or community, rather they relate to the cumulative loss of vegetation due to clearing in the Pilbara and therefore the contribution to the Fund will allow implementation of offset projects that will benefit Pilbara vegetation and flora values more broadly.
    - The contribution to the Fund for the subterranean fauna PECs is considered appropriate given that subterranean fauna ecosystems are not currently well understood. Contribution to the Fund will enable management or research to be undertaken that will benefit subterranean fauna values more broadly. Actions initiated through the Fund would be in addition to the Proponent's current contribution to Western Australian subterranean fauna research initiatives.
4. **Environmental offsets will be based on sound environmental information and knowledge.** The Pilbara is predominantly Crown land so traditional land acquisition offsets are not possible and on-ground conservation actions are difficult for a single proponent to implement due to tenure constraints including pastoral leases and mineral tenements. Contribution to the Fund is not a traditional offset where, for example a single conservation project would need to consider sound environmental information and knowledge about a particular species or community. However, the conservation and research projects to be implemented at a broad-scale through the Fund are intended to address the cumulative impacts of mining in the Pilbara as identified by the EPA and provide a more detailed understanding of conservation values in the Pilbara region in order to improve decision making regarding conservation and management.
5. **Environmental offsets will be applied within a framework of adaptive management.** The Proponent understands an adaptive management framework should be applied in relation to environmental offsets to take account of the potential risks. One of the key risks associated with the Fund as an environmental offset being applied for the majority of projects in the Pilbara is managing the time lag between establishing offsets and generating the anticipated benefits. This challenge and the adaptive management framework around conservation outcomes are being addressed in the development of the Fund mechanisms including partnerships, scheduling, procurement, funding arrangements, performance measures and reporting requirements in consultation with stakeholders. The Proponent has experience in on-ground implementation and adaptive management of offsets and, therefore, is able to contribute knowledge to this process.
6. **Environmental offsets will be focussed on longer term strategic outcomes.** The EPA recognises that the establishment of the Fund is consistent with this

principle in that strategic approaches, such as the use of the Fund, will provide a mechanism to coordinate implementation of offsets across a range of land tenures (Government of Western Australia 2014). The Fund provides a strategic, coordinated approach to the application of environmental offsets to achieve broad-scale biodiversity conservation outcomes for the Pilbara region. Rio Tinto recognises the commitment of the EPA to this strategic approach and is contributing via being a participant in the working group for establishment of the Fund.

The Proponent proposes financial contributions to the Fund for environmental offsets relevant under WA legislation only of:

- $750/ha for clearing of native vegetation in Good to Excellent condition
- $1,500/ha for clearing of areas with other environmental values (riparian vegetation, P1 subterranean fauna PECs).

Where values overlap and have two different offset rates ($/ha) the offset will be provided at the higher of the two rates. The Proponent notes that rates will be adjusted to take Consumer Price Index (CPI) into account and, subject to approval, final rates will be specified in the Ministerial Statement for the Revised Proposal.

3. EPBC ACT

3.1 Assessment of significant residual impacts

Four MNES have been recorded in the western portion of the Development Envelope: Northern Quoll, Pilbara Leaf-nosed Bat, Ghost Bat and Pilbara Olive Python. The Proposed Change has been designed to avoid the highest value habitat for these species, namely the Breakaways and Gullies habitat and River habitat. A MEZ will be established around the mesa escarpments which sterilises ore to protect the highest value habitat features supported by the mesa escarpment in the Breakaways and Gullies habitat.

The predicted residual impacts on MNES have been assessed in terms of their significance in accordance with the Significant Impact Guidelines 1.1, relevant conservation advice and referral guidelines. It is noted that the referral guidelines provide broad definitions of critical habitat at the national level, however this should not preclude use of the extensive Pilbara and Robe Valley datasets on MNES species to inform a more detailed understanding and assessment of the significance of habitats and impacts at a local and regional level. Where sufficient scientific information exists, the detailed understanding of local species occurrence and habitat use in the Robe Valley has been used to support a local definition of core habitat that is critical to the survival of local populations.

Following the application of mitigation measures, the Proposed Change is expected to result in the clearing of core habitat for the Northern Quoll and an offset is proposed in relation to this impact. Significant residual impacts to other MNES are not predicted and no offsets are required or proposed for these species. Mitigation measures, proposed rehabilitation and outcomes are provided in more detail in Appendix A.

3.1.1 Northern Quoll

The regional records of Northern Quoll show that the species is strongly associated with rocky habitats. This is supported by the local records in and around the Development Envelope. Of the 42 records from within the Development Envelope, the majority (37 records) were located within Breakaways and Gullies habitat or within 10 m of this habitat type. The Northern Quoll records indicate that, consistent with the regional information

described above, the local occurrence of Northern Quolls in the Development Envelope is strongly associated with rocky habitat.

Based on the evidence from the Robe Valley data (Astron 2016) and locations of records in the Development Envelope, the core habitat locally is considered to comprise the Breakaways and Gullies habitat, the habitat in the immediate vicinity of the Breakaways and Gullies habitat and portions of the River habitat (Robe River). This is consistent with the conclusion of MWH (2015) that the most important habitats for the Northern Quoll in the western portion of the Development Envelope are the Breakaways and Gullies and River habitats, which provide high value denning/shelter habitats associated with caves and rocky overhangs and/or enhanced foraging opportunities due to the availability of water.

The River habitat provided by the ephemeral Warramboo Creek is considered of much less value to Northern Quoll than the Robe River as it is further than 2 km from potential denning habitat and the nearest Northern Quoll record is approximately 7 km from Warramboo Creek. This habitat it is not likely to be used for denning purposes and is not considered core habitat.

Other foraging and dispersal habitat within the Development Envelope is considered widespread and low value and is not considered core habitat for the Northern Quoll.

The definition of habitat critical to the survival of the Northern Quoll provided in both the National Recovery Plan and by the DoE (2016), is a very broad definition of the habitat type preferred by the Northern Quoll. Comprehensive studies in the western portion of the Development Envelope have identified the Breakaways and Gullies habitat as supporting the majority of local conservation significant populations (88% of records in the western portion of the Development Envelope were found in the Breakaways and Gullies habitat type or within 10 m of it) and is thus considered to be of greatest value to the continuing conservation of the Northern Quoll within the Development Envelope. Breakaways and Gullies and River (specifically the Riverine terrestrial fauna habitat component) habitats are considered of high importance to Northern Quoll and the Revised Proposal has been designed to largely avoid these habitats. However, the loss of even small areas of these core habitats is considered significant and is therefore proposed to be offset.

3.2 EPBC Offset approach

The proposed offset for the significant residual impact to Northern Quoll is the contribution of $3,000/ha of direct impacts to an estimated 17 ha of core habitat that may be disturbed or an alternative but equivalent resourcing of an offset project that will provide direct benefits to Northern Quoll in the Pilbara.

The Proponent understands that actions conducted through the Fund will include habitat improvement so the contribution for MNES will result in benefits to other environmental values including the subterranean fauna PECs, riparian vegetation and Good to Excellent vegetation.

4. PROPOSED OFFSETS STRATEGY

4.1 Clearing approved under Miniserial Statement 756

The existing Ministerial Statement for the Mesa A/Warramboo Iron Ore Project (MS 756) approves 3,680 ha of clearing. An up-front offset of $2 million was provided under the commitments of approval of MS 756. This offset resulted in the establishment of a molecular systems unit at the WA Museum and funding for a research senior scientist, together supporting a taxonomic revision of *Tephrosia* in northern Western Australia. Therefore, the Proponent considers any past or future clearing undertaken as part of the

approved Mesa A/Warramboo Iron Ore Project is exempt from the requirement for a new offset under any new Ministerial Statement for the Revised Proposal. The Proponent proposes that any new Condition relating to offsets should reflect that the clearing of 3,680 ha (as approved under MS 756) is exempt from the requirements of an offset.

4.2 Proposed contributions to the Fund

Contributions to the Fund are intended to be inclusive as offsets for MNES will result in benefits to other listed environmental values. It is anticipated that a condition of approval under the EP Act will be included on the Ministerial Statement allowing the Proponent to apply to the CEO to seek a reduction in the funding required for WA State offsets where MNES offsets also apply.

A summary of the offsets proposed to satisfy the requirements of both State and Australian Government requirements, is provided in Table 4-1. The area of Northern Quoll core habitat to be affected is an upper limit as the mine planning around minimising impact to Breakaways and Gullies habitat has been undertaken in detail. The exact location of infrastructure within vegetation in Good to Excellent condition and within the extent of the PECs has not yet been finalised. Therefore, the areas requiring offsets in Table 4-1 are estimates only. The actual quantum of impact and offsets required will be determined through an Impact Reconciliation Procedure in accordance with EPA instructions.

Table 4-1 Summary of proposed offsets

Environmental value	Potential extent of significant residual impact (ha)		Total potential extent of significant residual impact (ha)	Proposed offset rate[1]	Estimated Offset amount[2]
	Hamersley sub-region	Roebourne sub-region			
Northern Quoll core habitat	17 ha	0 ha	17 ha	$3,000 / ha	$51,000
Riparian vegetation	0 ha	8 ha	8 ha (excludes riparian vegetation that is in the area to be offset for impacts to Northern Quoll core habitat)	$1,500 / ha	$12,000
P1 Subterranean fauna PECs	1,623 ha	28 ha	1,651 ha (excludes subterranean fauna PEC that is in the area to be offset for impacts to Northern Quoll core habitat)	$1,500 / ha	$2,476,500
Good to Excellent condition native vegetation	660 ha	640 ha	1,300 ha (excludes vegetation in the areas to be offset for impacts to Northern Quoll core habitat, riparian vegetation and/or subterranean fauna PECs)	$750 / ha	$975,000
				Total estimated offset	**$3,514,500**

[1] These proposed offset rates are the standard rates applied for the Hamersley IBRA sub-region. The actual offset rate will depend on CPI and whether different rates are applied to the Roebourne and Hamersley IBRA sub-regions.

[2] The actual offset amount will depend on the actual extent of disturbance.

5. REFERENCES

Astron Environmental Services (Astron) 2016. *Middle Robe and East Deepdale Level 2 Fauna Assessment*. Unpublished report prepared for Rio Tinto.

Astron Environmental Services Pty Ltd (Astron) 2018. *Warramboo Borefield Level 2 Fauna Assessment September 2017*. Unpublished report prepared for Rio Tinto Iron Ore Pty Ltd, October 2018.

Biota Environmental Sciences (Biota) 2011c. *Robe Valley Mesas Fauna Report*. Unpublished report prepared for Rio Tinto.

Department of the Environment (DoE) 2016. *EPBC Act referral guideline for the endangered Northern Quoll Dasyurus hallucatus. EPBC Act Policy Statement*. Available at: http://www.environment.gov.au/system/files/resources/d7e011a7-bf59-40ed-9387-9afcb8d590f8/files/referral-guideline-northern-quoll.pdf.

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

Environmental Protection Authority (EPA) 2014. *Cumulative environmental impacts of development in the Pilbara region*. Advice of the Environmental Protection Authority to the Minister for Environment under Section 16e of the Environmental Protection Act 1986. Government of Western Australia.

Environmental Protection Authority (EPA) 2017a. *Environmental Protection Authority 2016–17 Annual Report*, EPA, Perth, Western Australia.

Environmental Protection Authority (EPA) 2017b. *Report and Recommendations of the Environmental Protection Authority: Mining Area C – Southern Flank Project*. Report 1610, December 2017.

Government of Western Australia. 2011. *WA Environmental Offsets Policy.* Environmental Protection Authority, Western Australia.

Government of Western Australia. 2014. *WA Environmental Offsets Guidelines.* Environmental Protection Authority, Western Australia.

MWH 2015. *Level 2 Terrestrial Fauna Surveys: Mesa B-C, Warramboo BWT and Highway to Tod Bore*. Unpublished report prepared for Rio Tinto Iron Ore.

APPENDIX

Appendix A: EP Act and EPBC Act Environmental Offsets - Identification of residual impacts and requirements for offsets

Table A 1: EP Act and EPBC Act Environmental Offsets – identification of residual impacts and requirements for offsets

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
Flora and Vegetation				
Direct impacts Clearing of vegetation in Good to Excellent condition. Clearing of riparian vegetation. Loss of conservation significant flora.	The Proposed Change has been designed to avoid any direct disturbance to the Sand Sheet PEC. Disturbance to Priority Flora and riparian vegetation will be avoided as far as practicable and clearing will only occur in approved areas. The clearing footprint has been minimised through general project design and through selection of in-pit disposal of waste fines and reverse osmosis plant effluent rather than development of an external tailings storage facility and evaporation pond.	Disturbed areas will be rehabilitated progressively as mining activities are completed. The conditions of the new Ministerial Statement for the Revised Proposal shall require the Proponent to implement a Closure Plan in accordance with the DMP/EPA *Guidelines for Preparing Mine Closure Plans* (2015). The Closure Plan includes a closure objective to ensure that vegetation on rehabilitated land is self-sustaining and compatible with the final land use.	Can the environmental values be rehabilitated/Evidence? To date, approximately 222 ha of rehabilitation has been completed at the Mesa A and Warramboo operations collectively and has generally established well, with a range of native perennial species present and established. Operator experience in undertaking rehabilitation? The Proponent conducts rehabilitation activities progressively at all its operations	Yes, clearing of native vegetation in Good to Excellent condition and clearing of riparian vegetation is considered a significant residual impact. Extent[3] 1,300 ha native vegetation in Good to Excellent condition 8 ha of riparian vegetation Quality Good to Excellent Conservation Significance

[3] For the purpose of environmental offsets, this is the portion of the 3,000 ha to be offset for impacts only to native vegetation. The remaining 1,692 ha comprises the areas of subterranean fauna PECs and core MNES habitat to be impacted and offset for those factors and areas with poorer vegetation condition.

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
			in the Pilbara. All rehabilitation is undertaken in accordance with the Rio Tinto Iron Ore Rehabilitation Handbook, which is reviewed and updated periodically to reflect changes in industry standards, reflect new knowledge obtained through research and development, and to adopt learnings from ongoing rehabilitation projects. The Handbook addresses: • Soil resource management • Rehabilitation techniques • Local provenance species seeding practices • Records and data management • Ongoing monitoring. <u>What is the type of vegetation being rehabilitated?</u> A total of 76 vegetation units have been mapped in the western portion of the	1,300 ha of Good to Excellent condition native vegetation 8 ha of riparian vegetation <u>Land Tenure</u> n/a <u>Time Scale</u> n/a - no temporary clearing Consideration of the Residual Impacts Significance Model indicates that the residual impact is significant because it involves clearing of vegetation in Good to Excellent condition in the Pilbara and clearing of riparian vegetation of high local significance. This clearing will be rehabilitated at closure. However, given the substantial modification of landform associated with mining and the long timeframes, an offset is proposed in addition to committing to rehabilitation.

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
			Development Envelope. As a general overview the Proposed Change is located within the Fortescue District of the Eremaeun botanical province which is characterised by tree (*Eucalyptus* spp. and *Corymbia* spp.) and shrub (*Acacia* spp., *Hakea* spp., *Grevillea* spp. and *Senna* spp.) steppe communities and *Triodia* spp. hummock grasslands (Beard 1990). <u>Time lag?</u> Progressive rehabilitation will continue to be undertaken throughout the life of the Proposed Change where feasible, however the majority of rehabilitation will be undertaken at closure. <u>Credibility of the rehabilitation proposed (evidence of demonstrated success)</u> Refer to the Proponent's Closure Plan.	

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
<u>Indirect impacts</u> Loss or degradation of riparian vegetation due to groundwater drawdown or surface water discharge. Vegetation degradation due to weed ingress. Degradation due to dust deposition.	Groundwater abstraction will be minimised to that required to access the BWT resource and meet water supply requirements. Groundwater abstraction will remain within licence limits to minimise impacts to the local aquifer. Abstracted groundwater will be used on-site for processing and dust suppression to avoid discharge as far as practicable. Surplus water will be discharged at a rate which is not expected to cause channel erosion. The Proponent will implement strict hygiene procedures to prevent introduction of new or additional populations of weed species into the western portion of the Development Envelope. The Proponent will undertake annual weed control to minimise weed infestations in the Development Envelope. The Proponent will minimise exposed surfaces by minimising clearing and implement dust controls including	The Proponent will rehabilitate disturbed areas that are no longer in use and will implement a Closure Plan in accordance with the DMP/EPA *Guidelines for Preparing Mine Closure Plans* (2015). The Closure Plan includes a closure objective to ensure that vegetation on rehabilitated land is self-sustaining and compatible with the final land use.	As above	No significant residual impacts are expected (refer to Table 5-16 of the ERD) therefore offsets are not proposed.

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
	water sprays, dust suppressants and other measures to minimise the extent of dust deposition on vegetation. The Proponent has designed the proposed haul road and construction haul road such that they are located as far from the Sand Sheet PEC as practicable to reduce potential impacts of dust on the Sand Sheet PEC.			
Subterranean Fauna				
<u>Direct impacts</u> Direct disturbance to subterranean fauna habitat and PECs. Reduction in stygofauna habitat due to groundwater extraction. Loss of individuals and changes to assemblages due to mine pit development and groundwater abstraction.	The Proposed Change has been designed to minimise disturbance to the subterranean fauna PECs as far as practicable. The mine plan has also been designed to retain at least 50% by volume of connected pre-mining troglofauna habitat at Mesas A, B and C by delineation of a MEZ (and a sub-floor zone in the case of Mesa A).	Pit voids will be backfilled and/or used for storage of waste fines material facilitating recovery of groundwater levels and potentially enabling use of disturbed areas stygofauna habitat following cessation of groundwater abstraction.Progressive rehabilitation will be undertaken which will assist in re-establishing nutrient flows to the subterranean environment.	<u>Can the environmental values be rehabilitated/Evidence?</u> Based on limited sampling,there is evidence indicating subterranean fauna use of areas that have been previously disturbed (refer to Section 6.4.2.2 of the ERD). It may, therefore, be possible to re-instate subterranean fauna habitat at closure. However, this is not a well established process. Backfilling of pit voids may	Yes, the clearing of the P1 subterranean fauna PECs. <u>Extent</u> 1,651 ha <u>Quality</u> Partially disturbed by mineral exploration activities but overall quality is Excellent. <u>Conservation Significance</u>

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
	Impacts to the higher value troglofauna habitat retained in the pit floor at Mesa A will be avoided by locating the WFSF at Warramboo instead of in-pit at Mesa A. The mine plans for Mesas A, B and C have been designed to avoid as many single location and singleton troglofauna as practicable and ensure their ongoing avoidance by the retention of the MEZ. Additional water requirements will be sourced from an extension to the existing Warramboo borefield, avoiding the requirement for a new borefield impact area. Dewatering will be minimised to that required to access the BWT resource. Water from mine dewatering will be used on-site where possible to minimise the requirement for additional groundwater abstraction for operational water supply. The Proponent will abstract groundwater within the licence limits and monitor groundwater levels to		facilitate re-population of disturbed areas by troglofauna. Backfilling of BWT pit voids will facilitate recovery of groundwater levels which may enable recovery of stygofauna habitat. <u>Operator experience in undertaking rehabilitation?</u> The Proponent is experienced in the progressive backfill of pit voids and in progressive rehabilitation of mining areas in the Pilbara. <u>What is the type of habitat that is being rehabilitated?</u> Backfilling of pit voids may facilitate rehabilitation of subterranean fauna habitat. <u>Time lag?</u> Progressive backfilling and rehabilitation will be undertaken throughout the life of the Proposed Change where feasible, however the majority of rehabilitation will be undertaken at closure.	Habitat supports SRE and conservation listed troglofauna species. <u>Land Tenure</u> n/a <u>Time Scale</u> No temporary disturbance. Consideration of the Residual Impacts Significance Model indicates that the residual impact is significant because it involves disturbance to a P1 PEC.

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
	ensure impact remains within the predicted range of drawdown.		<u>Credibility of the rehabilitation proposed (evidence of demonstrated success)</u> The reinstatement of subterranean fauna habitat at closure is not a well established process. The Proponent has, therefore, taken a conservative approach and has not included an assumption of successful rehabilitation of subterranean fauna habitat in the impact assessment conclusions.	
<u>Indirect impacts</u> Reduction of organic inputs to the subterranean environment. Temporary reduction in troglofauna habitat due to seepage from the WFSF. Collapse of voids and mesocaverns due to blasting. Change in temperature and humidity of	Warramboo was selected as the preferred location for the WFSF rather than the alternative location of in-pit at Mesa A in order to avoid impacts to the higher value troglofauna habitat retained under the pit floor at Mesa A. Hydrocarbon storage and servicing and re-fuelling of plant and vehicles will not occur within the MEZs at Mesas A, B and C.	The Proponent proposes to backfill pits with waste rock material where mine schedules allow. Any hydrocarbon spills will be contained and hydrocarbon storage and handling facilities will be decommissioned at closure. The conditions of the new Ministerial Statement for the Revised Proposal shall require the Proponent to implement a Closure Plan in accordance with the DMP/EPA *Guidelines for Preparing Mine Closure Plans* (2015). The	As above	No significant residual impacts are expected (refer Table 6-22 of the ERD) therefore offsets are not proposed.

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
subterranean environment. Degradation of subterranean fauna habitat due to hydrocarbon spills.		Closure Plan (Appendix 3 of the ERD) includes a closure objective to ensure the final landform is stable and considers ecological values. Pit will be backfilled against narrow areas ('fingers') of MEZ where they occur at Mesa A, to ensure landform stability and potential connectivity of troglofauna habitat in the long-term.		
Terrestrial Fauna				
<u>Direct impacts</u> Direct loss or fragmentation of terrestrial fauna habitat including habitat for MNES species. Loss of individuals, including MNES individuals, from increased vehicle strike and collisions with fencing.	The Proposed Change has been designed to minimise clearing of significant fauna habitat. In particular, the Proposed Change has been designed to limit disturbance to the highest value fauna habitat types, the Breakaways and Gullies and River habitat types, to 8 ha and 3 ha respectively and no direct disturbance to the River habitat of the Robe River is proposed. The locations for escarpment cuts at Mesas B and C were selected to avoid the habitat the with highest	Disturbed areas will be rehabilitated progressively as mining activities are completed. The conditions of the new Ministerial Statement for the Revised Proposal shall require the Proponent to implement a Closure Plan in accordance with the DMP / EPA Guidelines for Preparing Mine Closure Plans (2015). The Closure Plan (Appendix 3 of the ERD) includes a closure objective to ensure that vegetation on rehabilitated land is self-sustaining	<u>Can the environmental values be rehabilitated/Evidence?</u> To date, approximately 222 ha of rehabilitation has been completed at the Mesa A and Warramboo operations collectively and has generally established well, with a range of native perennial species present and established. <u>Operator experience in undertaking rehabilitation?</u> The Proponent conducts rehabilitation activities	The Breakaways and Gullies and River habitat types are considered to be of high importance to the Northern Quoll. The Proposal has been designed to avoid direct disturbance to the River habitat of the Robe River and to largely avoid disturbance to the Breakaways and Gullies habitat. However, the loss of even small areas of core habitat is considered significant and is therefore proposed to be offset. *Northern Quoll habitat* The direct loss of core Northern Quoll habitat requires an offset:

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
	ecological value and the escarpment cut at Mesa B was re-designed to avoid direct and indirect (dust and noise) disturbance to the recorded diurnal/potential maternal Ghost Bat roost. The Proposed Change has been designed to avoid the highest value Ghost Bat habitat, including the roost complex associated with the diurnal/potential maternal roost at Mesa B and the roost complex associated wth the potential diurnal roost at Mesa C, by establishing a MEZ around these roosts. The Proposed Change will avoid the following recorded Ghost Bat roosts: • two nocturnal roosts at Mesa A • one diurnal/potential maternal roost at Mesa B • 11 nocturnal roosts at Mesa B • All nine roosts at Mesa C. The timing and location of Pilbara Leaf-nosed Bat calls indicate that the recorded Pilbara Leaf-nosed Bats originate from a diurnal roost outside	and compatible with the final land use.	progressively at all its operations in the Pilbara. All rehabilitation is undertaken in accordance with the Rio Tinto Iron Ore Rehabilitation Handbook, which is reviewed and updated periodically to reflect changes in industry standards, reflect new knowledge obtained through research and development, and to adopt learnings from ongoing rehabilitation projects. The Handbook addresses: • Soil resource management • Rehabilitation techniques • Local provenance species seeding practices • Records and data management • Ongoing monitoring. <u>What type of habitat will be rehabilitated?</u>	• Loss of habitat in the Breakaways and Gullies habitat • Direct disturbance to habitat within 10 m of the Breakaways and Gullies habitat type; <u>Extent</u> 17 ha <u>Quality</u> The Breakaways and Gullies habitat is largely undisturbed. <u>Conservation Signfiicance</u> The Breakaways and Gullies habitat supports potential Northern Quoll breeding and denning. Locally the Breakaways and Gullies habitat and the habitat in the immediate vicinity of the Breakaways and Gullies habitat is considered core habitat for the Northern Quoll. <u>Land Tenure</u> n/a <u>Time scale</u> No temporary disturbance. No significant residual impacts are expected for any other conservation listed terrestrial fauna species including the Ghost Bat, Pilbara

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
	the Development Envelope and that a diurnal roost is not present in the Development Envelope. Vehicle movements will take place predominantly during the day and will be generally limited to in-pit and haulage operations. The use of barbed wire will be avoided except where legislated. Where there is a statutory requirement for barbed wire, reflectors will be installed to minimise the risk of entanglement by bats.		The terrestrial fauna habitat to be rehabilitated consists of nine mapped habitat types: • Mesa Plateau • Rock Slopes • Breakaways and Gullies • Plains • Hardpan • Floodplain • Stony Hills and Rises • Major River/Creek • Minor Drainage Lines The majority of the disturbance will be to the Plains habitat type. <u>Time lag?</u> Progressive rehabilitation will continue to be undertaken throughout the life of the Proposed Change where feasible, however the majority of rehabilitation will be undertaken at closure. <u>Credibility of the rehabilitation proposed (evidence of demonstrated success)</u>	Leaf-nosed Bat and Pilbara Olive Python. Offsets for terrestrial fauna species other than the Northern Quoll are, therefore, not proposed.

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
			Refer to the Proponent's Closure Plan. The Proponent will rehabilitate the area to a safe, stable and self-sustaining native ecosystem. Natural migration of fauna species into rehabilitated land will be encouraged through creation of habitats of similar composition to pre-mining communities in appropriate locations with consideration of the post-closure soil and landform design. Habitat elements that will be considered as part of the final landform design include: • Vegetation known to provide food and/or shelter • Retaining and replacing woody debris • Generation and retention of leaf litter using small scale topography • Introducing or leaving in place rocky features	

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
			such as oversized waste burden or scree slopes • Returning soil to allow opportunities for burrowing fauna • Preserving connectivity with unmined areas and maintaining the quality of these habitats • Managing feral predators and herbivores across both reference and rehabilitated areas.	
<u>Indirect impacts</u> Alteration of fauna habitat due to altered hydrology from groundwater abstraction and increased temporal availability of surface water from discharge of surplus water. Loss or degradation of habitat due to noise and vibration.	The discharge point will be installed in River habitat, not considered to be of significant value to conservation significant aquatic fauna. The Proponent will abstract groundwater within the licence limits and monitor groundwater levels to ensure the extent of groundwater drawdown remains within the predicted range of impact. The MEZ and blast management measures will be implemented to	The conditions of the new Ministerial Statement for the Revised Proposal shall require the Proponent to implement a Closure Plan in accordance with the DMP/EPA *Guidelines for Preparing Mine Closure Plans* (2015). The Closure Plan (Appendix 3 of the ERD) includes a closure objective to ensure that vegetation on rehabilitated land is self-sustaining	As above	No significant residual impacts are expected (refer to Table 7-11 of the ERD) therefore offsets are not proposed.

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
Degradation of habitat due to altered fire regimes, introduction or spread of weeds and changes to feral animal populations. Degradation of aquatic fauna habitat due to changes to water chemistry arising from discharge of surplus water.	ensure the integrity of Ghost Bat roost caves is maintained . Surplus groundwater will be utilised on-site for mine operations and processing, where practicable. Surplus water will be discharged when supply exceeds demand. Lighting will be installed only where required, that is, mainly in-pit and operational areas and will be directed into the active pits to avoid the mesa escarpments. Dust emissions will be managed through application of dust suppression methods, including water sprays, where applicable. The Proponent will implement strict hygiene procedures to prevent introduction of new or additional populations of weed species into the Development Envelope and undertake annual weed control to minimise weed infestations in the Development Envelope. Feral fauna control will be implemented in the Development Envelope as needed to minimise	and compatible with the final land use.		

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
	potential for loss of conservation significant species to feral predators Fire prevention measures (and control measures, should a fire break out) will be in place in the Development Envelope, particularly around areas of high risk including all buildings and infrastructure.			
Hydrological Processes and Inland Waters Environmental Quality				
<u>Direct impacts</u> Changes to groundwater levels as a result of groundwater abstraction. Changes to the hydrological regime of Warramboo Creek as a result of surplus water management.	Abstraction will be minimised to that required to access the BWT resources and meet site water requirements. Monitoring of riparian vegetation and groundwater levels will be undertaken along the Robe River adjacent to the predicted drawdown within the Mesa C CID Aquifer. If changes to groundwater levels and vegetation health are detected, then appropriate mitigation measures will be determined in accordance with the EMP. Groundwater levels in the Warramboo borefield will be	Mine pits will be backfilled to appropriate levels to prevent the formation of pit lakes.	<u>Can the environmental values be rehabilitated/Evidence?</u> Rehabilitation will be undertaken through mine pit backfilling to prevent pit lake formation. Rio Tinto has undertaken successful pit backfilling at many of its operations. <u>Operator experience in undertaking rehabilitation?</u> Rio Tinto conducts rehabilitation activities progressively at all its operations in the Pilbara. All rehabilitation is undertaken in accordance with the Rio Tinto Iron Ore Rehabilitation	No significant residual impacts are expected (refer to Table 8-10 of the ERD) therefore offsets are not proposed.

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
	monitored to check that drawdown is occurring consistent with modelled predictions. Dewatering water will be utilised on-site in the first instance to supply water for operational purposes. Only surplus water exceeding the operational requirement will be discharged to Warramboo Creek.		Handbook, which is reviewed and updated periodically to reflect changes in industry standards, reflect new knowledge obtained through research and development, and to adopt learnings from ongoing rehabilitation projects. What is the nature of rehabilitation? The purpose of this rehabilitation is to prevent the formation of pit lakes. Backfilling will be completed to appropriate levels to prevent the formation of pit lakes. Time lag? Progressive rehabilitation will continue to be undertaken throughout the life of the Proposed Change where feasible, however the majority of rehabilitation will be undertaken at closure. Credibility of the rehabilitation proposed (evidence of demonstrated success)	

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
			Refer to the Proponent's Closure Plan.	
<u>Indirect impacts</u> Alteration of surface water and groundwater chemistry in Warramboo Creek and Yarraloola Aquifer as a result of disposal of surplus water, in-pit storage of waste fines and effluent from the reverse osmosis plant and surface water flows through operational areas.	During operations most of the seepage from in-pit storage of waste fines and disposal of effluent from the reverse osmosis plant will be captured by the water supply borefield and re-circulated in the wet plant. Mine design will avoid exposure of (potentially acid forming) PAF material. If PAF materials are encountered then existing PAF management strategies will be implemented to ensure that any potential risk is appropriately managed. Hydrocarbons will be handled, stored and disposed of in accordance with legal requirements. Water management structures will be constructed in key areas to minimise discharge of sediment-laden run-off from the site. The discharge and monitoring of surplus	n/a	n/a	No significant residual impacts are expected (refer to Table 8-10 of the ERD) therefore offsets are not proposed.

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
	water will be in accordance with licence conditions.			
Landforms				
<u>Direct impacts</u> Loss of variety of landforms due to removal or degradation of mesas. Loss of integrity of mesa landforms due to disturbance.	The most prominent feature of the mesas; the escarpments, will be retained excluding minor access cuts. The widths required for the access cuts into the mesa escarpments have been minimised as far as possible.	n/a	n/a	No significant residual impacts are expected (refer to Table 9-4 of the ERD) therefore offsets are not proposed.
<u>Indirect impacts</u> Loss or degradation of the ecological values of the mesa landforms. Loss or degradation of the social values of the mesa landforms.	The Proposed Change has been designed to retain the mesa escarpments excluding minor access cuts and to avoid disturbance to the sections of the escarpments with the highest ecological and heritage value. The implementation of the Blast Management Framework (including management of potential for flyrock) and retention of escarpments with an adequate width will minimise any potential impacts to the ecological value of the mesa escarpments,	All disturbed surfaces will be rehabilitated including pit floors to maximise the ecological value.	<u>Can the environmental values be rehabilitated/Evidence?</u> To date, approximately 222 ha of rehabilitation has been completed at the Mesa A and Warramboo operations collectively and has generally established well, with a range of native perennial species present and established. <u>Operator experience in undertaking rehabilitation?</u>	No significant residual impacts are expected (refer to Table 9-4 of the ERD) therefore offsets are not proposed.

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
	including the caves and rock shelters present on the mesa escarpment. Waste dumps near Mesas B and C will remain lower than the surrounding mesas.		Rio Tinto conducts rehabilitation activities progressively at all its operations in the Pilbara. All rehabilitation is undertaken in accordance with the Rio Tinto Iron Ore Rehabilitation Handbook, which is reviewed and updated periodically to reflect changes in industry standards, reflect new knowledge obtained through research and development, and to adopt learnings from ongoing rehabilitation projects. <u>What landform values will be rehabilitated?</u> The site will be rehabilitated to create safe, stable final landforms that are aesthetically compatible with the surrounding landscape and which are non-polluting and re-vegetated with native species, to maximise environmental and cultural heritage outcomes and ensure the site does not impact on the	

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
			current surrounding land uses. The final landforms will include large voids and waste dumps and will be unlikely to support pastoral activities in the immediate vicinity of the mining areas. <u>Time lag?</u> Progressive rehabilitation will continue to be undertaken throughout the life of the Proposed Change where feasible, however the majority of rehabilitation will be undertaken at closure. <u>Credibility of the rehabilitation proposed (evidence of demonstrated success)</u> Refer to the Proponent's Closure Plan.	
Social Surroundings				
<u>Direct impacts</u> Disturbance of sites of cultural significance. Location of the proposed Highway/Tod	The Proposed Change has been designed to avoid direct impacts to heritage sites with high significance.	n/a	n/a	No significant residual impacts are expected (refer to Table 10-3 of the ERD) therefore offsets are not proposed.

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
Bore pit on the current North West Coastal Highway alignment.	The Proponent has established an internal system for managing all ground disturbing activities to ensure compliance with heritage commitments and regulatory requirements. The Proponent is committed to consulting with the Kuruma Marthudunera People regarding the Proposed Change through Local Implementation Committee (LIC) meetings and heritage survey processes. The Proponent has developed a Mine Closure Plan consistent with DMP and EPA Guidelines (2015) to ensure social surrounds are rehabilitated post closure.			
<u>Indirect impact</u> Change of access to heritage sites. Changes to the physical and biological attributes of the environment which would impact sites of heritage significance.	The Proponent will work with the Kuruma Marthudunera People to provide access to traditional lands as far as practicable and to establish procedures to enable safe access. Changes to physical and biological attributes will be avoided and minimised through measures	n/a	n/a	No significant residual impacts are expected (refer to Table 10-3 of the ERD) therefore offsets are not proposed.

Existing Environment/Impact	Mitigation			Significant Residual Impact? (Yes/No)
	Avoid and Minimise	Rehabilitation	Likely Rehabilitation Success	
	implemented to manage impacts to other factors, as identified above.			
Other Environmental Impacts – Air quality				
<u>Direct impacts</u> Reduction in local air quality due to diesel combustion, native vegetation clearing, use of explosives during blasting and power consumption for ore processing.	Rio Tinto manages greenhouse gas emissions from its operations, consistent with all relevant legislation and national and state strategies. Rio Tinto has well established procedures for reporting greenhouse gas emissions from its Pilbara operations.	n/a	n/a	No significant residual impacts are expected (refer to Table 11-1 of the ERD) therefore offsets are not proposed.