Response to submissions

Mesa A Hub Revised Proposal

Assessment No. 2107

EPBC 2016/7843

RTIO-HSE-0330882

Robe River Mining Co. Pty. Ltd.

March 2019

Disclaimer and Limitation

This report has been prepared by Rio Tinto's Iron Ore group (Rio Tinto), on behalf of Robe River Mining Co. Pty. Ltd. (the Proponent), specifically for the Mesa A Hub Revised Proposal. Neither the report nor its contents may be referred to without the express approval of Rio Tinto, unless the report has been released for referral and assessment of proposals.

Document status					
Rev	Author	Reviewer/s	Date	Approved for Issue	
				To Whom	Date
A	ELA, F. Bell	Study team, R. Meyer, F. Sinclair, T. Savage	February 2019		
1	ELA, F. Bell	P. Royce	March 2019	EPA Services	March 2019

Mesa A Hub Revised Proposal

Assessment No. 2107
CMS 16112

Summary of Public Submissions

This document forms a summary of public submissions and advice received regarding the Public Environmental Review document for the Mesa A Hub Revised Proposal (the Revised Proposal) proposed by Robe River Mining Co. Pty. Ltd. (the Proponent).

The public review period for the Revised Proposal commenced on 10 December 2018 for a period of 2 weeks and ended on 24 December 2018. A total of seven submissions were received from the following: the Department of Water and Environmental Regulation; the Department of Biodiversity, Conservation and Attractions; the Department of Mines Industry Regulation and Safety; the Commonwealth Department of the Environment and Energy; the Kuruma Marthudunera Aboriginal Corporation RNTBC; the Wildflower Society of Western Australia and an individual (hereafter referred to as 'Confidential 1').

The principle issues raised in the submissions and advice received included environmental and social issues as well as issues focussed on questions of fact and technical aspects of the Revised Proposal. Although not all of the issues raised in the submissions are environmental, the Proponent has addressed all issues, comments and questions, as they are relevant to the Revised Proposal.

The key issues raised in the submissions related to:

- Potential impacts to vegetation, including riparian vegetation of Warramboo Creek, and conservation significant flora.
- Suitability and connectivity of troglofauna habitat outside the proposed mining areas and potential impacts to troglofauna.
- Potential impacts to Short Range Endemic invertebrates.
- Potential impacts to habitat classifiable as critical to the survival of the Northern Quoll and proposed monitoring of the Northern Quoll and the Ghost Bat.
- Abstraction of groundwater and the volume and water quality of the proposed surplus water discharge to Warramboo Creek.
- The importance of water, the Robe River System, Warramboo outstation and the rockshelter containing spinifex matting to the Traditional Owners.
- Proposed environmental offsets for disturbance to native vegetation, subterranean fauna habitat and habitat classifiable as critical to the survival of the Northern Quoll.
- Closure aspects including groundwater recovery, monitoring of riparian vegetation, potential seepage from the proposed waste fines storage facility and expectations for the content in three yearly revisions of the Mine Closure Plan.

The issues were raised with respect to the following environmental factors:

- Flora and vegetation
- Subterranean Fauna
- Terrestrial Fauna
- Hydrological Processes and Inland Waters Environmental Quality
- Landforms
- Social Surroundings

Contents page

Flora and Vegetation

No.	Submitter	Submission and/or issue	Response to comment
1.	Department of Water and Environmental Regulation	The residual impacts from the proposal will be: o Disturbance to five vegetation units determined by the proponent to be of high local significance. Direct disturbance of ChAbAtrTw, EcEvMgAtrCv, AanAbAsyTP, AanAiAatAbTP and CcAanTe, will be limited to between 1%-9% of the extent of each of these vegetation types in the western portion of the Development Envelope. o Direct clearing of up to 3,000 ha of native vegetation in Good to Excellent condition, including approximately 8 ha of riparian vegetation. o Disturbance of individuals of four Priority Flora species - *Abutilon* sp. Onslow, *Triodia* sp. Robe River, *Goodenia nuda* and *Rhynchosia bungarensis.* Direct impacts on these species will be limited to between 1%-5% of records in the Rio Tinto database. The most significant residual impact is to *Abutilon* sp. Onslow, due to its restricted occurrence. The impacts to this species can be managed with appropriate on-going weed control and preclearing surveys of the borefield. The EMP should be revised to include specific measures to manage impacts to *Abutilon* sp. Onslow, particularly with regards to weed control and pre-clearing surveys. The following conditions could be considered: o If the management plan is not revised as recommended above, a condition requiring management of residual impacts to *Abutilon* sp. Onslow through measures such as weed control and pre-clearing surveys to avoid plants during the construction of the borefield infrastructure. o In order to formalise the proponent's commitment to avoiding impacts on the Sand Sheet vegetation (Robe Valley) Priority Ecological Community, exclusion zones could be established.	**Noted - additional survey proposed** As stated in the ERD, direct impacts to *Abutilon* sp. Onslow will be limited to less than 5% of records in the Rio Tinto database. This represents the maximum disturbance to this species that may occur as a result of the Revised Proposal. The activities proposed in the vicinity of the *Abutilon* sp. Onslow records are associated with extension of the existing bore field and are thus low impact activities. The Proponent's well established internal approvals request process will be used to manage clearing associated with the proposed bore field extension such that known locations of *Abutilon* sp. Onslow will be avoided where practicable. The habitat in which *Abutilon* sp. Onslow occurs extends west and south of the proposed Development Envelope (vegetation types AanAiAatAbTP, AanAbAsyTP and to a lesser extent vegetation type CcAanTe) and the species is unlikely to be restricted to the Development Envelope. The Proponent proposes to complete an additional survey of the *Abutilon* sp. Onslow population focusing on the extent of the species immediately adjacent to and outside the proposed Development Envelope to verify that the species occurs outside the Development Envelope. Table ES 3 in the ERD outlines that strict hygiene procedures will be implemented to prevent introduction of new or additional weed species into the Development Envelope; weed control will be undertaken annually in the Development Envelope (including in the vicinity of the *Abutilon* sp. Onslow records) to minimise weed infestations. The Proponent does not consider that a revision of the EMP is required at this stage as: o The Proponent has committed in the ERD to limit disturbance to less than 5% of the *Abutilon* sp. Onslow records in the Rio Tinto database. o The species is considered likely to occur outside the proposed Development Envelope and the Proponent has committed in

No.	Submitter	Submission and/or issue	Response to comment
			this Response to Submissions to completing an additional survey to verify this. o The Proponent has a well established internal system to avoid and minimise impacts to priority listed flora wherever practicable. o The proposed activities in the vicinity of the *Abutilon* sp. Onslow records are low impact with sufficient flexibility in the locations that avoidance is likely to be possible once detailed designs are prepared. As shown in Figure ES 3 of the ERD, the proposed Mining Exclusion Zone at Mesa A incorporates both occurrences of the Sand Sheet Vegetation (Robe Valley) Priority Ecological Community. The draft Ministerial Statement (Appendix 2 of the ERD) includes the same figure (shown as Figure 3). The Proponent considers that use of this figure will formalise the Proponent's commitment to avoid impacts to the Sand Sheet Vegetation (Robe Valley) Priority Ecological Community.
2.	Department of Water and Environmental Regulation	<u>Groundwater dependent ecosystems and riparian vegetation</u> The proponent states that the effects of groundwater abstraction and dewatering have been extensively modelled and impacts to riparian vegetation are not expected; however, DWER notes that there will be removal of 8 ha of riparian vegetation required for installation of the discharge point. The majority of this vegetation (the western portion of the development envelope) has been assessed as being in Excellent (58%) or Very Good (27%) condition. DWER queries whether the removal of this 8ha of riparian vegetation is environmentally acceptable.	**Noted – clarification provided** The proposed clearing that may impact riparian vegetation is within the proposed Warramboo borefield area and is for small scale infrastructure such as tracks, pipelines and drill pads. Clearing for this type of infrastructure is considered to be low impact due to the small scale of the clearing, the well contained nature of the clearing and the available seed load which continues to be deposited in disturbed areas via close fringing vegetation. The available seed load and elevated moisture levels available in riparian zones will allow for relatively rapid re-growth of vegetation once areas are no longer in use and have been rehabilitated. While the 8 ha of vegetation that may be impacted by clearing has been classified as associated with the riparian zone, in many cases detailed assessment of this vegetation shows much of it is more accurately classed as terrace and floodplain vegetation (such as EcAanAtrAbAtuTe). These communities are more widespread, less sensitive to disturbance and in poorer condition (due to weed infestation and disturbance from cattle) than the true riparian zones of Warramboo Creek (refer to Figure 5-6 of the ERD).

No.	Submitter	Submission and/or issue	Response to comment
3.	Department of Water and Environmental Regulation	Groundwater dependent ecosystems and riparian vegetation DWER is concerned about the potential impact to riparian vegetation associated with Warramboo Creek – from both drawdown and discharge. Whilst the impacts of drawdown on this vegetation has been considered in isolation, the impact of a concurrent surplus/drawdown scenario for the impacted species does not appear to have been considered. The ERD does not demonstrate a clear water balance or indicative timing of water management options (surplus discharge vs drawdown). If the proponent has modelled the potential impacts of these concurrent water scenarios, the information should be presented for assessment, to enable DWER to judge the significance of impacts on riparian and groundwater dependent vegetation.	**Noted – clarification provided** The proposed surplus water discharge rate to Warramboo Creek is between 2 GL/a and 7 GL/a and the total proposed life of mine discharge volume is 9 GL (Table 8-7 of the ERD). The majority of surplus water discharge will therefore occur over a period of 2-4 years in the early stages of the implementation of the Revised Proposal. Thereafter, surplus water discharge will be on a sustaining pumping-cycle with peak discharges being mainly limited to periods following moderate to large rainfall events to regain water levels for effective mining operations. The groundwater numerical model was not set up to predict the interaction between groundwater abstraction and surplus discharge. However, given the evidence for connectivity between the Warramboo Creek bed and the CID/Yarraloola Aquifer (water head, chemistry, pumping test analysis and lack of confining layer), it is considered that surplus water discharge may mitigate some of the potential impacts of groundwater drawdown during below water table mining operations at Warramboo and throughout the life of the mine during seasonal events. The potential impacts of groundwater drawdown and surplus water discharge have been considered separately as presented in the ERD as this represents the modelled worst case scenario for the potential impacts to riparian vegetation.
4.	Department of Water and Environmental Regulation	Groundwater dependent ecosystems and riparian vegetation 13 km of the defined channel of Warramboo Creek is expected to be inside the modelled cone of depression. DWER requests the drawdown contours are overlaid on Figure 5-10, in addition to the discharge location, to demonstrate the areal extent of drawdown on Warramboo Creek and to map GDEs at risk from drawdown.	**Agree – revised figure provided** A revised version of Figure 5-10 including the modelled drawdown contours and the proposed discharge location is provided in Attachment 1.
5.	Department of Water and Environmental Regulation	Groundwater dependent ecosystems and riparian vegetation The proponent has identified that there is limited hydrogeological data available to assess the hydraulic connectivity between Mesa C and the Robe River, which would assist in understanding the possible impacts to riparian vegetation (associated with the Robe River). There is also limited understanding of how riparian	**Noted – clarification provided** The ERD and the 'Mesa C H3 Hydrogeological Level Assessment' indicate limited hydraulic connectivity between the Mesa C Aquifer and the Robe River Aquifer but not limited hydrogeological data. Additional drilling and test pumping was carried out in 2017 to ensure sufficient hydrogeological data were available to support the

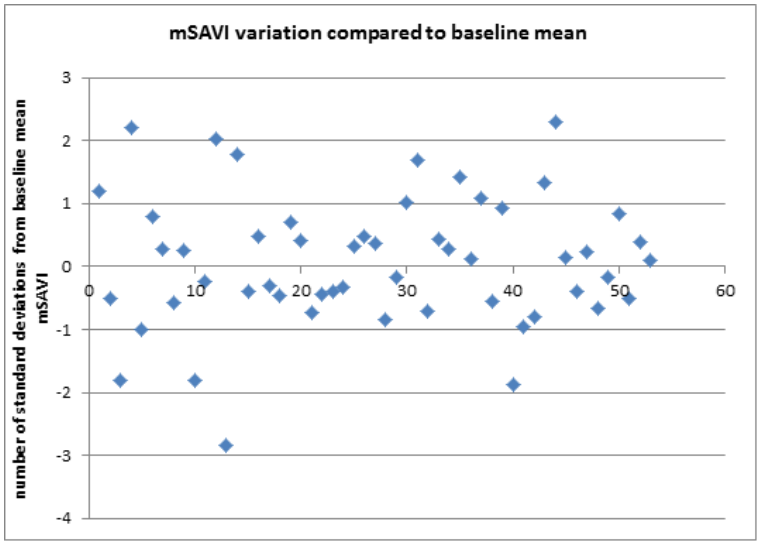
No.	Submitter	Submission and/or issue	Response to comment
		vegetation responds to cumulative stressors, including climate variability (e.g. climate warming, surplus water discharge). DWER requests clarification from the proponent on what further studies are to be undertaken to better understand aquifer connectivity and potential impacts, and when these studies will be incorporated into detailed management plans.	conceptualisation presented in the ERD and H3 assessment. Drilling of monitoring bores will be completed with the objectives to provide additional baseline data, increase confidence in the model and monitor drawdown extent. Data loggers have been installed in several of the existing bores which are used to assess groundwater level and changes in flow direction during rainfall and streamflow events, and twice yearly water chemistry samples are collected from selected bores for the same purpose. The Proponent is confident that the level of existing and planned monitoring and the recent test work that has been completed is adequate to provide confidence in the understanding of the hydraulic connectivity between the Mesa C Aquifer and the Robe River Aquifer and the potential impacts of the Revised Proposal.
6.	Department of Water and Environmental Regulation	<u>Warramboo Creek discharge</u> While the proponent acknowledges that excess discharge down Warramboo Creek may lead to vegetation changes, there is no discussion on how quickly this will happen and the ability of species to adapt over shorter timeframes.	**Noted – clarification provided** As stated in the response to Item 3, the proposed surplus water discharge rate to Warramboo Creek is between 2 GL/a and 7 GL/a and the total proposed life of mine discharge volume is 9 GL (Table 8-7 of the ERD). The majority of surplus water discharge will therefore occur over a period of 2-4 years. Thereafter, discharges will be on a sustaining pumping-cycle with peak discharges being mainly limited to periods following moderate to large rainfall events to regain water levels for effective mining operations. Riparian vegetation communities of arid landscape are inherently adapted to take advantage of rapid positive changes in water availability including sporadic surface water flows, shorter term soil moisture inputs and to cope with short to medium term pooling of water in certain parts of the drainage profile. The adaptive potential displayed by specific flora and flora-associates tends to be greatest in the base of the low flow channel and typically decreases laterally away towards the terrace and into the surrounding non-drainage associated habitats. Warramboo Creek has relatively high (1-3 m) vegetated banks and a bed that is a combination of coarse sand and gravel on clay-sand. The banks support understorey and overstorey components while the bed supports minimal vegetation present as scattered trees and

No.	Submitter	Submission and/or issue	Response to comment
			sporadic small islands of understorey vegetation. The image below shows typical bed and channel conditions along Warramboo Creek.  The proposed surplus water discharge will result in a discharge path becoming established in the relatively bare creek bed. The areas that will be exposed to consistently saturated sediments and standing water are those that currently support minimal vegetation and the vegetation that is present has the greatest local adaptive potential. Over the time period in which the majority of surplus discharge is proposed new understorey vegetation is likely to become established in the bed zone in response to rapid changes in the moisture regime and ongoing perennial surface water presence. However, the majority of such newly established vegetation is likely to be periodically removed by natural flow events in Warramboo Creek. Enhancement of vegetation communities present on the banks and terraces of Warramboo Creek is likely to occur due to the more consistently moist, but unlikely saturated, soil conditions that will result through horizontal and vertical bank recharge processes drawing from saturated bed sources during the period of surplus

No.	Submitter	Submission and/or issue	Response to comment
			water discharge. A small portion of vegetation bank vegetation may also be subject to reductions in vegetation health from waterlogging.
7.	Department of Water and Environmental Regulation	Warramboo Creek discharge The proponent considers that erosion at Warramboo creek is unlikely, as the discharge rate (velocity) is less than 1m/s. DWER questions whether a continuous flow over a long period will cause "softening" within the creek, resulting in increased erosion within the "wetting zone" once a natural flow event occurs. Warramboo Creek meanders and appears to have a high sand (small particle) content (from aerial imagery). The worst case scenario is that up to 220L/s could be discharged down the creek (under scenario of 7 GL/a discharge). In addition, removal (clearing) or loss (health decline) of riparian vegetation may lead to areas that are more susceptible to erosion during natural and/or high flow events. The proponent should acknowledge this potential and suggest contingencies in the event that erosion causes changes to the hydrological processes of Warramboo Creek.	**Noted – clarification provided** The bed material in the Warramboo Creek is a combination of coarse sand and gravel on clay-sand with the groundwater more than 15m below ground level in the vicinity of the proposed discharge location. The channel bed is undulating and dominated by natural scour depressions and open reach sections, where water will spread and pond. Flow velocities exceeding 1 m/s are required for erosion to become an issue. Flow persistence within downstream sections of the Warramboo channel will be attenuated by sections of ponded water. Once within the natural meandering low-flow channel a 200 L/s discharge would result in velocities less than 0.5 m/s and therefore have very low risk of hydraulic impact. The Proponent acknowledges there is a risk of erosion in the first 100-200 m after the discharge point where the transition from discharge flow to natural flow stream will occur. For this reason, the discharge outlet has been set back from the main creek and the first 30 m of transitional flow will include a 9 m wide rock-mattress to provide bed protection, encourage water spread and aid energy dissipation. The discharge is unlikely to change the physical hydrology of the creek (from a hydraulic and erosion perspective). Warramboo Creek has a loose depositional bed that is naturally dynamic and regularly re-formed by moderate to large natural flow events. These flow events involve much higher flow volumes that extend broadly over the channel profile and have velocities exceeding 1 m/s. The proposed discharge flow is more comparable to a very low post-event baseflow.
8.	Department of Water and Environmental Regulation	Warramboo Creek discharge DWER notes that the discharge point may intersect an existing population of *Cenchrus ciliaris* (Buffel grass) - identified as a major threat to biodiversity across Australia. DWER recommends the proponent consider an alternative discharge point, which avoid areas of high/significance weed occurrence, or commit to	**Disagree** Warramboo Creek runs through the Yarraloola Pastoral Station (refer to Figure 1-2 of the ERD). *Cenchrus ciliaris* has been recorded both upstream and downstream of the proposed discharge location. This species prefers the higher banks of drainage lines and floodplain areas; it is generally not located on

No.	Submitter	Submission and/or issue	Response to comment
		weed management measures prior to and during ongoing discharge.	the creek bed. The incised nature of Warramboo Creek in the vicinity of the discharge point means that water flow through *C. ciliaris* populations is likely to be minimal. Altering the proposed discharge location is unlikely to materially change any potential risks of seed flowing through the channel as the species is already well established along the creek banks.
9.	Department of Water and Environmental Regulation	Environmental Management Plan The Environmental Management Plan (EMP) (Appendix 4) details trigger and threshold criteria (based on standard deviation from baseline mean vegetation index) to measure changes to vegetation health. The proponent also intends to conduct remote sensing (mSAVI) to examine the spectral vegetation index for the upper canopy. The proponent considers on-ground monitoring only as a supportive measure if triggers are breached. DWER does not consider this as adequate and recommends that routine field monitoring of riparian vegetation be undertaken to assist in identifying declines in the health of riparian vegetation. This is recommended in addition to the remote sensing, which is proposed to be conducted annually, following the wet season.	**Agree – draft EMP revised** Tables 2-1 and 2-2 and Section 2.2 of the draft EMP have been revised to include annual field monitoring. Trigger and threshold criteria have been selected to align with previously submitted Rio Tinto EMPs (West Angelas Iron Ore Project and Yandicoogina Iron Ore Project). The revised draft EMP is provided as Attachment 2.
10.	Department of Water and Environmental Regulation	Environmental Management Plan DWER also recommends that the frequency of monitoring be increased to twice yearly. According to the EPA *Technical Guidance – Flora and Vegetation Survey's for Environmental Impact Assessments* (Dec 2016) surveys within the Eremaean province should occur 6-8 weeks post wet season and again in the dry season after winter rainfall. DWER can offer more guidance on monitoring methods and parameters to be measured if requested.	**Disagree – no change to EMP** Level 2 flora and vegetation surveys have been completed consistent with *Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016). These surveys were completed as baseline surveys for environmental impact assessment consistent with the requirements and purpose of the EPA 2016 Technical Guidance. The monitoring frequency proposed in the draft EMP is consistent with the majority of Rio Tinto's approved EMPs (e.g. Western Turner Syncline, Marandoo Revised Iron Ore Project, Brockman 4 Iron Ore Project) which include an annual post-wet season field survey. Monitoring is conducted during the season that is most suitable for detection and identification of the range of flora likely to occur in the study area, with the primary survey for the Eremaen region being the post-wet season (pending significant rainfall). Should the trigger proposed in the EMP be exceeded, the frequency of monitoring will be revised and may include post-dry season

No.	Submitter	Submission and/or issue	Response to comment
			monitoring pending post-wet season monitoring outcomes and recommendations.
11.	Department of Water and Environmental Regulation	<u>Environmental Management Plan</u> DWER has previously advised the proponent that the assessment of 2 standard deviations from a baseline 'mean' number is not appropriate as an ecological threshold - particularly when there is limited temporal data. There is potential for the 'mean' to be an inaccurate 'snap-shot' of the ecosystem. In addition, the threshold proposed would only be exceeded with a change of ≥ 2 standard deviations over *three* consecutive years. DWER considers a more appropriate measure to be: o A statistically significant decline from baseline ($p<0.05$) in the number and/or cover of native perennial species (trigger); and o Statistically significant decline from baseline ($p<0.05$) in the number and or cover of native perennial species over two successive monitoring events (threshold).	**Agree – draft EMP revised** The wording in the Mesa A Hub draft EMP has been revised to align the trigger and threshold criteria for upper canopy vegetation index with other recently submitted Rio Tinto EMPs (West Angelas Iron Ore Project and Yandicoogina Iron Ore Project) subject to the same EPA Environmental Factor. The trigger criterion of decline of two standard deviations from the baseline mean vegetation index has been proposed for the following reasons: o Decline from a baseline mean in a number of standard deviations aligns with commonly accepted convention for establishing trigger criteria to detect potential environmental disturbance o Quantifying decline in number of standard deviations from the baseline mean takes into account the natural variability observed within the community or ecosystem; this is preferable to using a set value or percentage which does not take natural variability into account o In a normally distributed dataset, 2 standard deviations from the mean encompasses 95% of the observed values, i.e. there is a 5% chance of measuring a value either higher or lower than 2 standard deviations from the mean, prior to any potential disturbance being imposed; this is aligned with the convention of using a statistical significance level of $p = 0.05$. o As a value lower than 2 standard deviations from the baseline mean is expected 2.5% of the time (in normally distributed data), this does not necessarily imply an impact or exceedance of an ecological threshold, but is a conservative measure to provide early warning for potential management intervention. Therefore, the threshold criteria proposed in the EMP requires this to be exceeded more than once. o The figure below shows remote sensing data from the modified soil adjusted vegetation index (mSAVI) for upper canopy riparian vegetation, calculated from baseline or reference data across a number of Rio Tinto sites in the Pilbara. The scatter

No.	Submitter	Submission and/or issue	Response to comment
			of data is mostly within 2 standard deviations of the baseline mean, with occasional values either higher or lower than this across a number of Pilbara sites. It is expected that baseline riparian data for the Robe River and Warramboo Creek will follow a similar pattern; however, the trigger criteria will be reviewed in line with an adaptive management approach as additional baseline data are collected.  The draft EMP has also been revised to align with the West Angelas and Yandicoogina EMPs for the proposed understorey trigger and threshold criteria, including application of a statistically significant decline from baseline as recommended in the submission from the Department of Water and Environmental Regulation. The revised draft EMP is provided as Attachment 2.
12.	Department of Water and	<u>Environmental Management Plan</u> The objective for Hydrological Processes is to *maintain the hydrological regimes of groundwater and surface water so that*	**Agree – draft EMP revised** The trigger and threshold criteria for introduced species have been revised in the draft EMP to align with other recently submitted Rio

No.	Submitter	Submission and/or issue	Response to comment
	Environmental Regulation	*environmental values are protected*. DWER considers the threshold value identified for "new introduced species becomes established and dominant within the riparian zone of Warramboo Creek" (Table 2-2) as too great. If monitoring is undertaken as per the trigger response actions, weeds should not get to the point of "established and dominant" - particularly if monitoring is increased to twice per year as proposed. DWER recommends the proposed triggers and thresholds are revisited, in consultation with the department.	Tinto EMPs (West Angelas Iron Ore Project and Yandicoogina Iron Ore Project) subject to the same EPA Environmental Factor. The revised draft EMP is provided as Attachment 2.
13.	Department of Water and Environmental Regulation	<u>Mine Closure</u> The closure objectives presented are based on key "aspirations" for the site as a whole. These objectives encompass too many areas and potential issues, and do not provide an adequate or appropriate set of tools to verify these criteria have been met. In particular, with regard to Warramboo Creek and riparian vegetation, there is no indication of what will be measured/monitored, or what the closure objective is for this and other impacted creek ecosystems. Whilst DWER accepts initial mine closure plans are less detailed and more strategic, the fact that there are likely to be impacts to vegetation through changes in hydrological processes needs to be acknowledged and addressed as a key closure item.	**Noted – clarification provided** As per the 'Guidelines for Preparing Mine Closure Plans' (DMP and EPA 2015), closure objectives at the proposal approval stage may be broadly identified and refined over time as the Closure Plan is a dynamic document with 3-yearly update intervals. Further refinement of the objectives in the Closure Plan will occur over time as increased data and knowledge are gained. As stated in the response to Item 3, the proposed surplus water discharge rate to Warramboo Creek is between 2 GL/a and 7 GL/a, with a total proposed life of mine discharge volume of 9 GL (Table 8-7 of the ERD). The majority of surplus water discharge will therefore occur over a period of 2-4 years in the early stages of the project. Due to the relatively small flow volumes and the temporary nature of the proposed discharge, irreversible impacts to riparian vegetation as a result of the proposed discharge are not expected. The draft EMP includes monitoring of riparian vegetation and additional monitoring of the proposed discharge may be required under Part V licence conditions. Monitoring conducted under the EMP and Part V licence will be used during the operations to monitor potential impacts to hydrological processes, including changes to riparian vegetation, and to inform future updates of the Closure Plan. Given the majority of the discharge will occur in the early stages of implementation of the Revised Proposal and because monitoring will be conducted during operations and irreversible impacts to riparian vegetation are not expected, riparian vegetation of Warramboo Creek may not be a key closure item and thus has not been included in the current Closure Plan.

No.	Submitter	Submission and/or issue	Response to comment
14.	Department of Water and Environmental Regulation	Mine Closure The proponent has not discussed option for management/monitoring once cessation of discharge to Warramboo Creek occurs. DWER requests clarification on whether monitoring will continue during and post closure.	**Noted – clarification provided** As noted in Item 13 above, the majority of surplus water discharge will occur in the early stages of implementation of the Revised Proposal. Due to the relatively small flow volumes and the temporary nature of the proposed discharge, irreversible impacts to riparian vegetation as a result of the proposed discharge are not expected. Therefore, monitoring directly related to the surplus water discharge is not proposed during closure or post closure.
15.	Department of Water and Environmental Regulation	Mine Closure The proponent has identified that death of "temporary vegetation" may impact negatively on the creek and states that work to investigate the best strategy for reducing discharge has been added to the closure task list for the site. DWER recommends that timing for undertaking these studies be included within the Mine Closure Plan.	**Noted** Timing for undertaking these studies will be included in future updates to the Closure Plan.
16.	Department of Water and Environmental Regulation	Proposed conditions DWER does not consider the proposed Ministerial Conditions are sufficient to ensure "irreversible impacts" on riparian vegetation of the Robe River and Warramboo Creek. DWER questions how the proponent will measure an irreversible impact, and over what timeframe this will be measured.	**Noted – clarification provided** The Proponent has defined 'irreversible impact' in the draft EMP as 'an impact resulting in a permanent loss of environmental value(s); or where intensive, and/or un-proven management intervention, potentially over a long-time frame, would be required to restore the environmental value(s).' The monitoring program to be implemented includes detailed trigger and threshold criteria against which performance against environmental outcomes will be measured over the life of the mine. Adaptive management will be implemented during the life of the mine to address potential impacts to environmental values should evaluation against trigger and threshold criteria indicate this is necessary. The Proponent clarifies that the term 'over a long timeframe', as it applies in the context of management intervention in the above definition, would be defined as extending into the post-closure phase (i.e. management intervention would extend into the post-closure phase).

No.	Submitter	Submission and/or issue	Response to comment
17.	Department of Biodiversity, Conservation and Attractions	Recommendation 1: That the proponent undertakes a clear quantitative assessment of direct and indirect impacts on all conservation significant flora, including numbers and proportions of individuals and populations, at both a local and regional scale.	**Noted – clarification provided** Please refer to Table 5-10 and Table 5-15 of the ERD which provide a quantitative assessment at both a local and regional scale of the numbers and proportions of individuals of conservation significant flora that may be impacted by the Revised Proposal.
18.	Department of Biodiversity, Conservation and Attractions	Discussion: It is important that a full quantitative assessment of impacts on conservation significant flora species is included in the Environmental Review Document (ERD). This should include numbers and proportions of individuals, and numbers and proportions of populations directly or indirectly impacted in a local and regional context. It is noted that the quantitative estimates of impacts on conservation significant flora currently presented in the ERD are based on species presence in the development envelope rather than an identified disturbance footprint. In the case of the Priority 1 *Abutilon* sp. Onslow (F. Smith s.n. 10/9/61), it appears that all of the known locations of this species within the development envelope are within Warramboo borefield extension area. It would therefore appear that the use of reasonable management measures, including the appropriate placement of infrastructure could be implemented to avoid or minimise impacts on this species.	**Noted – clarification provided** Section 5.6.1.2 of the ERD notes that a range of conceptual disturbance footprints have been considered and the maximum disturbance to Priority Flora is presented in the ERD. This approach has been taken in order to limit disturbance to significant environmental values while maintaining some flexibility for development within the Development Envelope. This is in line with the EPA's approach to development envelopes, which is detailed in the 'EPA Instructions on how to define the key characteristics of a proposal' namely that: 'The EPA considers that the development envelope approach provides flexibility for location of the proposal footprint and to allow for changes in design/layout.' As a range of development scenarios have been considered and the proposed extent of pits and locations of waste dumps and infrastructure are still conceptual, identification of specific individuals that may be disturbed is not possible. As stated in the ERD and the response to Item 1, direct impacts to *Abutilon* sp. Onslow will be limited to less than 5% of records in the Rio Tinto database. This represents the maximum disturbance to this species that may occur as a result of the Revised Proposal. The activities proposed in the vicinity of the *Abutilon* sp. Onslow records are associated with extension of the existing bore field and are thus low impact activities that can be managed to avoid direct impacts to *Abutilon* sp. Onslow. The Proponent's well established internal approvals request system, which includes demarcation of restriction zones around the locations of Priority Flora in the Proponent's Geographical Information System, will be used to manage clearing associated with the proposed bore field extension such that known locations of *Abutilon* sp. Onslow will be avoided where practicable.

No.	Submitter	Submission and/or issue	Response to comment
19.	Department of Biodiversity, Conservation and Attractions	Comment: It is understood from the ERD that the proponent is using its data held only by the company for impact calculations for conservation significant flora, which makes it difficult for government agencies to verify the quantitative impact assessments provided in the ERD. The proponent's regional data on these taxa should be provided to the relevant government agencies to facilitate assessment of the impacts of this proposal.	**Noted – clarification provided** The Proponent's regional conservation significant flora dataset is currently made available via the provision of Threatened Priority Flora Report Forms to the Department of Biodiversity, Conservation and Attractions (DBCA) under collection licence conditions; however, the Proponent would welcome the opportunity to enable electronic lodgement of these forms / data to facilitate the development of DBCA's regional datasets. The Proponent has also provided datasets pertaining to the Revised Proposal to the Index of Biodiversity Surveys for Assessments (IBSA) as part of the draft ERD submission.
20.	Department of Mines, Industry Regulation and Safety	ESD Requirement: Prepare a Closure Plan consistent with DMP and EPA *Guidelines for Preparing Mine Closure Plans* (2015), which includes methodologies and criteria to ensure progressive rehabilitation of disturbed areas with vegetation composed of native species of local provenance. Comment: Requirement met. The Mine Closure Plan (MCP) has completion criteria referencing local provenance seed (*p. 16*) and methods for sourcing local provenance seed has been provided (*p.41*). Whilst timeframes for future rehabilitation have not been documented, methods for implementing progressive rehabilitation have been outlined (*p.50*). It is DMIRS expectation that the next MCP three yearly revision contains more refined completion criteria consistent with a maturing operation.	**Noted**
21.	Wildflower Society of Western Australia	Section 5.4.2 Regional context The document does not specify a reference to indicate how up to date the source of "at least 98% of their pre-European extent remaining" and the percentage of each unit (Table 5-14) proposed to be cleared. Do they include clearing by Rio Tinto or all proposed clearing operations in the Pilbara bioregion. The Beard vegetation units are very broad scale and given the large number of projects in the Pilbara, a much more comprehensive analyses of vegetation units described for all	**Noted – clarification provided** The reference for pre-European vegetation extent is Department of Agriculture and Food, Western Australia (2011). *Pre-European Vegetation – Western Australia (NVIS Compliant version 20110715).* The pre-European vegetation extent is tabulated in Table 5-15 of the ERD. Historical clearing of vegetation in the Robe Valley, also tabulated in Table 5-15 of the ERD, is used to calculate the 98% value provided in Section 5.4.2 of the ERD. Historical clearing includes all clearing associated with Rio Tinto mining activities in the Robe Valley and clearing that has occurred on Rio

No.	Submitter	Submission and/or issue	Response to comment
		developments across the region is required to comprehensively assess the real environmental impacts.	Tinto tenements in the Robe Valley for other activities such as pastoral activities. As noted in Section 5.5.3 of the ERD, detailed mapping at the scale undertaken for the Development Envelope is not broadly available for the Pilbara region. Identification and assessment of potential cumulative impacts to vegetation requires regional scale mapping, such as that completed by Beard (1975a, 1975b), to be used.
22.	Wildflower Society of Western Australia	Section 5.4.3 Vegetation units The significance of the 76 vegetation units are defined purely on their extent within the Development Envelope. We have inadequate data from which to assess these vegetation units at a bioregional scale. As stated in Section 5.5.3 Cumulative Impacts "detailed mapping…is not broadly available for the Pilbara region" and thus only Beard vegetation mapping from 1975 is being used to try and assess how significant these types of broad scale clearing projects.	**Disagree** The assessment of significance was completed by botanists experienced in assessment of Pilbara flora and vegetation following detailed vegetation mapping of the proposed Development Envelope. As stated in Section 5.4.4 of the ERD, significance was assigned with consideration of the following: o **High local significance**: supports Threatened Flora; supports Priority 1 flora; associated with listed TECs or PECs; or associated with major drainage systems supporting riparian vegetation o **Moderate local significance:** supports Priority 2 flora, or high density of Priority 3 flora and associated habitat; associated with local drainage systems supporting riparian vegetation; or has limited local representation o **Low significance:** supports scattered records of Priority 3 flora, or locally common Priority 4 flora; associated with minor local drainage systems supporting riparian vegetation o **Negligible significance:** supports Priority 4 flora that are regionally common; or associated with vegetation common across the Pilbara region. Vegetation mapping by Beard was used as a consistent, regional scale mapping to provide context and to assess cumulative impacts across the Robe Valley. This broad approach (incorporating vegetation mapping by Beard) is common practice for environmental impact assessments for new proposals in the Pilbara and elsewhere.

No.	Submitter	Submission and/or issue	Response to comment
23.	Wildflower Society of Western Australia	Table 5-10 Potential direct impacts to known populations of Priority Flora These data specify the number of individuals of four Priority flora on the Rio Tinto database that are likely to be cleared, however do they take into account the number of known records that have been cleared or will be cleared for this, other Rio Tinto operations and other clearing proposals in the Pilbara? On a more bioregional scale we do not have any data to understand how many of the total known populations of these species have been cleared or are likely to be cleared.	**Noted – clarification provided** Table 5-10 of the ERD details the number of individuals of Priority Flora species that may be disturbed by the Revised Proposal. Table 5-15 of the ERD details the number of individuals and proportion of total Rio Tinto records that have been disturbed by other approved Rio Tinto activities and that are proposed for disturbance by other reasonably foreseeable Rio Tinto activities. FloraBase (Western Australian Herbarium 1998-) and the Proponent's regional conservation significant flora dataset provide regional data that have been included in Tables 5-10 and 5-15 of the ERD.
24.	Wildflower Society of Western Australia	Similarly with Section 5.5.2 Indirect impacts. We do not have any bioregional scale data from which to compare impacts to Warramboo Creek and all of the other, similar creeks that have been impacted directly or indirectly by mining and other developments in the Pilbara bioregion.	**Noted – clarification provided** The Proponent maintains a large and long-term environmental and hydrological data set for creek systems in the Pilbara that may be affected by the Proponent's mine dewatering or surplus water discharge. The data set includes data for potentially affected sites and reference sites. These data form part of the basis for adaptive environmental management for each site and are used to assist in the design of comprehensive monitoring programs with detailed trigger and threshold criteria that protect environmental values as far as practicable.
25.	Wildflower Society of Western Australia	The ERD states that "no irreversible impact on riparian vegetation is anticipated because of dewatering or surplus water discharge" and that "the troglofauna and stygofauna habitat present within each deposit is well connected and extends beyond the proposed impact areas" but is there any proof that this is the case? Has Rio Tinto conclusively proved that it has had no impacts from all of its other operations where it has stated that these impacts are limited or not irreversible?	**Noted – clarification provided** The Proponent has modelled the abstraction of groundwater and the discharge of surplus water. The assessment of potential environmental impacts from groundwater abstraction and surplus water discharge indicates that no irreversible impact on riparian vegetation is expected. The environmental impact assessment in the ERD concludes that, although there may be impacts to riparian vegetation along Warramboo Creek due to groundwater drawdown, the low flow channel and alluvial substrate will remain and the functionality of the community is expected to be maintained. The environmental impact assessment also concludes that, although there may be temporary changes to riparian vegetation as a result of increased water availability and altered water chemistry during

No.	Submitter	Submission and/or issue	Response to comment
			discharge, once discharge ceases the riparian vegetation will revert to that adapted to an ephemeral system. The monitoring program to be implemented includes detailed trigger and threshold criteria against which performance against environmental outcomes will be measured over the life of the mine. Adaptive management will be implemented during the life of the mine to address potential impacts to environmental values should evaluation against trigger and threshold criteria indicate this is necessary. Refer to the response to Item 40 below regarding comments on troglofauna and stygofauna.

Subterranean Fauna

No.	Submitter	Submission and/or issue	Response to comment
26.	Department of Water and Environmental Regulation	*Troglofauna* The ranking of habitat prospectivity (high, medium, low) is a novel approach that has not been used in previous assessments. Concerns regarding the accuracy of this approach were raised by DWER during the draft ERD and through the Peer Review (Biologic 2018). The proponent has responded to these issues in the final ERD (see Table 6-29) to increase the confidence in this approach. However, there is an inherent bias in the assigning of prospectivity criteria as the majority of sampled boreholes were located in the 'high' prospectivity habitat. Further information is required to confirm the assumptions regarding habitat connectivity between the mesas within medium prospectivity habitat, as acknowledged in the ERD, and discussed below. A total of 92 troglofauna species have been recorded within the Mesa A Hub development envelopes. The majority of species have been recorded from within conceptual pit areas, but there is a strong sampling bias as the majority of sampling occurred within pit boundaries at all sites (Figure 6-1 to 6-3). Eighteen troglofauna species have been recorded only from within areas that are proposed to be impacted by the proposal. The majority of species have been recorded from a single borehole (Figure 6-16) and are considered to be potential SREs. The impact to troglofauna species within each of the development areas and mesas is discussed below. *Warramboo* Four species have been recorded only from the Warramboo area, with one species *Tyrannachthonius* sp. 'Warramboo' known only from the impact area, and *Hyliidae* sp. 'PH006' is known only from a borehole on the pit boundary (see Fig 6-16). The location of *Tyrannachthonius* sp. 'Warramboo' is included in the areas approved for disturbance as part of the Mesa A/Warramboo Iron Ore Project (MS756). No additional singleton troglofauna species are expected to be impacted by the revised proposal.	**Noted – clarification provided** *Assumptions regarding habitat connectivity between mesas* Section 6.4.1.3 of the ERD notes that a troglofauna sampling program is underway to sample medium prospectivity habitat between Mesas B and C in order to examine the habitat connectivity between these two mesas. It is acknowledged in Section 6.4.1.3 that there are currently insufficient data to determine the degree of habitat connectivity between Mesas B and C. The Proponent has, therefore, taken a conservative approach by assessing the potential impact based only on modelled high prospectivity habitat. This approach assumes there is no habitat connectivity through the medium prospectivity habitat that lies between the high prospectivity habitat at Mesas B and C and assesses the impacts independently for each mesa. *Troglofauna species recorded only from proposed impact areas* Sixteen potential Short Range Endemic (SRE) taxa are currently known only from proposed impact areas. Section 6.4.3.1 of the ERD provides the numbers of potential SRE taxa that are currently known only from proposed impact areas by mining area: o Warramboo: 1 taxon (assessed as part of the Mesa A/Warramboo Iron Ore Project) o Highway/Tod Bore: 1 taxon o Mesa B: 11 taxa o Mesa C: 3 taxa o Mesa A: none, all taxa have been recorded in the proposed revised Mining Exclusion Zone (MEZ) *Highway/Tod Bore cumulative impacts* Section 6.4.4.3 of the ERD provides an assessment of the cumulative impacts to troglofauna habitat in each of the proposed mining areas and to the two Priority 1 PECs relevant to troglofauna.

No.	Submitter	Submission and/or issue	Response to comment
		Highway/Tod Bore Four species have been recorded only from the Highway/Tod Bore area, with one species *Cryptops* sp. 'CHI002' known only from the impact area. Cumulative impacts may need to be considered where the Highway/Tod Bore impact area sits adjacent to the Mesa A mining exclusion zone (MEZ) (Figures 6-25 and 6-16). *Mesa A* Twenty-one species have been recorded only in the Mesa A area. The current proposal includes removal of areas within the existing MEZ, as per Condition 6-6 Ministerial Statement 756. No troglofauna species are restricted within the proposed additional mining/cut widening areas within the MEZ (Figures A7-3(1-9)). *Mesa B* Twenty-eight species were recorded only from Mesa B, the ERD states that 11 species are known only from the impact area: Armadillidae sp. 'OES23', Campodeidae sp. 'DCA001', Chthoniidae sp. 'PCH049', Chthoniidae sp. 'PCH050', Cormocephalus sp. 'blind', Hanoniscus sp. '3', Hanoniscus sp. 'OES21', Indohya sp. 'PH001', Indohya sp. 'PSE073', Parajapygidae sp. 'DPA003', Prethopalpus sp. 'ARA051', (see Table 6-16 and Figure A7-1(1-9)). However, Table 6-5 and Figure A7-1(2) also include Curculionidae sp. B03 as only found from the mine pit area. Therefore, there are a total number of 12 potentially restricted troglofauna species at Mesa B. *Mesa C* 10 species were recorded only from Mesa C, with three species, Parajapygidae sp. 'DPA004', Parajapygidae sp. 'DPA008' and Cryptopidae sp. 'CHI026' known only from the proposed impact area (Table 6-16 and Figures A7-2(1-8)). *Habitat connectivity* There is a lack of evidence to support habitat connectivity between the mesas and impact areas within the Mesa A Hub development envelope. This is demonstrated by the unique troglofauna assemblages recorded within each of the mesas and	Comparison of the troglomorphic taxa recorded at Highway/Tod Bore and Mesa A (Figures 6-16 and 6-19 of the ERD) indicates that the troglofauna communities recorded at Highway/Tod Bore and at Mesa A are distinct from each other. As the communities appear to be distinct, the Proponent considers the impact to each community should be assessed separately, rather than cumulatively. *Mesa B* Table 6-16 of the ERD states that 11 taxa recorded from Mesa B are currently known only from the proposed mining area. Figure A7-1(2) of the ERD includes an additional taxa (*Curculionidae* sp. B03) as currently known only from the proposed mining area. Table 6-16 is correct, there are 11 taxa from Mesa B currently known only from the proposed mining area. Table 6-5 and Figure A7-1(2) incorrectly include *Curculionidae* sp. B03 as a separate taxon. This is incorrect as, based on molecular analysis, *Curculionidae* sp. B03 has been shown to be the same species as *Curculionidae* sp. 'CCU004/005' which has been recorded outside the proposed mining areas. *Habitat connectivity – troglofauna records in medium prospectivity habitat near Warramboo and Highway/Tod Bore* Figure 6-16 of the ERD shows the troglomorphic species recorded at Warramboo and Highway/Tod Bore, including some records in medium prospectivity habitat. Some of the records in the medium prospectivity habitat were taxa that have only been recorded from single borehole locations. Given the nature of troglofauna sampling and the lower sampling intensity in the medium prospectivity habitat compared with the high prospectivity habitat, it is not unexpected to record species in single bore locations. In addition, it should be noted that Figure 6-16 of the ERD is limited in view to Warramboo and Highway/Tod Bore. This figure does not illustrate that a number of troglomorphic taxa found at Warramboo are also found elsewhere (outside the extent of Figure 6-16) demonstrating connectivity between taxa at Warramboo and elsewhere:

No.	Submitter	Submission and/or issue	Response to comment
		impact areas (see Tables 6-4 to 6-6), and genetic evidence, which the ERD states: 'molecular evidence for some troglobitic orders indicates that there is unlikely to be continuous gene flow between the mesas of the Robe Valley' (Page 234). However, the distributions of troglofauna species suggest that there is, or has been, some habitat connectivity between the Mesa B and C (Page 180), and connectivity with other impact areas. For example: o *Paradraculoides bythius*, Hubbardiidae gen. nov. sp. SCH052 and Therriidae sp. AT001 (Mesa B and C); o Carabidae sp CCA001/012 (Warramboo and Mesa B); o Curculionidae sp. CCU004/005 (Highway/Tod Bore and Mesa A, Mesa B and Mesa C); o Armadillidae ISA009a/9b (Warramboo and Highway/Tod Bore and Mesa A); o Nicoletinae sp. TN010 (Highway/Tod Bore and Mesa B) Widespread species that have been recorded within and outside of the Mesa A Hub development envelope include: Haplodesmidae sp. DIHAP001, Curculionidae sp. OES10, Meenoplidae sp. OES11, Armadillidae sp. ISA056/57, *Tyrannochthonius basme*, *Nocticola* OES11, ?Staphylinidae sp. MesaKOES2. The ERD states that 'medium prospectivity [habitat] will provide connectivity between Warramboo, Highway/Tod Bore and beyond the western portion of the Development Envelope' (Page 220). Although there are troglofauna records from the 'medium' prospectivity habitat outside of the impact area, these are recorded from single borehole locations and are not widespread species (Figure 6-16). One species Armadillidae ISA009a/9b was found in both the Warramboo and Highway/Tod Bore areas. The ERD states that 'there are currently insufficient data to determine the degree of habitat connectivity and utilisation of the habitat' in medium prospectivity habitat and that additional sampling programs are underway between Mesas B and C, and between Highway/Tod Bore and the western Dinner Camp Bore areas, 'to determine degree of habitat connectivity and utilisation	o *Carabidae* sp. `CCA001/012` - recorded from Warramboo and Mesa B o *Armadillidae* sp. `ISA009a/9b` - recorded from Warramboo and Highway/Tod Bore o *Haplodesmidae* sp. `DIHAP001` - recorded from Warramboo, Mesa B, Mesa C and Hardey River

No.	Submitter	Submission and/or issue	Response to comment
		of the habitat' (Page 180, 220 and 230). The ERD does not state when the results of these surveys are expected to be available. Therefore, for the purposes of assessment the impacts should be considered independently for each of the mesas and areas, pending the results of the additional sampling to determine habitat connectivity.	
27.	Department of Water and Environmental Regulation	Troglofauna *Management and mitigation* No mitigation has been proposed for troglofauna in the Warramboo and Highway/Tod Bore areas as the proponent assumes that connected habitat extend beyond the development envelopes (Page 228). Additional sampling is being undertaken by the proponent to confirm habitat connectivity outside of the Warramboo and Highway/Tod Bore areas. The key mitigation to be implemented for the impacts to troglofauna is the establishment of a MEZ at Mesa B and Mesa C, based on the design of the existing MEZ at Mesa A. No MEZ has been proposed for the Warramboo and Highway/Tod Bore development envelopes. The current proposal includes removal of 42 ha of the existing MEZ at Mesa A, established as per Condition 6 of Ministerial Statement 756. The Minister has previously approved implementation of three changes to MS756, including an amendment to the mining pit shell and MEZ (17 December 2010), which was approved on the basis that the area of the MEZ was enlarged (EPA Bulletin 1264 Attachment 2 Figure 2). Therefore, implementation of the proposed excavation of the MEZ at Mesa A is inconsistent with the intent of the previous s45c (EPA Bulletin 1264). A s45C application was submitted to the OEPA in January 2016, which proposed to mine a portion of the area added to the Mesa A MEZ in 2010. The results from troglofauna habitat monitoring within the Mesa A MEZ were inconsistent and the significance of the change and effect of mineral extraction on troglofauna fauna habitat could not be determined. The 2016 s45C application was not approved by the EPA. The proponent has since undertaken	**Noted – clarification provided** *Mesa A Mining Exclusion Zone* Three changes to the Ministerial Statement for the Mesa A/Warramboo Iron Ore Project have been approved under Section 45C of the *Environmental Protection Act 1986*. Of these changes, one related to an alteration to the shape of the mining pit shell at Mesa A. This alteration did not require a change to the net volume of troglofauna habitat retained and was approved in December 2010. A Section 45C application was submitted to the OEPA in August 2015 seeking changes to the Mesa A pit design and the associated MEZ to enable preferential mining of higher quality ore. The 2015 Section 45C was not approved as the EPA considered the proposed change too significant for approval under Section 45C and instead requested the Proponent refer the proposal under Section 38 of the *Environmental Protection Act 1986* with a view to formally assessing the proposal. The Proponent referred the proposed change to the Mesa A pit design and associated MEZ under Section 38 as part of the Revised Proposal. Since the initial assessment and approval of the Mesa A/Warramboo Iron Ore Project, a significant volume of additional data pertaining to troglofauna have been collected as described in Section 6.4.2.2 of the ERD, including data from: o Biennial troglofauna sampling in the Mesa A MEZ o Troglofauna sampling in disturbed habitats o Subterranean habitat monitoring o Downhole optical image surveys As discussed in Section 6.4.2.2, the data collected since commencement of mining indicate that the Mesa A MEZ is

No.	Submitter	Submission and/or issue	Response to comment
		a peer review of the Mesa A troglofauna habitat monitoring data (Astron 2017b), which compared this data to monitoring stations at Mesa K (active mining activity) and Mesa B (no mining activity - control).	functioning as intended. Under the Revised Proposal, at least 50% by volume of connected, pre-mining troglofauna habitat will be retained at Mesa A and all documented troglofauna in the proposed additional mining areas have been recorded in the revised MEZ. Given the data indicate the current MEZ is functioning as intended and that the proposed change will continue to retain a significant volume of troglofauna habitat at Mesa A, the Proponent considers that the proposed change can be managed to meet the EPA Objective to 'protect subterranean fauna so that biological diversity and ecological integrity are maintained'.
28.	Department of Water and Environmental Regulation	<u>Troglofauna</u> The ERD states that based on the peer review of troglofauna habitat monitoring 'the Mesa A MEZ is functioning as intended' and that 'the results indicate that a troglofauna community with similar abundance and diversity to the pre-mining community continues to be present at Mesa A' (Page 206). The review of the monitoring data found that there had been no discernible difference in temperature and humidity over time at Mesa A, and was similar to Mesa B and K (Astron 2017b) with relatively stable temperatures and humidity recorded over time. Although pre-mining data at Mesa A and K was not available for before-after comparison, the observed changes at Mesa A and Mesa K were within the parameters recorded at the control sites at Mesa B (Astron 2017b). The proponent has proposed to continue the subterranean temperature and humidity monitoring program at Mesa B (before and during mining) and Mesa A (during mining), and in reference habitat at Mesa F (Page 242). Continued monitoring of troglofauna habitat at Mesa B will provide appropriate baseline data that can be used to measure any changes over time prior to implementation of the proposal to commencement and during mining activity. The proponent should state why no troglofauna habitat monitoring has been proposed for Mesa C. The ERD states that the proposed Mesa B and Mesa C MEZs have been designed to include the majority of orders of	**Noted – clarification provided** *Subterranean fauna habitat monitoring* Section 6.4.2.1 of the ERD provides a comparison of troglofauna habitat across the Robe Valley mesas. The discussion concludes that the mesas of the Robe Valley were formed through the same broad depositional processes and therefore comprise the same geological units with similar stratigraphy, with the same propensity for the Pisolite to host voids and cavities suitable for supporting troglofauna. Troglofauna assemblages at order level were also shown to be similar across the mesas of the Robe Valley, indicating that habitats on each mesa are similar with a similar range of ecological niches. The Proponent considers that continued monitoring of subterranean fauna habitat at Mesas A and B and establishment of new reference monitoring at Mesa F will provide a substantial data set including data from before and during mining and in reference habitat. Given the similarity of the mesa formations and troglofauna habitats across the mesas of the Robe Valley, addition of subterranean fauna habitat monitoring at Mesa C would not significantly enhance the design of the proposed monitoring program. *Avoidance of singleton troglofauna records* During the assessment of the Mesa A/Warramboo Iron Ore Project some troglofauna taxa were identified to be 'at risk' as they had only

No.	Submitter	Submission and/or issue	Response to comment
		troglofauna (Page 229), but does not include records of all species. The implementation of the MEZs assumes that the habitat within each mesa is continuous and without any barriers to troglofauna movement. Using a precautionary approach, the ERD states that the proposed changes at Mesa A have excluded the locations of species recorded as singletons (Page 225). However, it does not appear that the same approach has been included in the proposed MEZ at Mesa B and Mesa C. The proponent should clarify whether singleton species will be avoided as a precaution at Mesa B and C, as per the mitigation implemented at Mesa A. The ERD states that rehabilitated and in-pit waste dumps/low grade stockpiles will provide habitat for troglofauna after mining (Page 201), based on surveys of waste dumps at Mesa K and Mesa A (Biota 2017c). However, the data is inconclusive as there is no pre-mining baseline data available for comparison. Biota (2017c) states that 'no troglomorphic specimens were collected from Mesa K during current survey' and 'that data is not conclusive on whether specimens were collected from below or in waste dump'. Further investigations are being undertaken by the proponent to investigate the re-colonisation of in-pit waste dumps/low grade stockpiles and utilisation by subterranean fauna (Page 201). To address the issues identified above, the following should be included in the troglofauna management plan or considered as conditions on the proposal, including: o Troglofauna habitat monitoring at Mesa C (as per the planned habitat monitoring at Mesa B); o Undertake additional surveys (as proposed in the ERD) of 'medium' prospectivity habitat between mesas and impact areas to demonstrate habitat connectivity prior to ground disturbance; and review of the troglofauna management and mitigation to take into account any new information as outcomes of these surveys. o Undertake additional surveys (as proposed in the ERD) of rehabilitated and in-pit waste dumps/low grade stockpiles to	been recorded in the proposed mining area. The proposed MEZ was revised to include the areas around the records of taxa considered to be 'at risk'. Sampling conducted in the MEZ since approval of the Mesa A/Warramboo Iron Ore Project has resulted in collection of additional specimens of some of the taxa originally considered to be 'at risk'. Specifically, at the time of the assessment of the Mesa A/Warramboo Iron Ore Project, *Lagynochthonius asema* was known from two locations (one of which is in-pit); however, it is now known from eight locations and *Ideoblothrus* sp. 'Mesa A1' was known from three locations (one of which is in-pit) and is now known from four locations, demonstrating that taxa originally considered 'at risk' due to limited records have distributions that are greater than the original sampling showed. Figures 6-5 to 6-8 of the ERD show typical cross-sections of the Robe Pisolite within Mesas B and C. The figures show that Robe Pisolite is present across the entirety of the mesas and there are no known geological barriers or faults within Mesas B and C. A significant volume (>50% of the pre-mining habitat volume) of connected troglofauna habitat is to be retained at Mesas B and C through delineation of MEZs. The original draft MEZs have been modified several times during mine planning in order to ensure that mine pit shells avoid as many singleton troglofauna records as practicable. The resultant proposed MEZs include records for 27 of the 38 troglomorphic taxa at Mesa B (i.e. all but 11 potential SRE troglofauna taxa) and 13 of the 16 troglomorphic taxa at Mesa B (i.e. all but three potential SRE troglofauna taxa). Of the 11 taxa currently known only from the proposed mining area at Mesa B, ten are singleton records. All three of the taxa currently known only from the proposed mining area at Mesa C are singleton records. The EPA acknowledges that habitat may be used as a surrogate for inferring distributional boundaries of potentially restricted taxa (EPA 2016a, 2016b). Where a habitat type that supports a species is continuous then the extent of that habitat may be used to infer the likely presence of that species in the same habitat. The EPA also notes that taxa with greater known distributions may act as surrogates to infer the distributions of poorly sampled species

No.	Submitter	Submission and/or issue	Response to comment
		investigate re-colonisation of in-pit waste dumps/low grade stockpiles and utilisation by subterranean fauna; and review of the troglofauna management and mitigation to take into account any new information as outcomes of these surveys.	(EPA 2016b). *Paradraculoides bythius*, a conservation significant species listed as Threatened – Vulnerable, has been recorded across the full extent of Mesa B and almost across the full extent of Mesa C (see Figure 6-30 of the ERD). Records of the same species from multiple locations indicates that the troglofauna habitat within each mesa is well connected. Additional data regarding troglofauna and troglofauna habitat are available for the assessment of Mesas B and C compared with the data that were available during the assessment of the Mesa A/Warramboo Iron Ore Project. In light of the additional data, the Proponent is not proposing to avoid all singleton records at Mesas B and C. The occurrence of some taxa from multiple locations within Mesas B and C and the absence of known geological barriers and faults from both mesas indicate that the troglofauna habitat within each mesa is well connected. For this reason, the Proponent considers that the troglofauna taxa currently only recorded from inside the proposed mining areas (including singleton records) are likely to have distributions that extend beyond the proposed mining areas into the proposed MEZs, as has been shown for *Lagynochthonius asema* and *Ideoblothrus* sp. 'Mesa A1' at Mesa A. *Waste dumps/low grade stockpiles* Section 6.4.2.2 of the ERD describes the results of troglofauna sampling in disturbed areas and states only that potential habitat exists in or under waste dumps and under the pit during mining. Section 6.4.2.2 acknowledges that troglofauna sampling in disturbed areas is limited both spatially and temporally and that further work is required to evaluate the diversity of troglofauna present in disturbed habitats and the utilisation of those habitats by troglofauna. Additional troglofauna sampling in disturbed habitats will be undertaken. This sampling does not fit within the framework of the current EMP template provided by DWER as it does not have readily associated management actions and targets and the availability of sampling locations is dependent on mining operations

No.	Submitter	Submission and/or issue	Response to comment
			and drillhole stability (drillholes in waste dumps are inherently subject to collapse). *Surveys of medium prospectivity habitat* Additional troglofauna sampling of medium prospectivity habitat between Mesas B and C is underway to examine the habitat connectivity between these two mesas. However, as noted in the response to Item 26 above, the Proponent has taken a conservative approach to habitat connectivity between the mesas by assessing the potential impact based only on modelled high prospectivity habitat. This approach assumes there is no habitat connectivity through the medium prospectivity habitat that lies between the high prospectivity habitat at Mesas B and C. Additional troglofauna sampling is underway to further investigate habitat connectivity between the Highway/Tod Bore and Dinner Camp Bore areas. Biennial troglofauna sampling of medium prospectivity habitat in these areas and analysis of results will be undertaken as detailed in the draft EMP.
29.	Department of Water and Environmental Regulation	<u>Troglofauna</u> The proponent has proposed an offset for Subterranean Fauna (See Section 13). The proponent has acknowledged that there will be significant residual impact from unavoidable clearing of the two Priority 1 PECs (*Subterranean invertebrate community of mesas in the Robe Valle region* and *Subterranean invertebrate community of the pisolitic hills in the Pilbara*) and has proposed contributions to the Pilbara Environmental Offsets Fund (PEOF) to enable management or research (Page 521).	**Noted**
30.	Department of Water and Environmental Regulation	<u>Stygofauna</u> The ERD states that 'habitat characterisation undertaken by Biota (2017d) indicates stygofauna habitat is generally widespread across at least a third of the mapped broader Robe Valley area' (Page 261). The distribution of widespread stygofauna species recorded in the development envelope and from the desktop study support this conclusion (Figure 6-33; Biota 2017d).	**Agree** Modelling of prospective stygofauna habitat is a developing area. The Proponent has provided modelling with a scientific basis that utilises the best available information. As with any model, further refinement of the model is possible as additional data become available.

No.	Submitter	Submission and/or issue	Response to comment
		The ranking of stygofauna habitat prospectivity (high, medium, low) is a novel approach that has not been used in previous assessments. The ERD states that 'stygofauna habitat prospectivity across the Robe Valley is shown in Figure 6-32. Habitat prospectivity mapping was verified by overlaying specimen results and null records on the habitat prospectivity mapping' (Page 248). However, null results are not presented in the ERD Figure 6-32 or in Appendix 7 (Biota 2017d) to support the classification of the habitat prospectivity rankings used. In addition, stygofauna sampling sites are biased towards habitat ranked as 'high' prospectivity (see Figure 5.6 Biota 2017d), but 45.2% of stygofauna specimens were recorded from 'low' prospectivity habitat (Biota 2017d). This indicates that the use of stygofauna habitat prospectivity ranking may not be appropriate without further refinement of the method.	
31.	Department of Water and Environmental Regulation	<u>Stygofauna</u> The ERD states that 'below water table (BWT) mining and groundwater abstraction are not proposed at Mesas A and B and Highway/Tod Bore' (Page 256) and species recorded in these areas are beyond the predicted extent of groundwater drawdown (see Figure 6-33).	**Noted**
32.	Department of Water and Environmental Regulation	<u>Stygofauna</u> Groundwater drawdown is predicted to impact stygofauna species associated with Mesa C and Warramboo. Three stygofauna species, *Nesida* sp. 'AMM004', *Nesida* sp. 'AMM031' and *Stygoridgewayia trispinosa* were recorded within the Mesa C maximum modelled groundwater drawdown contour. These three species have also been recorded outside of the groundwater drawdown contour within the Mesa C 10km survey buffer. Four stygofauna species, *Atopobathynella* sp. 'B25', *Cypretta* sp. '4', *Nedsia* sp. 'AMM003' and *Nedsia* sp. 'AMM005' are only known from the Warramboo groundwater drawdown contour. Therefore, these four species are potentially at risk from the proposal. Saturated thickness at Warramboo is predicted to be	**Noted**

No.	Submitter	Submission and/or issue	Response to comment
		reduced by up to 70% (36m) in central cone of groundwater drawdown. The locations of the four stygofauna species are located outside of the central cone, within the 19m (*Cypretta* sp. '4', *Nedsia* sp. 'AMM003' and *Nedsia* sp. 'AMM005') and 7m (*Atopobathynella* sp. 'B25') maximum modelled groundwater drawdown contours. Considering the extent of available habitat beyond the area of predicted groundwater drawdown and the distributions of widespread stygofauna species recorded in the Warramboo area (for example Eriopisidae sp. '1 (PSS)', *Nedsia* sp. 'AMM004', Paramelitidae sp. 'AMP023'), the conclusion that *Atopobathynella* sp. 'B25', *Cypretta* sp. '4', *Nedsia* sp. 'AMM003' and *Nedsia* sp. 'AMM005' occur beyond the area of impact is likely to be appropriate.	
33.	Department of Water and Environmental Regulation	Stygofauna The ERD does not state what the purpose of the Warramboo and Mesa C 10 km buffer areas is. Biota (2017d) incorporated a buffer within 10 km of the predicted drawdown extent at Mesa C and Warramboo to allow for uncertainty in the hydrological modelling, which was used to inform the stygofauna sampling program. The proponent should discuss the potential significance of the impacts to stygofauna species that are known only from the buffer areas (Table 6-26 and 6-27) and outline management in the event that groundwater drawdown exceeds the current predicted groundwater drawdown extent.	**Noted – clarification provided** In order to obtain sufficient baseline data to conduct Environmental Impact Assessment, stygofauna sampling commenced before mine planning and hydrogeological modelling for the Revised Proposal were complete. The Warramboo and Mesa C 10 km buffer areas were included in the early stages of stygofauna sampling for the Revised Proposal to ensure that sampling results and contextual information would cover a sufficient spatial extent and still be applicable if changes were made to mine planning and hydrogeological modelling during the Pre-Feasibility and Feasibility study phases. As the Feasibility Study for the Revised Proposal is now complete, with multiple conceptual and numerical uncertainties addressed, significant changes to the current modelled extent of groundwater drawdown are unlikely. Hence significant impacts to stygofauna species known only from within the 10 km buffer areas are unlikely.
34.	Department of Biodiversity, Conservation and Attractions	Recommendation 2: That the proponent undertakes a specific program of troglofauna investigations designed to clarify / confirm whether Robe Pisolite and other inferred habitat material located adjacent or beneath the final mining pits and outside the Mining Exclusion Zone (MEZ) provides suitable habitat for troglofauna species and communities impacted by adjacent mining of habitat, in particular threatened and priority species impacted by mining	**Agree** As described in Section 6.4.2.2 of the ERD, troglofauna sampling has been conducted in disturbed in-pit areas at Mesa A to investigate the suitability of habitat material beneath the pit floor for troglofauna species. The sampling is limited by availability and access to drill holes in the active mining area; however, the limited sampling undertaken to date has recorded troglofauna species

No.	Submitter	Submission and/or issue	Response to comment
		operations. Such a program could be used to mitigate the impacts of this proposal on conservation significant troglofauna and their habitat and improve ongoing certainty in decision-making that troglofaunal species and communities and their optimal habitat are suitably protected after mining through retention of sub-grade material. This program should commence as soon as possible.	under the mine pit. Additional troglofauna sampling in disturbed habitats, including beneath the pit floor at Mesa A, will be undertaken. Additional troglofauna sampling between Mesas B and C is already underway to investigate the suitability of potential troglofauna habitat in this area. Additional troglofauna sampling is already underway to further investigate the suitability of habitat between the Highway/Tod Bore and Dinner Camp Bore areas. Biennial troglofauna sampling in these areas and analysis of results will be undertaken as detailed in the draft EMP.
35.	Department of Biodiversity, Conservation and Attractions	Recommendation 3: That the proponent provides further information on monitoring or investigation that has been undertaken at Mesa A, specifically focused on troglofauna habitat beneath the Mesa A pit floor (sub-floor zone). Discussion: While it is clear from the ERD that monitoring for troglofauna at Mesa A includes the MEZ, it is unclear how much investigation or monitoring of troglofauna habitat beneath the Mesa A pit floor (the sub-floor zone) has been undertaken.	**Noted – clarification provided** Section 6.4.2.2 of the ERD discusses the results of monitoring at Mesa A and other Robe Valley operations, including sampling that has been completed beneath the Mesa A pit floor. Table 6-11 of the ERD summarises all sampling and troglofauna records from disturbed habitats in Mesas A, K and the Middle Robe region of the Robe Valley. A total of 49 samples have been collected from within pits (20 unique samples) and 12 samples have been collected from waste dumps (four unique samples) between 2005 and 2018.
36.	Department of Biodiversity, Conservation and Attractions	The ERD indicates that the proposed pit design at Mesa A will " .. continue to meet the requirements of MS756 ... " (ERD page 65) and the ERD states that the current proposal includes retention of "... at least 50% by volume of connected pre-mining troglofaunal habitat at Mesa A, B and C" (ERD, page 23). The Department of Biodiversity, Conservation and Attractions (DBCA) was, however, unable to locate the specific percentages of the MEZ and sub-floor for each mesa within the document. Given the lack of sampling in the sub-grade inferred habitat material at and between the three mesas, it appears difficult to conclude, with confidence, that the Mesa A troglofauna assemblage is likely to persist beneath waste dumps and / or the sub-floor (pit floor) when compared to the retained habitat behind the escarpment at Mesa A (that is, in the MEZ).	**Noted – clarification provided** Section 6.4.2.2 (p. 201) of the ERD notes that due to the complexities of sampling in an operating mine pit, limited sampling has been completed beneath the pit floor at Mesa A. The troglofauna sampling results to date, therefore, provide a greater level of confidence of troglofauna persistence in the retained habitat behind the mesa escarpment at Mesa A (that is, in the MEZ) than beneath the pit floor. This information was used to guide the design of the proposed MEZs at Mesas B and C. The design of the MEZs and troglofauna habitat to be retained at Mesas B and C include only troglofauna habitat behind the mesa escarpment and do not include retention of troglofauna habitat beneath the pit floor. Thus it is proposed that the retained habitat of at least 50% by volume of the pre-mining habitat will be located entirely behind the mesa escarpments at Mesas B and C. The design of the troglofauna

No.	Submitter	Submission and/or issue	Response to comment
			habitat to be retained at Mesa A will continue to include both the habitat behind the mesa escarpment and the habitat beneath the pit floor. Specific percentages of habitat volume to be retained in each mesa were not provided in the ERD, rather the value of 50% is used as the upper limit of disturbance proposed. This approach allows some flexibility in mine design and is consistent with the approach taken for other environmental factors.
37.	Department of Biodiversity, Conservation and Attractions	Eleven species at Mesa B, three species at Mesa C and four species at Highway/ Tod Bore are currently only known from proposed pit and waste dump areas (no known locations outside impact areas). It appears that the proposal has the potential to impact on several taxa that have all or most of their known range restricted to proposed impact areas. It is noted that when inferring potential ranges of individual taxa using habitat profiling and mapping, assumptions are made about which potential habitat is actually used by individual taxa. Therefore, in some cases (due to the paucity of information involved with novel or undescribed species and potential habitat specialisation), taxa may be at high risk from development activities and require a level of precautionary protection and an adaptive approach to management until enough information can be gathered to: o adequately clarify their distribution and habitat; and o ensure their long-term survival is not placed at risk by impacting activities.	**Noted – clarification provided** As stated in the response to Item 26, sixteen potential SRE taxa are currently known only from proposed impact areas. Section 6.4.3.1 of the ERD, provides the numbers of potential SRE taxa that are currently know only from proposed impact areas by mining area: o Warramboo: 1 taxon (assessed as part of the Mesa A/Warramboo Iron Ore Project) o Highway/Tod Bore: 1 taxon o Mesa B: 11 taxa o Mesa C: 3 taxa o Mesa A: none, all taxa have been recorded in the proposed revised MEZ For the potential SRE taxa that are currently only known from proposed impact areas, the Proponent has used habitat and taxa with greater known distributions as surrogates for inferring distribution.
38.	Department of Biodiversity, Conservation and Attractions	As identified in the subterranean fauna peer review report (Biologic 2018), there are several apparent unresolved uncertainties surrounding the current effectiveness of the MEZ as a strategy for conserving restricted troglofaunal species and assemblages. The peer review report includes a number of statements suggesting that there is insufficient direct evidence that subterranean fauna habitat in the mesas is significantly connected between mesas and that the sub-grade material at the three mesas contains suitable habitat for the full range of troglofaunal species present. This is noting that a high proportion	**Noted – clarification provided** *Habitat connectivity between mesas* Section 6.4.1.3 of the ERD acknowledges that there are currently insufficient data to determine the degree of troglofauna habitat connectivity between Mesas B and C. The Proponent has, therefore, taken a conservative approach by assessing the potential impact based on the assumption that there is no habitat connectivity between Mesas B and C.

No.	Submitter	Submission and/or issue	Response to comment
		of the retained inferred habitat material is within sub-floor areas. These include the following: o "Statement that "Ongoing sampling at Mesa A indicates that [the MEZ] is a suitable approach and that the MEZ is providing a suitable volume of habitat to maintain troglofaunal representation" (RTIO 2017) is poorly supported by current compliance monitoring data and analysis" (page 13). o Most of the sampling has focused on the Mesa landforms and highly prospective CID habitats, with very little sampling in medium or low prospectivity habitats ... " (page 19). o "Highly prospective troglofauna habitat at Warramboo/ Highway/ Tod Bore is assumed to be well-connected and contiguous (based on baseline habitat assessment) beyond the indicative impact area to the south-west (Figure 6.1, Biota 2017a, RTIO 2018). Nevertheless, sampling data from the same inferred habitat further south-west of Warramboo (known as Dinner Camp Bore, sampled by Bennelongia 2011, shown in Figure 5. 7 Biota 2017a) showed a completely different troglofauna assemblage, indicating potential habitat heterogeneity, a barrier to dispersal, or other reasons for species turnover" (pages 20 and 21). o "Most of the specimens collected during the earlier rounds of compliance monitoring were not identified to species level. The resulting conclusions regarding the persistence of species or assemblages during mining are therefore unable to be verified by the available data. Additionally, results from each round of monitoring were not consistently compared to previous monitoring rounds or to baseline results. In the instances where comparisons were made, it was based on presence/absence of taxonomic orders only; therefore, the current monitoring lacks a comprehensive assessment of whether key species or assemblages have persisted within the MEZ to date" (page 30). o "Many of the current compliance monitoring reports lack the analysis required to indicate whether and to what extent troglofauna assemblages at Mesa A have been affected by mining. This is due to the lack of species level identifications	*Sub-grade ore classification* The classification of iron ore as 'high grade', 'low grade' and 'sub-grade' is determined by the chemical composition of the ore, with high grade ore comprising higher percentages of iron and lower percentages of contaminant oxides, such as SiO_2 and Al_2O_3, than lower grade ore. Conversely, the key parameters for troglofauna habitat relate to the physical characteristics of the formation, rather than the chemical composition. In particular, the presence of fractures, cavities, vugs or interstices sufficient in size to accommodate troglofauna is considered to be a key requirement for suitable troglofauna habitat. For this reason, the ERD considers the physical characteristics of the formation rather than the ore grade classification. *Sub-floor habitat* The design of the MEZs and troglofauna habitat to be retained at Mesas B and C include only troglofauna habitat behind the mesa escarpments; retention of troglofauna habitat beneath the pit floors (sub-floor habitat) is not proposed. The design of the troglofauna habitat to be retained at Mesa A will continue to include both the habitat behind the mesa escarpment and the habitat beneath the pit floor. *Statements made in the peer review* The Proponent addressed issues raised in the peer review as part of developing the Revised Proposal and the draft EMP (as required by the Environmental Scoping Document). Changes made to the ERD and EMP included changes in the areas of data provision, data analysis, habitat modelling, and monitoring program design. Please refer to Table 6-29 of the ERD which details the Proponent's responses to the issues raised in the peer review, including all items quoted in the current DBCA submission. *Proposed habitat retention* The design of the troglofauna habitat to be retained at Mesa A will

No.	Submitter	Submission and/or issue	Response to comment
		for some groups and the coarse level (taxonomic order level) of comparisons with previous data. Additional analyses are required to assess the effectiveness of the MEZ as a strategy for conserving troglofauna species" (page 30). o " ... there is still some uncertainty about whether the Mesa A troglofauna assemblage can persist beneath waste dumps and/ or the pit floor, but there is at least evidence that schizomid species can occur in these habitats. As the current proposal does not plan to retain troglofauna habitat beneath the pit floor at Mesa B (which is formed in basal pisolite, considered low prospectivity for troglofauna), and the proposed mining at Mesa C and Warramboo extends below water table, these findings are only relevant to the proposed waste dumps, which are mainly located on 'medium' to 'low' prospectivity geologies surrounding the Mesas" (page 33). o "The presence of troglofauna in disturbed in-pit areas demonstrates that potential habitat exists in or under waste dumps and under the pit during mining. However, only limited sampling has been undertaken to date in disturbed habitats; further work is required to evaluate the diversity of troglofauna present in disturbed habitats and utilisation of those habitats by troglofauna. This includes the under-pit habitat at Mesa A; due to the complexities of sampling in an operating pit, sampling to determine whether troglofauna communities persist under the pit as successfully as in the MEZ is currently limited. There is, therefore, currently a greater level of confidence of troglofauna persistence in the retained habitat behind the escarpment at Mesa A (that is, in the MEZ) than beneath the pit floor; this information has been used to guide the design of the MEZs at Mesas Band C" (ERD, page 201). DBCA contends that it would be extremely unfortunate if further mining within Robe Valley mesas supporting significant troglofaunal species and communities is approved and continues to diminish confirmed habitat for significant and locally endemic troglofauna without any measures such as investigations being implemented to verify with confidence that the extensive volume of inferred troglofaunal habitat in sub-grade material adjoining and	continue to include both the habitat behind the mesa escarpment and the habitat beneath the pit floor. A significant volume (>50% of the pre-mining habitat volume) of connected troglofauna habitat is to be retained at Mesas B and C through delineation of MEZs. The troglofauna habitat proposed for retention at Mesas B and C will be comprised almost entirely of high prospectivity habitat located behind the mesa escarpment; retention of troglofauna habitat beneath the pit floor is not proposed, nor is it considered warranted. The areas proposed for retention are part of the mesa, not beneath or adjoining the mesa, and as such comprise material comparable to that in the proposed mining area in terms of the key physical characteristics required to support troglofauna (i.e. the presence of fractures, cavities and vugs). Troglofauna capture rates were calculated for sampling conducted at Mesa B and Mesa C and for sampling conducted in the proposed MEZs at Mesas B and C to confirm the suitability of the proposed MEZs. The capture rates for each mesa and for each proposed MEZ are shown in Table 6-21 of the ERD. The results show similar capture rates for each proposed MEZ compared with the entire mesa, indicating that each of the proposed MEZs is representative of the respective mesa in terms of overall troglofauna utilisation. Given that: o The Mesa A MEZ is providing suitable habitat (as evidenced by subterranean temperature and humidity monitoring and troglofauna sampling results) (see Section 6.4.2.2 of the ERD); and o The MEZ designs proposed for Mesas B and C are similar to the Mesa A MEZ (see Figures 6-23 to 6-25 of the ERD); and o The MEZ designs proposed for Mesas B and C comprise material that is likely to be representative of the troglofauna habitat throughout both mesas (see Figures 6-25 to 6-28 and Table 6-21 of the ERD) It is considered that the Revised Proposal can be managed such that the diversity and ecological integrity of the troglofauna assemblages and habitat at Mesas B and C are maintained.

No.	Submitter	Submission and/or issue	Response to comment
		beneath the orebodies actually contains habitat with characteristics that will ensure the survival and persistence of these fauna. If these areas are not able to be confirmed as suitable habitat, there is potential for decisions leading to the loss of the overwhelming majority of suitable habitat for endemic troglofauna in Robe Valley mesas.	
39.	Department of Mines, Industry Regulation and Safety	ESD Requirement: Prepare a Closure Plan consistent with DMP and EPA Guidelines for Preparing Mine Closure Plans (2015), which considers: o The use of Mining Exclusion Zones (MEZ) to protect troglofauna habitat; o The use of waste rock to maximise survival of, and possible recolonization by troglobitic fauna; and o The need to retain intact material suitable for troglobitic fauna habitat under the pit floor after mining to facilitate movement of troglobitic fauna between the material below the pit floor. Comment: Requirement met. The proponent has implemented Mine Exclusion Zones (MEZ) at Mesa A for the protection of two subterranean invertebrate Priority Ecological Communities. The proponent has also advised that MEZs will be implemented at Mesa B and Mesa C in consultation with regulators during the environmental impact assessment for the Mesa A Hub (*p. 57*). The ERD outlines proposed MEZs, which also includes maintaining habitat below the base of pits. A number of MEZs protrude into the Mesa A, B and C pits as thin 'fingers'. Backfilling of these areas will be required to ensure stability of the Mesa façade, as well as provide potential connectivity of troglofauna habitat in the long term (*p. 57*).	**Noted – clarification provided** At Mesa A thin 'fingers' of MEZ protrude into the pit. Backfilling against these thin 'fingers is being undertaken to ensure landform stability. The MEZ designs for Mesas B and C do not have similar 'fingers' of MEZ protruding into the pits (see Section 18.8 of the Mine Closure Plan) so the need for backfilling against such structures for ensuring landform stability is not relevant.
40.	Wildflower Society of Western Australia	The ERD states that "no irreversible impact on riparian vegetation is anticipated because of dewatering or surplus water discharge" and that "the troglofauna and stygofauna habitat present within each deposit is well connected and extends beyond the proposed impact areas" but is there is any proof that this is the case? Has Rio Tinto conclusively proved that it has had no impacts from all	**Noted – clarification provided** Refer to the response to Item 25 above regarding comments on riparian vegetation.

No.	Submitter	Submission and/or issue	Response to comment
		of its other operations where it has stated that these impacts are limited or not irreversible?	*Troglofauna habitat* The Robe Pisolite has been recognised by the EPA as potential troglofauna habitat during previous assessments and is likely to be the primary habitat for troglofauna in the western portion of the Development Envelope. Resource evaluation drilling has shown that the Robe Pisolite is present from Highway/Tod Bore to Warramboo and further west to Dinner Camp Bore. Figure 6-10 of the ERD shows the modelled troglofauna habitat prospectivity based on geological and geophysical data. The location of the proposed Development Envelope and conceptual pit outlines in relation to the high and medium prospectivity habitat in Figure 6-10 show that troglofauna habitat extends beyond the proposed impact areas. Resource evaluation drilling has also shown the Robe Pisolite to be present across Mesas B and C (see Figures 6-5 to 6-8 of the ERD) and there are no known geological barriers or faults within Mesas B and C. Greater than 50% by volume of the pre-mining troglofauna habitat at Mesas B and C is proposed for retention through delineation of a MEZ. The MEZ will ensure that habitat remains beyond the proposed impact areas at Mesas B and C (see Figures 6-23 and 6-24 of the ERD). *Stygofauna habitat* Eighty-nine percent of the Robe Pisolite deposit at Warramboo lies above the pre-mining water table. Therefore very little of the deposit is suitable as stygofauna habitat. The Robe Pisolite is incised into the Yarraloola Conglomerate, an extensive regional aquifer that extends to the west of Warramboo. Based on the inferred extent of the Yarraloola Conglomerate and hydrogeological drilling, it is estimated that the modelled cone of depression will impact less than 2% of the area of the Yarraloola Conglomerate. Extensive stygofauna habitat will, therefore, continue to be available outside the proposed Warramboo impact area. Approximately 5% of the Mesa C orebody lies below water table. Therefore very little of the deposit is suitable as stygofauna habitat. Hydrogeological test work indicates that the Mesa C CID Aquifer

No.	Submitter	Submission and/or issue	Response to comment
			may be seasonally recharged from the Robe River Alluvial Aquifer, an extensive aquifer present along the length of the Robe River. Results of stygofauna sampling from the Mesa C CID Aquifer indicate that recharge of the Mesa C CID Aquifer occurs on a reasonably frequent basis. Given the evidence for connectivity between the two aquifers, extensive stygofauna habitat will continue to be available outside the proposed Mesa C impact area.

Terrestrial Fauna

No.	Submitter	Submission and/or issue	Response to comment
41.	Department of Water and Environmental Regulation	Terrestrial fauna (aquatic fauna) The proponent has acknowledged that some aquatic species may rely on the cycle of wetting and drying associated with an ephemeral creek for survival. Given the discharge to Warramboo Creek is "temporary" the proponent expects that aquatic communities will return to baseline/background conditions. DWER requests further information on the likely wetting/drying schedule for the creek (as a direct result of the discharge) to be able to appropriately assess the risk to species of aquatic fauna.	**Noted – additional information provided** The majority of surplus water discharge will occur over a period of 2-4 years while the groundwater levels under the Warramboo pits are reduced to enable below water table mining. Thereafter, discharge will be on a sustaining pumping-cycle with peak discharges being mainly limited to periods following moderate to large rainfall events. The discharge rate is planned to be approximately 200 L/s, delivering approximately 15-18 ML/day. Review of discharge flow behaviour in a clay-sand creekline out of Mesa J identified channel loss rates of 50 L/s per km. Applying a similar loss rate to Warramboo Creek indicates that the potential impact of the proposed discharge flow at Warramboo will be mainly in the first 4 km section of the creek bed downstream of the discharge outlet. The discharge flow stream is expected to be 2-5m wide and 0.1-0.3 m deep. The most likely outcome is that the deeper reach sections that pool following natural flow occurrences within 1-2 km of the discharge outlet will experience semi-permanent ponding during the initial discharge period and during periods of persistent discharge (wet season). During this time some aquatic fauna may establish more permanent populations than currently occurs under the current ephemeral hydrology (Warramboo Creek has no significant seasonal baseflow). The persistence of ponding will decrease with distance downstream since diminishing flows volumes are not expected to be sufficient to sustain pools. The potential impacts of the increase in water availability on aquatic fauna have been discussed in Section 7.6.13.2 of the ERD.
42.	Department of Water and Environmental Regulation	Accuracy of predicted impacts Eight potential Short-range Endemic (SRE) invertebrate taxa have been recorded from the Development Envelope (Table 1, and see ERD Table 7-6). The ERD concludes that impacts to these potential SRE taxa are unlikely to be significant, because	**Noted – clarification provided** The taxa listed in the DWER submission are categorised as potential short range endemics; none were confirmed as short range endemic species by expert taxonomists. Potential SRE species are those species for which there exists some uncertainty,

<table>
<tr><th>No.</th><th>Submitter</th><th>Submission and/or issue</th><th>Response to comment</th></tr>
<tr>
<td></td>
<td></td>
<td>
the relevant habitats in the western portion of the Development Envelope will be minimally impacted.

Table 1: Potential SRE invertebrates known only from the Development Envelope
<table>
<tr><th colspan="2">Taxon group and name</th></tr>
<tr><td>o Selenopid spiders
o ?Karaops ‘indet’
o Scorpions
o Lychas ‘multipunctatus complex’
o Lychas ‘bituberculatus complex’
o Lychas ‘gracilimanus’
o Urodacus sp. indet</td><td>o Slaters
o Philosciidae sp. indet
o Isopods
o Buddelundia ‘70’
o Land snails
o Rhagada convicta</td></tr>
</table>

This conclusion assumes that the conceptual project layout proposed in the ERD accurately reflects the final project configuration. The Proposal allows for clearing of up to 3,000 ha to occur anywhere in the Development Envelope, potentially including locations at which these SRE invertebrates were recorded (outside of the Mining Exclusion Zone).

The ERD may therefore underestimate the impacts of the proposal on SRE invertebrates. In the absence of information confirming that these taxa are secure outside the Development Envelope, or that they will be protected within it, it remains possible that substantial impacts to SRE invertebrates may occur (potentially including the loss of restricted taxa).
</td>
<td>
often due to limited taxonomic resolution or a lack of regional collection records. In these cases, habitat can be a useful indicator as to whether a potential SRE species is likely to have a restricted distribution or not. The use of habitat as a surrogate to infer the distribution of short range endemic species is an approach endorsed by the EPA (EPA 2016c).

The table below shows the habitat types in which the potential SRE taxa have been recorded. Most of the recorded potential SRE taxa occur in more than one habitat type and most of these habitat types are not restricted in the landscape. Using habitat as a surrogate for inferring distribution, it is likely that most of these potential SRE taxa occur more widely due to the wider occurrence of similar habitat in the Hamersley and Roebourne region. The exception may be ?Karaops ‘indet’ that is known only from the Breakaways and Gullies habitat type. This habitat type has a discontinuous distribution in the landscape. However, the Revised Proposal includes a MEZ around the Breakaways and Gullies habitat type at Mesas B and C, except for 8 ha where escarpment cuts are required to access the mesas. The MEZ will protect the Breakaways and Gullies habitat and thus ?Karaops ‘indet’ from direct disturbance. Impacts to potential SRE taxa are, therefore, unlikely to be significant.

<table>
<tr><th>Taxa</th><th>Habitat type where taxa recorded</th></tr>
<tr><td>?Karaops ‘indet’</td><td>o Breakaways and Gullies</td></tr>
<tr><td>Lychas ‘multipunctatus complex’</td><td>o Major River
o Riparian</td></tr>
<tr><td>Lychas ‘bituberculatus complex’</td><td>o Mesa Plateau
o Floodplain
o Floodplain
o Clay plain</td></tr>
<tr><td>Lychas ‘gracilimanus’</td><td>o Stony plain
o Acacia on stony plain</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr><th>No.</th><th>Submitter</th><th>Submission and/or issue</th><th>Response to comment</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><td></td><td>o Major River
o Hardpan
o Creekline
o Clay plain</td></tr>
<tr><td>Urodacus sp. indet</td><td>o Major River</td></tr>
<tr><td>Philosciidae sp. indet</td><td>o Major River
o Major River</td></tr>
<tr><td>Buddelundia ‘70’</td><td>o Floodplain
o Clay plain
o Clay plain
o Clay plain</td></tr>
<tr><td>Rhagada convicta</td><td>o Major River
o Major River
o Stony plain
o Clay plain</td></tr>
</table>
</td></tr>
<tr><td>43.</td><td>Department of Water and Environmental Regulation</td><td><u>Accuracy of predicted impacts</u>
The impacts of the Proposal on vertebrate fauna and fauna habitats, as identified in the ERD, are considered accurate. It is unlikely that there are substantial impacts to these values that the ERD has failed to identify.</td><td>Noted</td></tr>
<tr><td>44.</td><td>Department of Water and Environmental Regulation</td><td><u>Mitigation and management actions</u>
The designation of a Mining Exclusion Zone is a positive step that will mitigate some of the impacts of the Proposal on Terrestrial Fauna. The ERD presents sufficient evidence to justify the selection of buffer distances around bat caves and shelters, and other proposed management actions.</td><td>Noted</td></tr>
<tr><td>45.</td><td>Department of Water and Environmental Regulation</td><td><u>Residual impacts</u>
The most substantial residual impact of the Proposal on Terrestrial Fauna is the clearing and fragmentation of approximately 3,000 ha of fauna habitat. The fauna assemblages that are supported by these habitats in the Development Envelope are relatively intact and typical of the biodiversity of the</td><td>Noted
The Proponent agrees with the position stated in the DWER submission in relation to the management proposed to preserve the values of habitat types that are less widespread in the landscape.
Please refer to the response to Item 42 above for clarification regarding potential impacts to potential SRE invertebrates.</td></tr>
</table>

No.	Submitter	Submission and/or issue	Response to comment
		Pilbara region, and include significant vertebrate taxa and potential SRE invertebrate taxa. Most of the habitats found within the Development Envelope are widespread in the surrounding region, and appropriate management measures have been proposed in the ERD for preserving the values of habitat types that are more restricted or are otherwise important. It is therefore unlikely that the proposal will result in the loss of any instances of critical habitat, or result in substantial local or regional impacts to habitats, fauna assemblages or significant fauna (except for potential risks to SRE invertebrate taxa – see point below): o The Proposal will result in the loss of one nocturnal Ghost Bat shelter at Mesa B (shelter MBS-05 – ERD Figure 7-5). This is unlikely to represent a substantial local or regional impact, given that the shelter has not been identified as a diurnal or maternity roost and that there are several similar shelters in the immediate vicinity that will be retained. The management and mitigation measures proposed in the ERD are appropriate for management of impacts to other caves and shelters in the Development Envelope. o The Proposal will result in the loss of approximately 8 ha of Breakaways and Gullies habitat and 3 ha of Major River/Creek habitat, both of which are considered critical habitats for the Northern Quoll (WA – Endangered, EPBC – Endangered). - The ERD demonstrates that the specific locations at which clearing will occur in the Breakaways and Gullies habitat, for cuts in the Mesa escarpments for haul road access to Mesas A, B and C, have been selected to avoid areas of highest value. It is considered unlikely that these specific instances of clearing will represent a substantial impact at either local or regional scales. The proposed clearing within the Breakaways and Gullies habitat represents approximately 6% of the mapped extent of this habitat type in the Development Envelope; the majority will be retained, including with specific protection provided by the Mining Exclusion Zone.	

No.	Submitter	Submission and/or issue	Response to comment
		- Clearing within the Major River/Creek habitat is associated with the installation and operation of hydrogeological monitoring bores and the surplus water discharge point, and will affect less than 1% of the total extent of this habitat type within the Development Envelope (indirect impacts associated with water discharge into Warramboo Creek are unlikely to alter the use of this habitat by terrestrial fauna). This is considered unlikely to represent a substantial impact, at either local or regional scales. o The residual impacts to SRE invertebrates may be underestimated by the ERD and could potentially be substantial, depending on the final configuration of the Proposal (refer to 'Accuracy of predicted impacts', above).	
46.	Department of Water and Environmental Regulation	Conditions The Proponent should demonstrate prior to implementation that the Proposal will not result in the loss of SRE invertebrate taxa known only from the Development Envelope (i.e. range-restricted taxa). Potential options for doing so include, but are not limited to: o presenting additional survey data that clearly demonstrate the presence of these taxa in instances of habitat outside the Development Envelope; o presenting taxonomic, biogeographic, molecular or other evidence that clearly demonstrates that these taxa are unlikely to be SREs; and/or o demonstrating by way of management measures, exclusion zones or similar, that those instances of habitats in which these taxa were recorded within the Development Envelope will be protected from disturbance (including appropriate buffer areas).	**Noted** Please refer to the response to Item 42 above for clarification regarding potential impacts to potential SRE invertebrates. Additional SRE survey work is not proposed for the reasons given in the response to Item 42.
47.	Department of Biodiversity, Conservation and Attractions	Recommendation 4: That as a part of the proposed mitigation on impacts on the ghost bat (*Macroderma gigas*), consideration is given to contributions towards additional studies (i.e. funding of research or provision of ghost bat scat material into the current study Population Genetics of the Ghost Bat (*Macroderma gigas*) in the Pilbara Bioregion) to facilitate an improved understanding	**Noted** The Proponent is open to contributing to studies into the population genetics of the Ghost Bat in the Pilbara region and discussing options to support this outcome with the DBCA.

No.	Submitter	Submission and/or issue	Response to comment
		of the importance of 'satellite' caves as refuges and stop off points for this species. Discussion: It is recognised that the information in the ERD in relation to the ghost bat impact assessment is likely to have been constrained by the lack of information available on the ecology of the species, its distribution within the Pilbara and in particular the location of roosting habitat, and the species' response to disturbance. The vast majority of information available on the ecology of the ghost bat has been collected from Northern Australia (e.g. Northern Territory, Queensland) where conditions are different to the arid Pilbara region and the species behaves differently. The ghost bat is also difficult to study due to the remoteness of roosts, and its cryptic nature. It is currently understood that the distribution of ghost bats in the Pilbara is determined by the presence of suitable roosting sites, either natural caves or man-made mines and adits. Ghost bats are known to move between a number of caves seasonally, or as dictated by weather conditions, and require a range of cave sites. Outside the breeding season, male bats are known to disperse widely, most likely during the wet season when conditions allow bats to use caves that would otherwise not be suitable. Genetic studies indicate that females are likely to stay close to preferred maternity roosts. The proponent has identified a series of proposed measures to reduce the likely risks and residual impacts on ghost bats through the implementation of the mitigation hierarchy which is focused on management measures, including the avoidance and minimisation of disturbance (e.g. page 339-342). While these measures are supported as reasonably practicable for this proposal under the circumstances, there is considerable uncertainty around the value and regional significance of day and feeding roosts used by ghost bats for conservation of the species. On this basis, DBCA recommends that consideration is given to a proponent contribution to current studies into the population genetics of the ghost bat in the Pilbara region to enhance the understanding of the importance of 'satellite' caves as refuges and stop off points for the species. As an example, DBCA is	

No.	Submitter	Submission and/or issue	Response to comment
		currently involved in the Population Genetics of the Ghost Bat (*Macroderma gigas*) in the Pilbara Bioregion study. A contribution to this research by the proponent would assist conservation of the species in the long-term by increasing the level and scope of scientific understanding in relation to these aspects. Further, appropriately scoped and targeted scientific work is likely to greatly assist proponents and the State Government in undertaking environmental impact assessments, condition setting and requirements for mitigation measures in relation to this species.	
48.	Department of Biodiversity, Conservation and Attractions	Recommendation 5: That GIS data (shapefiles, etc, covering conservation significant flora and fauna point locations and habitat, stygofauna and troglofauna point locations and habitat, etc.) are provided to DBCA to assist in future management of these species.	**Noted – clarification provided** The Proponent already provides point locations for conservation significant flora and fauna recorded during surveys to the DBCA under collection licence conditions. The Proponent has also provided datasets pertaining to the Revised Proposal to the Index of Biodiversity Surveys for Assessments (IBSA) as part of the draft ERD submission.
49.	Department of the Environment and Energy	Northern Quoll and EMP Additionally the proponent has stated that the "EMP does not include monitoring in the Mesa Plateau, Hills and Plains habitats as these habitat types are not considered critical to the survival of the species", however, given the description of habitat critical to the survival of the Northern Quoll, it is likely that this habitat should also be monitored. The Department considers that the proponent needs to provide further information on proposed outcomes, objectives, trigger and threshold criteria, management actions and monitoring for EPBC Act listed species as this remains unclear. o The EMP should be revised to include the outcomes/results or the baseline data collection or adaptive management measures to allow for changes/additions. o The Department considers that there is still merit to monitoring health and population sizes of the Ghost Bat and Northern Quoll in the Development Envelope regardless of the regional data availability as this may be vital to	**Agree – draft EMP revised, clarification provided** Section 2-2 of the draft EMP has been revised to include monitoring of the Northern Quoll in Mesa Plateau, Hills and Plains habitat types as well as the Breakaways and Gullies habitat type. Section 2-2 of the EMP has also been revised to include a review of the Northern Quoll monitoring program after 3 years of monitoring to enable changes or additions to be made to the monitoring program based on the data collected. The draft EMP proposes a management-based provision to improve knowledge of the Ghost Bat population and utilisation of high value habitat in the Robe Valley (Table 2-4 of the draft EMP). The management action associated with this provision is to undertake a five year study of Ghost Bat utilisation of high value habitat in the broader Robe Valley in order to make a preliminary estimate of the local population of Ghost Bats and to indicate the type and frequency of use of caves within the western part of the Robe Valley. The draft EMP also includes monitoring of Northern Quoll across

No.	Submitter	Submission and/or issue	Response to comment
		understanding their ongoing presence in the development area.	the broader Robe Valley. As this monitoring is to be conducted over a large area for the life of the mine (subject to regular review of the monitoring program based on the collected data), it will improve knowledge of the northern Quoll population in the Robe Valley.
50.	Department of Mines, Industry Regulation and Safety	ESD Requirement: Prepare a Closure Plan consistent with DMP and EPA *Guidelines for Preparing Mine Closure Plans* (2015), which addresses the need for progressive rehabilitation of habitat for conservation significant species. Comment: Requirement met. Conservation significant fauna species that occur, or are likely to occur, at the Mesa A Hub, along with their preferred habitat, have been listed (*p.36*). Habitat elements (e.g. rocky features, waste materials suitable for burrowing) required by a number of the conservation significant species are considered in landform design post-closure (*p. 36*). Regular reviews of the mine plan are conducted to identify disturbed areas that can be rehabilitated throughout operations (*p. 39*). Progressive rehabilitation learnings will inform refinement of closure criteria.	**Noted**

Hydrological Processes and Inland Waters Environmental Water Quality

No.	Submitter	Submission and/or issue	Response to comment
51.	Department of Water and Environmental Regulation	Groundwater and surface water quality The number of data points per groundwater bore used may compromise the reliability of predicting the quality of the surplus dewatering discharge. In some cases, only one sample has been undertaken.	**Disagree** Since 2000, 399 water samples have been collected from 103 bores, averaging 3.8 samples per bore. Although the water quality assessment did not include this many samples, ongoing monitoring has increased the confidence in the groundwater quality data presented in the ERD and the 'Warramboo H3 Hydrogeological Level Assessment'. Refer to the response to Item 63 below for further information.
52.	Department of Water and Environmental Regulation	Groundwater and surface water quality The ERD states that nitrate levels in groundwater range from 0.05 mg/L to 130 mg/L. The ERD also states that TDS levels in groundwater range from 8 mg/L to 7000 mg/L. These levels of nitrate and TDS are several orders of magnitude higher than the baseline surface water quality levels within the Warramboo Creek. Some metal contaminants are also elevated in groundwater. The proponent should provide information on the likely sources of elevated nitrates and TDS in some groundwater bores.	**Noted – clarification provided** The concentrations quoted for nitrate and TDS are from Section 8.4.4.2 of the ERD which provides data for the existing groundwater quality in the general Warramboo area, rather than data that is most likely to represent the proposed surplus water discharge. In the Warramboo area there is a natural chloride gradient, with increasing concentrations towards the coast. There are also naturally occurring pockets around the Warramboo area with higher TDS concentrations. These pockets occur mainly in the Ashburton Formation which is of low hydraulic conductivity and therefore unlikely to contribute significantly to the Warramboo dewatering. The high nitrate concentration of 130 mg/L was recorded at only two regional bores located away from the mine operations. Pastoral pumps and associated puddles have been identified around these bores which may be the source of high nitrate concentrations. As nitrate concentrations elsewhere in the Warramboo area are at least one order of magnitude lower, the sources of high nitrate concentrations are believed to be anthropogenic and of minimal extent. Taking into account the general locations where dewatering bores will be required, and the low hydraulic conductivity of the Ashburton formation, groundwater monitoring data relevant to the proposed dewatering and surplus water discharge was collated and is presented in Table 8-9 of the ERD. These data are more

No.	Submitter	Submission and/or issue	Response to comment
			representative of the proposed surplus water discharge than those provided in Section 8.4.4.2 of the ERD.
53.	Department of Water and Environmental Regulation	Groundwater and surface water quality The proponent should provide a more meaningful prediction of the quality of the surplus dewater discharge (metals, TDS and nitrogen etc.), taking into account predicted increases in contaminants due to seepage from the in-pit waste fines facility and the higher chloride concentration located towards the coast to the west of the Warramboo pits. The proponent should then quantify the predicted impacts to aquatic fauna based on a worst-case scenario.	**Noted – clarification provided** The majority of surplus water discharge will occur over a period of 2-4 years in the early stages of implementation of the Revised Proposal to enable below table mining at Warramboo. Once the wet processing plant is commissioned, surplus water discharge will generally be limited to periods following moderate to large rainfall events since water abstracted from Warramboo will be used in the processing plant, rather than discharged to Warramboo Creek. The waste fines storage facility will become operational only once the wet processing plant has been commissioned; at this time discharge to Warramboo Creek will generally be limited to post-rainfall events. Surplus water to be discharged will, therefore, not interact with seepage from the waste fines storage facility and the groundwater chemistry data provided in Table 8-9 of the ERD is that most likely to represent to the proposed surplus discharge to Warramboo Creek.
54.	Department of Water and Environmental Regulation	Groundwater and surface water quality The surface water quality data in Table 8-9 is unclear and does not include data gathered by WRM in 2018. The proponent should update this table with the data from WRM 2018 and provide clarification on the how the values in Table 8-9 have been derived (e.g. mean values from all sample points).	**Agree – table revised and clarification provided** A revised version of Table 8-9 of the ERD is provided as Attachment 3. The revised version of the table includes the data from WRM 2018. Results from samples collected from the Warramboo Creek Site are shown as individual sample results. Results from sites WARUS1 to WARDS6 (WRM sites) are shown as median values for all sites sampled in each sampling event (noting that some sites were dry during the 2016 sampling event). For comparison groundwater results are shown as median values for all sampling events at all locations sampled. More detailed groundwater quality data are provided in Table A9-2 of Appendix 9 of the ERD.
55.	Department of Water and Environmental Regulation	Geochemical testing and tailings storage The ERD documents that the standard assay data from ore rock samples are similar for Mesa J and Mesa A to justify why the	**Noted – additional information provided** Standard assays were completed on ore rock samples collected from drillholes at Mesa J and Mesa A/ Warramboo. Standard assay data, other than commercially sensitive ore grade data, are

No.	Submitter	Submission and/or issue	Response to comment
		Mesa J test work is relevant to the Mesa A Hub Revised Proposal. The proponent should provide data to support this statement.	presented in the table below. The assay data show similar values for ore from Mesa J and Mesa A/Warramboo.

Parameter	Total count	Mean values for Tertiary Pisolite ore	
		Mesa A/ Warramboo	Mesa J
S (%)	123,845	0.02	0.01
CaO (%)	124,105	0.10	0.20
K_2O (%)	98,290	0.02	0.01
MgO (%)	99,805	0.10	0.19
Mn (%)	122,933	0.05	0.09
As (%)	43,541	0.002	0.002
Ba (%)	43,076	0.003	0.004
Cl (%)	43,592	0.012	0.006
Co (%)	43,471	0.002	0.002
Cr (%)	43,513	0.003	0.002
Cu (%)	96,102	0.001	0.002
Na (%)	42,996	0.018	0.013
Ni (%)	43,427	0.003	0.002
Pb (%)	90,089	0.001	0.001
Sn (%)	43,316	0.001	0.001
Sr (%)	43,209	0.002	0.002
V (%)	43,504	0.003	0.004
Zn (%)	100,946	0.003	0.008
Zr (%)	43,645	0.005	0.004

No.	Submitter	Submission and/or issue	Response to comment
56.	Department of Water and Environmental Regulation	<u>Environmental Management Plan</u> The EMP does not provide details on management measures for the dewater discharge, e.g. erosion monitoring, discharge point erosion control methods, discharge water quality monitoring, sediment monitoring etc.	**Noted – clarification provided** The Proponent considers that any requirement to implement management measures and monitoring for surplus water discharge can and should be managed through licensing under Part V of the EP Act. Management controls would be based on assessment of the potential risk associated with the surplus water discharge, including consideration of environmental receptors.
57.	Department of Water and Environmental Regulation	<u>Groundwater abstraction</u> There is inconsistency between documents on the rate of groundwater recovery post-mining. The ERD states that drawdown is not expected to recover under steady-state conditions to pre-mining levels, however it is assumed that with extensive rainfall, increased surface run-off and infiltration into the mesa due to reduced vadose zone, water level recovery may be seen by 140 years after mining (at Warramboo). The Mine Closure Plan (Appendix 3) states that water levels are "expected to return to pre-mining levels" (Table 21); and further, in Section 18.6 it is stated that "groundwater is expected to recover to pre-mining water table levels once abstraction has ceased in the area, taking around 70-100 years". DWER requests that the proponent clarify and provide justification around how the estimated post-mining groundwater recovery levels have been estimated, and whether this will be subject to ongoing investigation/modelling. This uncertainty means that environmental outcomes may be variable, and it is difficult to assess whether post-mining water levels may be detrimental to any receptors at this stage.	**Noted – clarification provided** *Warramboo* The time for recovery of groundwater level following cessation of dewatering was assessed using the hydrogeological model for Warramboo. The 'Warramboo H3 Hydrogeological Level Assessment' report and the ERD state that recovery of the groundwater table to 80% of pre-mining groundwater level is estimated to take approximately 40 years, with complete recovery of the groundwater level estimated to take up to 140 years. Environmental impact assessment has been undertaken using these estimates. The current version of the Mine Closure Plan was completed prior to the most recent hydrogeological modelling and therefore includes estimates that are for earlier mine planning and hydrogeological modelling. The estimates for groundwater recovery will be updated in the next revision of the Closure Plan. The hydrogeological model will be updated using transient data which will be available once below water table mining commences. *Mesa C* The time for recovery of groundwater level post-mining was assessed using the hydrogeological conceptualisation for Mesa C. The 'Mesa C H3 Hydrogeological Level Assessment' report and the ERD indicate that the Mesa C CID Aquifer is unlikely to recover to pre-mining levels under steady state conditions but that extensive rainfall and possibly increased surface run-off and infiltration into the mesa are likely to assist in water level recovery. Environmental impact assessment has been undertaken on this basis. The

No.	Submitter	Submission and/or issue	Response to comment
			hydrogeological model will be updated using transient data which will be available once below water table mining commences.
58.	Department of Water and Environmental Regulation	Groundwater abstraction The H3 hydrogeological assessment(s) provided in Appendix 9 will be reviewed to support the proposed increase in groundwater abstraction. It is noted that there is no below water table mining proposed at Mesa B, and minimal below water table mining is proposed at Mesa C (6 GL/ over the Life of Mine). DWER will review any hydrogeological reports submitted to support a groundwater licence as the project progresses.	**Noted**
59.	Department of Water and Environmental Regulation	Mine Closure The proponent has not proposed any water monitoring to advise closure planning or to support any completion criteria.	**Noted** The response to Item 68 below proposes additional criteria regarding ground and surface water aspects. To support these criteria, monitoring will be included in the verification process and evidence section of the next update of the Mesa A Hub Closure Plan. It should be noted that operational water quality monitoring will be undertaken under Part V licence conditions.
60.	Department of Water and Environmental Regulation	Mine Closure The proponent has stated that further work is required to investigate the best strategy for reducing the discharge to Warramboo Creek, but has not indicated the timing of this work. This should be provided along with measurable closure criteria.	**Noted** The timing of these studies will be included in future updates of the Closure Plan. It should be noted that no irreversible impact is proposed to the environmental values associated with Warramboo Creek. Investigation of the best strategy for cessation of discharge to Warramboo Creek is focused on the potential decline of temporary vegetation that may have become established in Warramboo Creek during the initial 2-4 year period of surplus water discharge. The study will examine how reduction in the surplus water discharge can be managed such that a sudden change in the temporary vegetation is not observed.
61.	Department of Water and Environmental Regulation	Mine Closure The proponent expects that seepage from the proposed waste fines storage facility (WFSF) will recharge the local aquifer immediately below the WFSF, creating a groundwater mound.	**Noted – clarification provided** Modelling of the proposed Warramboo waste fines storage facility has been conducted to examine seepage until the end of mining and until closure/post-closure (DHI 2018). The modelling indicates

No.	Submitter	Submission and/or issue	Response to comment
		During operations, most of this seepage volume is to be captured by the water supply borefield and re-circulated in the wet plant. Any changes to groundwater chemistry will also be confined to the cone of depression resulting from groundwater abstraction. The proponent has not discussed how seepage will behave post closure and what implications may exist for groundwater contamination. Seepage and the risk of consequent impacts should be discussed and related to any pit lake/groundwater void modelling that has been or is proposed to be undertaken.	that during operations, groundwater chloride concentrations due to seepage from the waste fines storage facility will be contained within the cone of depression resulting from groundwater abstraction and that the majority of the increase in chloride concentration will remain beneath the pit area (DHI 2018). At closure/post-closure, increased chloride concentrations from the waste fines storage facility will slowly disperse, with maximum concentrations expected to be less than chloride concentrations in naturally occurring higher chloride pockets at Warramboo.
62.	Department of Water and Environmental Regulation	Mine Closure Further to the above, a closure task has been identified to assess the potential for seepage from waste fines storage facilities into the aquifer and potential for impact to groundwater quality and subterranean habitats. DWER would like to know the timing for the further studies required and what contingencies exist if it is found that there is seepage to the aquifer.	**Noted – clarification provided** Modelling of the potential for seepage from the waste fines storage facility has been conducted. Results of the modelling are provided in DHI (2018).
63.	Department of Water and Environmental Regulation	It is noted that the *2014 Review of Existing Water Quality Data Warramboo / Mesa A Mine,* Rio Tinto (2015b) identified several issues with respect to surface and groundwater. It is unclear whether these were specifically addressed in the subsequent *Mesa C H3 Hydrogeological Level Assessment,* Rio Tinto (2017c)' and *Warramboo H3 Hydrogeological Level Assessment*, Rio Tinto (2017d) report. The issues raised were: Groundwater o The number of data points per bore used was not ideal and may compromise interpretational reliability. In some cases only one sampling event was undertaken and as such any trends noted in this study may not be accurate. Additional sampling and analysis should be undertaken across the site to increase the number of data points to 3 or more. Following this, data should be re-analysed and trends should be re-evaluated accordingly. o An investigation into the elevated nitrogen concentrations in the groundwater should be undertaken. This will be particularly important if surplus water is to be discharged	**Noted – clarification provided** Since 2000, 399 water samples have been collected from 103 bores, averaging 3.8 samples per bore. Although the water quality assessment did not include all of these samples, ongoing monitoring has increased the confidence in the groundwater quality data presented in the ERD and the 'Warramboo H3 Hydrogeological Level Assessment'. Since completion of the initial water quality assessment in 2014/2015, six additional sampling campaigns have been completed. There are currently 42 operational bores at Warramboo and 12 operational bores at Mesa C that have been sampled 4 or more times. Ongoing sampling of selected bores twice a year is planned throughout the life of the mine. Table 8-9 of the ERD shows the median nitrogen and nitrate nitrogen (N-NO3) concentrations measured in groundwater bores most likely to represent the proposed surplus water discharge were 1.8 mg/L and 1.16 mg/L respectively. As stated in the ERD, these values are elevated compared with the 95% aquatic ecosystem protection levels of 0.3 mg/L for total nitrogen and 0.03 mg/L for

No.	Submitter	Submission and/or issue	Response to comment
		back into the surrounding environment and to determine if treatment prior to discharge is required.	nitrate nitrogen (ANZECC/ARMCANZ 2000); however, baseline sampling conducted along Warramboo Creek has recorded nitrogen and nitrate nitrogen in the surface water at levels up to 1.8 mg/L and 0.47 mg/L respectively. These baseline concentrations are also elevated compared with the ANZECC/ARMCANZ 2000 Guidelines. Nitrate levels in Pilbara aquifers can be relatively high due to multiple non-point sources such as pastoral and mining activities. Land clearing may release salts accumulated in the unsaturated zone into groundwater, particularly in arid and semi-arid regions that have a thick unsaturated zone with a salt-store accumulated over thousands of years. At Warramboo it is possible that this process has contributed to elevated nitrate levels where vegetation and topsoil stripping has occurred for pastoral, construction and mining activities. Detailed investigations have not been undertaken at Warramboo but are underway at other Rio Tinto sites.
64.	Department of Water and Environmental Regulation	It is unclear if impacts from the combined natural stream flow with the discharged dewatering water have been assessed. It is assumed that dewater discharge will continue during periods of peak natural stream flow, which has been modelled at 11.5GL/yr for Warramboo Creek. It is unclear, however, how variable this flow is from year to year (noting that most flow occurs between January to May) and what the ranges may be. It is assumed that dewatering discharge will continue during periods of peak natural flow with a maximum annual discharge of 7GL and flow rate of $1ms^{-1}$. The combined flow may have implications for erosion, water quality and vegetation composition and abundance. While it is noted that the Environmental Management Plan refers to ensuring no impacts to overstorey vegetation > 2 standard deviations, limited details have been provided on management measures for the dewatering discharge, e.g. erosion monitoring (particularly at discharge points and bends), discharge water quality monitoring, contingency planning and vegetation monitoring.	**Noted – clarification provided** Indicative annual flow data for Warramboo Creek was derived from scaling of flow data from the larger Cane River catchment, which drains similar landscapes adjacent to Warramboo Creek. Based on the scaled data, median flow volumes in Warramboo Creek are estimated to be 11.5 GL/a with approximately 85% of flow years expected to drain greater than 4 GL/a. In Warramboo Creek flows are extremely ephemeral and of short duration; there is a notable absence of seasonal baseflow. In low flow years the annual flow volume is attained from only one or two flows, usually originating from multi-day rainfall exceeding 50 mm. There is a marked change in geomorphology at the North-West Coastal Highway such that smaller flows reaching the low gradient coastal flats tend to pool and dissipate. As stated in the response to Item 41, discharge of 200 L/s is no more than 2-5 m wide and 0.1-0.3 m deep; the low flow stream that would result from surplus discharge is very small compared to the full channel bed width of 20-40 m. Full channel natural flows extend over the full creek bed width and are more than 0.5 m deep. The contribution of discharged surplus water to combined flows is

No.	Submitter	Submission and/or issue	Response to comment
			therefore negligible. Discharge flows are of similar magnitude to recession flows and post-event baseflows; daily flow volumes during these phases are much lower than peak-flow volumes and are typically not associated with creek bed erosion. The likely impact during post-event periods would be the increased persistence of temporary post-event water ponding. Changes to vegetation due to discharge will occur due to the temporary increase in water availability as discussed in Section 5.6.2 of the ERD. Most of the vegetation associated with Warramboo Creek is located on the banks and terraces with very little vegetation present in the channel (see response to Item 6 above for further detail). The proposed discharge will result in a discharge path becoming established in the relatively bare creek bed. Over the time period in which the majority of surplus discharge is proposed, new understorey vegetation is likely to become established in the bed zone in response to the temporary increase in water availability. However, the majority of such newly established vegetation is likely to be periodically removed by natural large flow events in Warramboo Creek. Enhancement of vegetation communities present on the banks and terraces of Warramboo Creek is likely to occur due to the more consistently moist soil conditions that will result from the proposed discharge. As the groundwater table is more than 15 m below the creek bed in the vicinity of the discharge location, it is unlikely that vegetation away from the creek fringes will significantly benefit from the small surplus discharge flows. The draft EMP has been revised to include outcome based provisions for and monitoring of understorey vegetation in addition to the previously proposed outcome based provisions for the upper canopy. The revised draft EMP is provided as Attachment 2. The Proponent considers that any requirement to implement management measures and monitoring for surplus water discharge can and should be managed through licensing under Part V of the EP Act. Management controls would be based on assessment of

No.	Submitter	Submission and/or issue	Response to comment
			the potential risk associated with the surplus water discharge, including consideration of environmental receptors.
65.	Department of Water and Environmental Regulation	While it is noted that there is connectivity between the Yarraloola and CID aquifers in the vicinity of the Warramboo Creek, it is still unclear how significant this is and how it may affect groundwater recharge and groundwater quality from dewatering discharge into Warramboo Creek or from waste fines storage in the Warramboo pit.	**Noted – clarification provided** Surplus water will be generated during below water table mining operations at Warramboo. It is proposed that groundwater will be abstracted from the CID/Yarraloola Aquifer to enable below water table mining. As stated in the response to Item 3, surplus mine dewater from the CID /Yarraloola aquifer will be discharged to Warramboo Creek at a rate of between 2 GL/a and 7 GL/a, with a total proposed life of mine discharge volume of 9 GL (Table 8-7 of the ERD). The majority of surplus water discharge will, therefore, occur over a period of 2-4 years in the early stages of implementation of the Revised Proposal. Thereafter, discharges will be on a sustaining pumping-cycle with peak discharges being mainly limited to periods following moderate to large rainfall events. Water head, chemistry, pumping test analysis and lack of a confining layer provide evidence of connectivity between the Warramboo Creek bed and the CID/Yarraloola Aquifer. It is, therefore, likely that some of the discharged surplus water will re-circulate back into the Yarraloola Aquifer. Modelling of seepage from the waste fines storage facility (DHI 2018) indicates changes in groundwater chemistry are likely to be confined to the cone of depression generated by groundwater abstraction, with the majority of changes likely to be confined to the area under the mine pits.
66.	Department of Water and Environmental Regulation	The conceptual model provided is based on life of mine totals and likely ranges of water use, abstraction and discharge. While it has been stated that water use and discharge requirements have been scheduled to minimise abstraction and discharge requirements, it was unclear how this had been achieved/ calculated.	**Noted – clarification provided** The ERD states that dewatering, abstraction and surplus water discharge rates will vary significantly throughout the life of the mine. Groundwater abstraction rate will vary depending on mine operational requirements to access below water table ore and water use requirements. Water use requirements will largely depend on the commissioning and operation of the wet processing plant. Abstracted water will be used on site and for wet processing where feasible to minimise surplus water discharge to Warramboo Creek.

No.	Submitter	Submission and/or issue	Response to comment
			Scheduling of mining operations takes into account factors such as ore grade, access to ore, dewatering rates, wet plant operation, mine efficiency and reduction of environmental impacts.
67.	Department of Water and Environmental Regulation	While the options considered by the applicant for water management appeared to be reasonable, it was noted that the volume dewatered and discharged would be highly dependent on mine scheduling activities. It was unclear, however, if and how the scheduling has been managed to reduce impacts.	**Noted – clarification provided** Scheduling of mining operations takes into account factors such as ore grade, access to ore, dewatering rates, wet plant operation, mine efficiency and reduction of environmental impacts. Groundwater abstraction will be limited to that required to allow access to below water table ore and to meet site water demand. Abstracted water will be used on site and for wet processing where feasible to minimise potential impacts to Warramboo Creek.
68.	Department of Mines, Industry Regulation and Safety	ESD Requirement: Prepare a Closure Plan consistent with *DMP and EPA Guidelines for Preparing Mine Closure Plans* (2015) which addresses the development of completion criteria to maintain hydrological regimes and the quality of groundwater and surface water so that environmental values are maintained post closure. Comment: Requirement not met. While a broad closure strategy for hydrological regimes and groundwater and surface water quality is presented in Section 8.7 of the ERD, the corresponding indicative completion criteria in the Mine Closure Plan (MCP) regarding the maintenance of hydrological regimes and the quality of groundwater and surface water are inadequate (*p. 15 & 16*). It is DMIRS expectation that the next three yearly MCP revision contains more refined completion criteria that reflect the S. M.A. R. T (Specific, Measurable, Achievable, Realistic and Time-bound) principle.	**Noted – clarification provided** The Proponent understands that it is DMIRS expectation that the completion criteria, verification process/method and evidence will be updated in the Closure Plan throughout operations. To maintain alignment with the updated completion criteria in the Mesa J Hub Mine Closure Plan, the following additional criteria will be incorporated into the next update of the Mesa A Hub Mine Closure Plan: o Groundwater levels and quality are recovering and trending towards acceptable ranges; o Backfill of the final landform has been undertaken to prevent the formation of pit lakes; and o Operational drainage structures have been constructed or modified to consider local surface water regimes post closure.
69.	Confidential 1	Once again the exponentially increasing and totally unsustainable extraction of finite potable water (millions of years old) and the destruction of unique flora continues in the deliberate exclusion of live data to the public of WA. The process is therefore verging on corrupt. Why even call for comment when the EPA will approve this operation and grant water we do not have and cannot spare.	**Noted – clarification provided** The majority of the proposed groundwater abstraction will be from the Yarraloola Aquifer, an extensive regional aquifer that extends to the west of Warramboo. Based on the inferred extent of the Yarraloola Conglomerate and hydrogeological modelling, it is estimated that the modelled cone of depression will impact less than 2% of the area of the Yarraloola Conglomerate.

No.	Submitter	Submission and/or issue	Response to comment
		As saline water encroaches our coastline the EPA lines up another loss of irreplaceable water.	Groundwater drawdown may affect availability of groundwater to facultative phreatophytic vegetation along the 13 km section of the defined flow channel of Warramboo Creek and into the flood plain downstream of the defined channel. Changes in groundwater availability may result in a reduction in canopy cover, increased mortality and in limited areas, changes in structure and composition. Although the Revised Proposal may result in impacts to riparian vegetation along Warramboo Creek, the low flow channel and alluvial substrate is expected to remain, maintaining the functionality of the community. The median concentration of Total Dissolved Solids in the groundwater proposed for abstraction is approximately 1180 mg/L. To be classified as good quality potable water, it is recommended that TDS is < 600 mg/L (NHMRC and NRMMC 2011). According to the 'Australian Drinking Water Guidelines' (NHMRC and NRMMC 2011), the groundwater at Warramboo is classified as being of poor palatability and, at times, as being of unacceptable palatability as potable water.

Landforms

No.	Submitter	Submission and/or issue	Response to comment
70.	Department of Mines, Industry Regulation and Safety	ESD Requirement: Prepare a Mine Closure Plan consistent with DMP and EPA *Guidelines for Preparing Mine Closure* Plans (2015), which addresses maintaining the integrity of physical landforms post closure (including geotechnical stability). Comment: Requirement met. The proponents principles of waste dump design to achieve stable landforms has been outlined (*p. 51*). Erosion risk and implications on waste dump design have been discussed for the Mesa A Hub (*p. 52*). In addition, waste dumps and abandonment bunds are to be located outside of the zones of potential pit instability (*pp. 52, 53, 54 & 55*). Indicative completion criteria have been presented for landform stability and are considered adequate for this stage of operations (*p. 15*). It is DMIRS expectations that the completion criteria, verification process/method and evidence will be updated throughout operations. DMIRS recommends the provision of "as built" reports would be beneficial in the evidence section.	**Noted**

Social Surroundings

No.	Submitter	Submission and/or issue	Response to comment
71.	Department of Mines, Industry Regulation and Safety	ESD Requirement: Prepare a Mine Closure Plan consistent with DMP and EPA *Guidelines for Preparing Mine Closure Plans* (2015), which addresses the need to protect the social surrounds from significant harm post closure. Comment: Requirement met. Safety risks post closure have been identified and presented (e.g. pit voids, access by general public via North West Coastal Highway and access by Traditional Owners to significant heritage and ethnographic sites). The proponent has presented a number of management measures for these risks, including rehabilitation of tracks, decommissioning of all infrastructure and construction of abandonment bunds around open pits (*p.54*). Adequate indicative completion criteria have also been presented for the objective 'public safety hazards have been managed' (*p. 15*).	**Noted**
72.	Department of Planning, Lands and Heritage	The Department of Planning, Lands and Heritage has no comment as issues relating to Aboriginal heritage have been adequately addressed in the ERD.	**Noted**
73.	Kuruma Marthudunera Aboriginal Corporation RNTBC	Kuruma Marthudunera Aboriginal Corporation RNTBC (KMAC) is the appointed Heritage Body and Registered Native Title Body Corporate (RNTBC) for the Robe River Kurama (RRK) People, also known as the Kurama and Marthudunera People. The RRK People have traditional rights and interests to an area covering about 15 759 square kilometres in the Pilbara region. Within this area is the township of Pannawonica and the Robe River system, *Jajiwurra* that runs through RRK country and embodies cultural values relating to RRK People's sacred beliefs, laws and customs. KMAC on behalf of the RRK People submit the following comments in relation to Environmental Review Document (ERD) Mesa A Hub Proposal (the Proposal), prepared by Rio Tinto Iron Ore (RTIO). In particular, I draw your attention to the following matters: The Robe River System (*Jajiwurra*), Robe River Kurama Heritage Sites and Water.	**Noted** The Proponent acknowledges the importance of the Robe River system to the Robe River Kurama People and confirms that the Revised Proposal will not prevent water from flowing freely through the system.

No.	Submitter	Submission and/or issue	Response to comment
		1. The Robe River System (*Jajiwurra*) RRK people wish to emphasise the importance and significance of *Jajiwurra*. It has significance beyond its immediate location. It is a sacred body of water that represents the wider connection between RRK People, their country and resources since time immemorial. This wider connection encompasses the creation story of the *Jajiwurra* that is connected to a broader mythology that serves as a Dreaming Track linking important *thalu* sites and law grounds along the *Jajiwurra* in a series of connected narratives. It is a place that the spirits of the RRK People's ancestors inhabit. This forms an integral part of the RRK People's sacred belief system, giving *Jajiwurra* continuing cultural meaning across the generations. *Jajiwura* is an integrated cultural landscape considered the 'lifeblood of the RRK People' and the 'main artery' of their country. It is central to their identity and highly revered by the RRK People. RRK Law dictates that the water must be able to flow freely through the river system. Serious repercussions will be experienced by the RRK People if they fail to safeguard this system. Looking after *Jajiwurra* by keeping cultural links strong is vital to the health and well-being of RRK People, community and country. This ERD acknowledges the importance and significance of *Jajiwurra* to the RRK People.	
74.	Kuruma Marthudunera Aboriginal Corporation RNTBC	2. Robe River Kurama Heritage Sites Warramboo Outstation is a heritage site of special significance to the RRK People. It is an important site where many RRK Elders lived and worked, and they continue to bring their families to this place and spend time here. Warramboo Outstation is a place that will be excluded from mining and RRK People have access to this place regulated. The nature and extent of consultation undertaken by RTIO and the information provided to the RRK People is that they can continue to access this site and that access will be maintained subject to safety constraints, with procedures that are already in place to allow safe access (p. 69, *Environmental Review Document Mesa A Hub Proposal*). There are several heritage sites in the area which the ERD says will not be directly impacted including the Robe River System and named pools and a highly unusual rockshelter site with spinifex matting that makes it of extremely high value in terms of rarity and uniqueness in the Pilbara	**Noted** The Proponent acknowledges that Warramboo Outstation is a site of special significance to the Robe River Kurama People and confirms that access will be maintained to this site, subject to safety constraints, with procedures that are already in place to allow safe access. The Proponent confirms that the Revised Proposal will not directly impact the Robe River, associated named pools or the rock shelter with spinifex matting. All activities to be conducted under the Proposal will occur in accordance with the management plans developed by the Proponent and the Robe River Kurama People.

No.	Submitter	Submission and/or issue	Response to comment
		(pp. 437-438, *Environmental Review Document Mesa A Hub Proposal*). Yirrkawiya Gap, a registered site with the Department of Planning, Lands and Heritage {ID 6505) is a kangaroo dreaming site set up by the Maralga (creation spirits). The ERD states that this site may contain some archaeological sites that are disturbed indirectly due to vibrations in the area. An existing track through this site will also need to be widened (p. 441, *Environmental Review Document Mesa A Hub Proposal*). All of these sites are of great significance to RRK People and important for community well-being and the overall health of their country. All activities to be conducted under the Proposal should occur in accordance with management plans developed by RTIO and the RRK People.	
75.	Kuruma Marthudunera Aboriginal Corporation RNTBC	<u>3. Water</u> Water is viewed by RRK People as what gives life to *Jajiwurra*, country, heritage sites and landscapes. Without water there is no life and no source of energy. According to RRK People, water is essential for 'talking to' the country. To RRK People it provides a means of monitoring the health of country, carrying out traditional activities (such as hunting and ceremony), as well as practicing culture and law. It is the source of everything and all are connected. Water can also be dangerous and must be respected. RRK People value water in the highest regard and have their own traditional law and ways governing how it is utilised and managed. This ERD discusses in detail how water will be supplied and managed in relation to this Proposal. The RRK People have a strong interest in how this occurs once the Proposal is underway.	**Noted** The Proponent acknowledges the high level of significance the Robe River Kurama People place on water in the landscape. The Proponent will continue to consult with the Robe River Kurama People regarding water and other significant heritage aspects via the established Local Implementation Committee meetings and the Heritage Advisory Committee.
76.	Kuruma Marthudunera Aboriginal Corporation RNTBC	<u>Conclusion</u> RRK People have responsibilities to look after RRK country through obligations to their families and community, law and culture to see that the Robe River System *Jajiwurra* and their heritage sites are protected. Water is an intrinsic part of RRK country and its value, like that in any society, is not only environmental but cultural.	**Noted**

Offsets

No.	Submitter	Submission and/or issue	Response to comment
77.	Department of Water and Environmental Regulation	The Residual Impact Significance Model (RISM) should be completed and include all (direct and indirect) impacts, not just those that have been identified as significant residual impacts. Text (separate to the RISM table) should also be provided which provides rationale for the proponent's position of whether or not an impact is significant and requires an offset. Impacts for each environmental value should also be quantified by IBRA sub-region.	**Agree – additional information provided** A revised offsets proposal is provided in Attachment 4. The revised offsets proposal includes the RISM completed for all direct and indirect impacts and quantification of the proposed offset areas separated into Hamersley and Roebourne IBRA sub-regions.
78.	Department of Water and Environmental Regulation	<u>Flora and Vegetation</u> o The proponent has identified that the direct clearing of up to 3,000 ha of good to excellent vegetation is a significant residual impact, including 8 ha of riparian vegetation. o The proponent considers that potential indirect impacts can be managed and residual impacts will not be significant enough to warrant application of offsets. o In consideration of the information provided in the ERD, DWER considers that the significant residual impacts for flora and vegetation have been appropriately identified on the basis that there are no loss (mortality) to the vegetation communities as a result of indirect impacts. If the proponent considers that loss will occur as a result of indirect impacts, these will need to be quantified. o To date, the EPA has not applied offsets for the clearing of Good to Excellent vegetation in the Roebourne sub-region. For DWER to determine the appropriate quantification of significant residual impacts, the quantification for each vegetation community will need to be separated into both Hamersley and Roebourne IBRA sub-regions.	**Agree – additional information provided** The quantification of potential direct impacts to significant vegetation has been separated into Hamersley and Roebourne IBRA sub-regions and is provided in Attachment 5.
79.	Department of Water and Environmental Regulation	<u>Terrestrial Fauna</u> o The proponent considers that no significant residual impact remains for terrestrial vertebrate fauna. o For DWER to determine the appropriate quantification of significant residual impacts, the quantification for each	**Agree – additional information provided** The quantification of potential direct impacts to terrestrial fauna habitat has been separated into Hamersley and Roebourne IBRA sub-regions and is provided in Attachment 5. The 'Revised environmental offsets proposal' (Attachment 4) provides an

No.	Submitter	Submission and/or issue	Response to comment
		terrestrial fauna habitat (including whether habitat is considered critical) will need to be separated into both Hamersley and Roebourne IBRA sub-regions. o DWER considers that the ERD may underestimate the impacts on short range endemics (SREs). Noting this, DWER is unable to confirm whether or not significant residual impacts remain for SRE's. o DWER notes that the Commonwealth considers that a rate of $3,000 or greater should be applied for critical habitat for the Northern Quoll. Given that the proposal is across both Roebourne and Hamersley sub-region, the higher rate for additional environmental values, which would include critical habitat, would be the $1,500 base + CPI (depending on when clearing is undertaken).	estimate of Northern Quoll core habitat separated into Hamersley and Roebourne IBRA sub-regions. Please refer to Item 42 above regarding impacts to potential SRE invertebrates.
80.	Department of Water and Environmental Regulation	Other comments o Section 13/1 – The ERD states that 'projects funded will address the priorities outlined in the Pilbara Conservation Strategy (Government of Western Australia 2017) including Karijini National Park restoration, management of Fortescue Marsh and also management of fire, feral animals and weeds in the Pilbara Region'. Please note that the Pilbara Environmental Offsets Fund projects will not be based on the Pilbara Conservation Strategy.	**Agree – correction made** This correction has been made in the 'Revised environmental offsets proposal' (Attachment 4).
81.	Department of the Environment and Energy	Northern Quoll and offsets Northern Quoll is listed as endangered under the EPBC Act and therefore an action is likely to have a significant impact if it removes habitat critical to the survival including for the species, populations and important populations. As noted within the EPBC Act Referral guideline for the endangered northern quoll *Dasyurus hallucatus* (available at: http://www.environment.gov.au/system/files/resources/d7e011a7-bf59-40ed-9387-9afcb8d590f8/files/referral-guideline-northern-quoll.pdf), this includes foraging and dispersal habitat in proximity to denning sites (approximately within 2 km) along with rocky habitats such as ranges, escarpments, mesas, gorges, breakaways, boulder fields, major drainage lines or treed creek	**Agree – offsets proposal revised** The Proponent has collected a considerable amount of data for the Northern Quoll in the Robe River region. The data from the Robe River region show that Northern Quoll are associated with the Breakaways and Gullies habitat, with > 80% of records from within 10 m of the Breakaways and Gullies and Major River/Creek habitat. The Proponent considers that the core Northern Quoll habitat locally comprises the Breakaways and Gullies habitat type, the habitat within 10 m of the Breakaways and Gullies habitat type and the River habitat of the Robe River. These habitats are considered to be of high importance to the Northern Quoll and the Revised Proposal has been designed to largely avoid these habitats.

No.	Submitter	Submission and/or issue	Response to comment
		lines. The proponent notes that "This definition is broad and includes the majority of the western portion of the Development Envelope". The records appear to indicate that the Northern Quoll is associated with the Breakaways and Gullies habitat and the surrounding buffer habitat (likely for foraging or dispersal). The response (page 475 in the main document) notes that "12 records from the Mesa Plateau or Rocky Slopes habitat units but all of these records were within 10 m of the Breakaways and Gullies habitat units". Given the species is utilising this buffer area around the Breakaways and Gullies habitat, the Department considers it to meet the definition of critical habitat. The Department considers that the discussion related to removal of critical habitat is still insufficient and as a result, the offset quantum and compensation amount ($) is likely insufficient. Critical habitat for EPBC Act listed species should be offset at a higher dollar value than the current offset proposed for the PEC as evidenced in past assessments ($3,000 or greater) and a discussion should be provided on the *EPBC Act Environmental Offsets Policy*.	However, the loss of even a small area of core habitat is considered significant and is, therefore, proposed to be offset. The Proponent has revised the environmental offsets for the Proposal to address comments received following the public review period. The 'Revised environmental offsets proposal' (Attachment 4) includes a discussion of the 'Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy' and an offset for clearing of core Northern Quoll habitat at the rate of $3,000/ha. The draft Ministerial Statement has been revised to align with the changes to the proposed environmental offsets and is provided as Attachment 6.
82.	Wildflower Society of Western Australia	If Rio Tinto considers the residual impact associated with clearing 3000 ha of native vegetation in Good to Excellent condition and clearing of two subterranean fauna community PECs and riparian vegetation to truly be significant as they state, then it should be paying a lot more for the environmental offset than is offered. ($750 per hectare for clearing vegetation and $1500 per hectare for the subterranean fauna habitat). More importantly have they identified how they will ensure that the species impacted by these operations will not become extinct due to their operations? The offsets are little more than a few million dollars which may seem a lot to desperately underfunded government agencies however Rio Tinto made gross sales revenue of $US 18,251 million (in 2017) from its iron ore operations and in the Pilbara alone netted the company $US 6,576 million in 2017.	**Noted – clarification provided** The Proponent has assessed the potential impacts and applied the mitigation hierarchy to identify mitigation strategies for each key Environmental Factor (see Tables 5-16, 6-22, 7-11, 8-10, 9-4 and 10-3 of the ERD). After application of the mitigation hierarchy, the Proponent considers that the EPA Objective can be met for each key Environmental Factor. The Proponent has revised the environmental offsets for the Proposal to address comments received following the public review period. The 'Revised environmental offsets proposal' (Attachment 4) includes offsets at rates between $750/ha and $3,000/ha dependant on the environmental value to be offset. The offset rates proposed are the rates that have been applied to other projects in the Pilbara region.

Revisions

During preparation of the Response to Submissions, revisions have been made to the items noted in the table below as a result of further refinement of the EMP and in response to additional queries received from the EPA Services.

No.	Section of the ERD/EMP	Revision
1.	EMP Section 2.2 and Tables 2-4 and 2-9	Monitoring of temperature and humidity in the recorded potential diurnal/maternal Ghost Bat roost caves on Mesas B and C has been added to the draft EMP.
2.	EMP Tables S1, 2-5, 2-12	To align with changes made to the Mesa H draft EMP in response to comments from Decision Making Authorities, the trigger and threshold criteria for disturbance to Northern Quoll habitat have been revised to apply to 'potential Northern Quoll denning habitat' rather than 'viable Northern Quoll denning habitat'.
3.	EMP Tables S1, 2-3, 2-12	The proposed management target for 24-hour dust levels at the Sand Sheet PEC has been changed to '24-hour average dust levels (PM10), attributable to the Revised Proposal, no more than 10 occurrences per year of greater than 70ug/m^3 as measured at the Sand Sheet Vegetation (Robe Valley) PEC'. This change has been made to align with the iron ore industry specific criterion recommended in the 'Port Hedland Air Quality and Noise Management Plan" (Department of State Development 2010).
4.	ERD Figures 2-2, 6-3 and 6-16	The Mesa A pit outline used in Figures 2-2, 6-3 and 6-16 of the ERD included remnant mine planning contours, giving the appearance of gaps in the mine pit area. Revised versions of Figures 2-2, 6-3 and 6-16, with mine planning contours removed, have been included as Attachment 1.
5.	ERD Appendix 7, Figure A7-3, map 4	*'Campodeidae* New genus sp. nov' was incorrectly listed twice in the legend of Figure A7-3 (map 4) and '*Projapygidae* New genus sp. nov.' was omitted from the legend. A revised version of Figure A7-3 has been included as Attachment 1.

References

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.

Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) 2000. Australian Water Quality Guidelines for Fresh and Marine Waters, National Water Quality Management Strategy. Australian and New Zealand Environment and Conservation Council, Canberra.

Beard, J.S. 1975a. Vegetation Survey of Western Australia: Pilbara. 1:1,000,000 Vegetation Series: Explanatory Notes to Sheet 5. University of Western Australia Press, Western Australia.

Beard, J.S. 1975b. Pilbara Explanatory Notes and Map Sheet, 1:1,000,000 Series, Vegetation Survey of Western Australia. University of Western Australia Press, Nedlands.

Department of Mines and Petroleum (DMP) and Environmental Protection Authority (EPA) 2015. *Guidelines for Preparing Mine Closure Plans.* Perth, Western Australia.

Department of State Development 2010. *Port Hedland Air Quality and Noise Management Plan*. Perth, Western Australia.

DHI 2018. *Warramboo TSF Seepage Study For Environmental Approvals*. Unpublished report prepared for Rio Tinto Iron Ore.

Environmental Protection Authority (EPA) 2016a. *Technical Guidance - Sampling methods for subterranean fauna.* Environmental Protection Authority, Western Australia.

Environmental Protection Authority (EPA) 2016b. *Technical Guidance: Subterranean fauna survey.* Environmental Protection Authority, Western Australia.

Environmental Protection Authority (EPA) 2016c. *Technical Guidance: Sampling of short range endemic invertebrate fauna.* Environmental Protection Authority, Western Australia.

NHMRC, NRMMC (2011). *Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy*. National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra.

Western Australian Herbarium (1998-). *FloraBase – the Western Australian Flora.* Department of Biodiversity, Conservation and Attractions. https://florabase/dpaw.wa.gov.au/

Attachment 1:	**Revised versions of ERD Figures 2-2, 5-10, 6-3, 6-16 and A7-3**
Attachment 2:	**Mesa A Hub Environmental Management Plan (v2.4)**
Attachment 3:	**Revised version of Table 8-9 of the ERD**
Attachment 4:	**Revised environmental offsets proposal**
Attachment 5:	**Potential direct impacts to vegetation and terrestrial fauna habitat by IBRA sub-region**
Attachment 6:	**Revised draft Ministerial Statement**