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The proposal – General comments

A number of submitters showed support for the proposal, giving regard to the potential for jobs in the region and what they considered to be minimal environmental impacts. For brevity, comments on matters unrelated to environmental impacts have not been included in the summary of submissions.

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
01	Mowanjum Aboriginal Corporation ANON-WQPC-QVK9-6	We are pleased that the presence of the mine will reduce the intentional burning of the area and additional emergency response capability will minimise impacts of fire.	Noted.
02	Public Submission ANON-WQPC-QVKX-5	New resources, through Thunderbird, would greatly assist with fire management, which of course would be a great benefit not only for the pastoralists, but also for Flora and Fauna.	Noted
03	Melissa Price MP Federal Member for Durack ANON-WQPC-QVK3-Z	I would like to propose that Sheffield develop and operate a community committee, as a priority, and in advance of the construction phase, to provide yet another formal channel for the Kimberley community to become involved in the Project.	Sheffield has noted this request and is supportive of development of such a committee, as planned. This will be discussed in coming months with relevant stakeholders in order to determine the composition function and role of such a committee.
04	Derby Landcare Group ANON-WQPC-QVK6-3	Uncontrolled fires at the wrong time of year (“hot fires”) are unfortunately a regular destructive element on the Dampier Peninsula (as well as across this entire Region). Mining activity at Thunderbird could potentially lead to accidental fires, but we’re sure that Sheffield will have appropriately trained Staff, Equipment and Systems to deal with any such fire. The gravelled roads within the minesite will effectively become firebreaks in the event of uncontrolled bushfires traversing the land adjacent to the Mine and Workers Accommodation. The access road from Great Northern Highway will effectively be another permanent firebreak. Sheffield has also undertaken to work with Traditional Owners and Emergency Services Personnel to develop an ongoing Preventative Burning program. This program will potentially lead to a significant improvement in Fire Management at the mine and surrounding areas.	Noted. As part of the projects emergency response preparedness, Sheffield will maintain mobile firefighting equipment on site and will have trained personnel on site at all times to respond to fires. These people and firefighting equipment will be made available to assist with control of fires outside of the immediate project area. Sheffield attended a Dampier Peninsula fire management workshop on 21-22 February 2017 co-ordinated by the Kimberley NRM. During this it was noted that the proposed ranger program to be implemented for the project could in effect become a bush fire brigade operating under DFES control. At this meeting, Sheffield has committed to provide assistance to Nyul Nyul Rangers in maintaining fire breaks through provision of a grader during the upcoming dry season given the high fire risk likely to be posed by the above average wet season. Sheffield will also continue to be part of the team looking at development and implementation of a long term fire strategy for the peninsula
05	Derby Landcare Group ANON-WQPC-QVK6-3	DLG respectfully requests that the EPA consider a regular (perhaps annual) progress report to be released to the Public. This would provide continued reassurance that the Thunderbird Project delivers environmental as well as economic benefits to the West Kimberley Community.	As part of State project approvals, it is typical that annual compliance reports are required to be prepared and submitted to the Office of the EPA. These document compliance with conditions of approval that may have been applied to a project. These reports are typically required by conditions in Ministerial Statements to be made publically available. Sheffield are supportive of public disclosure of annual progress and environmental reports. This is consistent with their policy of being transparent in their dealings. It will do this in compliance with whatever regulatory arrangements are in place during the proposed 40+ year life of project
06	The Chamber of Commerce and Energy Western Australia ANON-WQPC-QVK2-Y	The project will make a significant contribution to the scientific knowledge of the Kimberley through ongoing monitoring and progressive rehabilitation of the mine disturbance.	Noted.
07	Kimberley Pilbara Cattlemen's Association ANON-WQPC-QVK4-1	Thunderbird shall be situated on traditional Aboriginal lands, part of a pastoral station, and the site is covered in low, sparse eucalypt woodlands, shrubs and grasslands. As a pastoral lease the site is burnt regularly. It is subject to accidental fires caused by lightning strikes etc. Accidental fires can have a negative impact on the whole Peninsula, they destroy cattle feed, flora and fauna, as well as infrastructure. I am pleased that the development of the mine shall add fire management resources and expertise to the Peninsula, and thereby help protect us from the impacts of accidental fire, which can be catastrophic, both environmental and economically, for pastoralists. In addition, Sheffield proposes to manage the mine site to reduce the risk of accidental fires.	Noted. Sheffield attended a Dampier Peninsula fire management workshop on 21-22 February 2017 co-ordinated by the Kimberley NRM. During this it was noted that the proposed ranger program to be implemented for the project could in effect become a bush fire brigade operating under DFES control. At this meeting, Sheffield has committed to provide assistance to Nyul Nyul Rangers in maintaining fire breaks through provision of a grader during the upcoming dry season given the high fire risk likely to be posed by the above average wet season. Sheffield will also continue to be part of the team looking at development and implementation of a long term fire strategy for the peninsula

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08	Yeeda Pastoral Company Pty Ltd and the Burton family ANON-WQPC-QVKF-K	<p>This [fire regime] is another major item that will be impacted by the mine all be it in a mostly positive way. The peninsular is known as one of the fire hot spots in all of Australia. It burns with wild fires regularly. These fires that ignite on the peninsula (thru various ignition sources) can and regularly do end up burning out hundreds of thousands of hectares. This is a major issue with the ecology and negatively impacts our cattle operation and also regularly ends up threatening Broome and its outer areas.</p>	<p>As part of the projects emergency response preparedness, Sheffield will maintain mobile firefighting equipment on site and will have trained personnel on site at all times to respond to fires. These people and firefighting equipment will be focused on control of fires that may ignite within the project area, but will also be made available to assist with control of fires outside of the immediate project area. Sheffield will work collaboratively with the pastoral land owner with regard to implementation of a fire management and control plan for Mt Jowlaenga and Yeeda Stations. This will include implementation of fire prevention procedures (e.g. hot work permits), provision and maintenance of firefighting equipment (e.g. fire extinguishers) and provision of training to the workforce regarding fire prevention and control</p>
		<p>The operating mine will be both a positive and negative. The positive is that the existence of the mine creates access into an area that previously had very limited access. The mine will have on site all manner of equipment that would be useful to help fight fires and enact cool burning. The negative is that the mine creates its own potential to ignite a fire. There needs to be a detailed and structured fire mitigation and containment procedure on site. This includes a good cool season preventative burning program around the mine that meshes with ours on the surrounding property.</p> <p>We are keen to get together with the mine to develop a strategy.</p>	<p>Sheffield attended a Dampier Peninsula fire management workshop on 21-22 February 2017 co-ordinated by the Kimberley NRM. During this it was noted that the proposed ranger program to be implemented for the project could in effect become a bush fire brigade operating under DFES control. At this meeting, Sheffield has committed to provide assistance to Nyul Nyul Rangers in maintaining fire breaks through provision of a grader during the upcoming dry season given the high fire risk likely to be posed by the above average wet season. Sheffield will also continue to be part of the team looking at development and implementation of a long term fire strategy for the peninsula</p>
09	Public Submission ANON-WQPC-QV1B-N	<p>The Thunderbird Mineral Sands Project is an example of when it is better to not proceed with the Project than go ahead with it. As a single project the Project would have a devastating impact on a pristine wilderness landscape, it would also open the door for other prospective exploiters multiplying the cumulative impacts. The increased scarcity in world supplies of pristine wilderness is increasing the value of vast Kimberley landscapes and opportunities in wilderness industries such as tourism, culture and the arts, land care and recreational parks, education and research as well as traditional Indigenous law and cultural practice and complimentary industries such as the pastoral industry and fishing, crabbing and prawning in the King Sound.</p>	<p>The view of the submitter is noted. The project is located on active pastoral stations. While the area retains significant wilderness values, it is not pristine and will continue to be used for pastoral purposes regardless of whether the project is implemented or not.</p> <p>The concern about cumulative impacts from other mining projects or other large scale developments in the Kimberley's is noted. Cumulative impacts are assessed by looking at the interaction between a project and other past, present, and reasonably foreseeable future projects. Baseline environmental surveys undertaken for the project have considered the impact from past and present activities (such as pastoral grazing). Impact assessment contained in the PER considers the cumulative impact of the proposed project along with continued existence of approved land use activities for the Mine Site Development Envelope (rangeland grazing). If future mineral exploration by Sheffield or others identifies other economic mineral deposits, proponents of these projects will be required to seek their own project approvals under various State Acts. As required by EPA procedures, the cumulative impacts of these theoretical future projects when combined with the Thunderbird Mineral Sands Project would be assessed through Part IV <i>EP Act</i> processes for the future theoretical project/s. Similarly if land clearing is proposed for other industries e.g. intensive pastoral activities (centre pivot irrigation), the proponents of those projects would be required to obtain necessary approvals under various State Acts. Cumulative impacts of these theoretical future projects when combined with the Thunderbird Mineral Sands Project would be assessed through the environmental approvals process for the future theoretical project/s.</p>
		<p>The PER is a good example of an outdated attempt to seek environmental approval.</p>	<p>The PER has been prepared in a manner consistent with current environmental impact assessment requirements, as demonstrated by its release for public consultation</p>
		<p>The EPA must reject the Project because it does not reflex contemporary standards of water management and contamination of the environment and the impact to human health.</p>	<p>The concern is noted. The PER reflects industry best practice in water management, contamination management (though there is little risk posed any products or processes proposed of contamination) and human health protection.</p>
		<p>There is a sustainable increasing value from investing in the future potential benefits from maintaining a pristine wilderness landscape makes a compelling argument to choose not to mine. The EPA need to look at the benefits and risks in regards to who is taking the risks, who is getting the benefits and what is the fairness in the decision making process.</p>	<p>The project is located on two active pastoral stations. While the area retains significant wilderness values, it is not pristine and will continue to be used for pastoral purposes regardless of whether the project is implemented or not.</p> <p>Sheffield is confident that the project can be undertaken in such a way as to meet the EPA objectives for Key Environmental Factors, Other Environmental Factors, and Integrating Factors. Mitigation and management measures have been applied to minimise the residual environmental impact of the project, and an offset strategy has been proposed to provide additional mitigation to project residual impacts. Sheffield considers that the residual impacts are therefore acceptable.</p>

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09	Public Submission ANON-WQPC-QV1B-N	<p>The EPA needs to take into account the genuine costs associated with the proposed mine particularly in relation to the real impact on the loss of value to future regional development in wilderness industries such as tourism, culture and the arts, land care and recreational parks, education and research as well as traditional Indigenous law and cultural practice and complimentary industries such as the pastoral industry and fishing, crabbing and prawning in the King Sound. All of these industries and cultural activities have coexisted for a long time or have emerged more recently to harmoniously fill market driven gaps sharing land use. All of these peoples relationship with the proposed mine site and surrounding 'country' would be at risk, all for a short-term benefit, 40 years of profit which largely goes out of the region and leaves an eternity of devastated land, water, people, plants and animals. When all of the negative impacts are considered, a genuine cost benefit analysis identifies this project is not worth the risk. A business indicator of this fact is the risk is so great the mining company could not afford to take out insurance against the many potential risks they impose.</p>	<p>The project is located wholly within two pastoral leases. Changes in future land use beyond what is being proposed by Sheffield for a very small portion of the larger Mt Jowlaenga and Yeeda Stations are outside of the scope of the PER. Sheffield is committed however to working with the range of different project stakeholders, including the pastoral station owner and traditional land owners to ensure the post mining land use is consistent with stakeholder desires and allows sustainable ongoing use of the area.</p>
10	Wilderness Society BHLF-WQPC-QV1N-1	<p>We make the following submission in relation to the proposal from Sheffield Resources to clear and mine an initial 1,700 ha area on the Dampier Peninsula in the Kimberley region of WA for mineral sands. This proposal, if approved, is likely to be just the first stage in a far bigger mining operation which has the potential to cover tens of thousands of hectares.</p> <p>The impacts of the proposed mine would be serious and irreversible and include direct and indirect impacts as well as downstream and cumulative impacts. The 'downstream' impacts include such serious matters as road transport risks and the use of Derby port with the potential pollution of King Sound by dredging or spills.</p>	<p>Cumulative impacts are assessed by looking at the interaction between a project and other past, present, and reasonably foreseeable future projects. Baseline environmental surveys undertaken for the project include the impact from past and present activities (such as pastoral grazing). Sheffield have considered reasonably foreseeable future projects, specifically on the Dampier Peninsula and do not believe there are any with reasonable likelihood of implementation that might interact with the Thunderbird Mineral Sands Project to cause cumulative impacts.</p> <p>If future mineral exploration by Sheffield or others identifies other economic mineral deposits, proponents of these projects will be required to seek their own project approvals under various State Acts. As required by EPA procedures, the cumulative impacts of these theoretical future projects when combined with the Thunderbird Mineral Sands Project would be assessed through Part IV <i>EP Act</i> processes for the future theoretical project/s.</p> <p>As part of the PER, potential impacts were identified and assessed using a qualitative risk assessment process. This did not identify any serious and irreversible impacts as stated by this submission. The impact assessment process considered both direct and indirect impacts as well as cumulative impacts where project activities interacted with other land uses.</p> <p>Road transport risks to amenity were considered by the Environmental Protection Authority to be a Key Environmental Factor for the Derby Port Development Envelope, and were therefore assessed in the PER. These include dust emissions and noise emissions decreasing amenity. Ambient concentrations for dust at the Derby Port boundary and along the transport route will be within accepted air quality limits and will not adversely impact on sensitive receptors in Derby. Noise impacts on sensitive receptors in the town of Derby are unlikely to cause loss of amenity for Derby residents and Port users. The overall potential impact to amenity from road transport was assessed as 'Low'. Please refer to Section 9.2 of the PER.</p> <p>There is no dredging in King Sound proposed as part of the project; therefore dredging impacts were not assessed in the PER.</p> <p>Marine environmental quality was considered by the Environmental Protection Authority to be a Key Environmental Factor for the Derby Port Development Envelope, and was therefore assessed in the PER. This included the risk to the environment from spills of product and hydrocarbons. Some minor generation of dust or spillage of product is likely throughout the life of the project; however, it is considered that it will not result in any discernible changes to the quality of water, sediment or biota in King Sound or adjacent waters. Mineral sands occur naturally in King Sound and are environmentally benign. Refined mineral sand products are inert and contain no constituents that could leach and become bioavailable in the marine environment. Spillage of hydrocarbons is possible during tug or barge refuelling operations; however volumes will be minimal and consequences assessed to be low due to the mitigation measures proposed. The overall potential impact to marine environmental quality from spills was assessed as 'Low'. Please refer to Section 9.1.2.2 and Section 11.2.2.4 of the PER.</p>

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10	Wilderness Society BHLF-WQPC-QV1N-1	We note the EPA has previously assessed mineral sands mining proposals in this region and made recommendations against such mining [Statement 434 (2014) & Report 519 1991)], thus we'd support EPA to recommend against approval of this proposal.	<p>Sheffield has considered the EPA reports and documents referred to and provides the following comments.</p> <p>Report 519 – Application for Exploration Licence 04/530 – Quondong Point, north of Broome The EPA recommended that no exploration would be environmentally acceptable on the western side of the Broome-Minari Road due to the presence of the following features:</p> <ul style="list-style-type: none"> • Areas of “beaches, coastal dunes, watercourses, seasonal freshwater swamps and permanent freshwater springs”. • “Sub-coastal vine thickets and closed vine forests occur in isolated patches immediately behind the coastal dune systems. The Department of Conservation and Land Management indicates that the conservation values of these ecosystems is very high.” • “The recreational values of the coastal strip are considered to be very high.” • The Western Australian Museum recently reported that there are fossils in a white sandstone type at Quondong Point which are of great scientific importance [consisting of] dinosaur footprints belonging to at least three different species” • “The Western Australian Museum reports that the area to the west of the Broome-Minari Road contain archaeological sites and ethnographic sites of great cultural significance to Aboriginal people. The Museum currently has proposed to declare part of the Quondong Point area as a Protected Area under the <i>Aboriginal Heritage Act</i>.” <p>None of these environmentally or culturally sensitive features are present within or adjacent to the Mine Site Development Envelope or Derby Port Development Envelope.</p> <p>Further investigation and approvals were required for the area east of the Broome-Minari Road as there was little available data to base an assessment on at the time of the EPA report. This is not the case for the Thunderbird Mineral Sands Project, as extensive biological and heritage surveys have been undertaken, and the results of these have been presented in the PER.</p> <p>Statement 434 – Heavy Sands Mine, Beenup, Shire of Augusta – Margaret River This Ministerial Statement serves as approval to amend conditions previously applied to an approved mineral sands mine, specifically reducing the proposal area after the project ceased operations. This mine was approved, and is in the southwest of Western Australia (a region far removed from the Kimberley).</p> <p>Sheffield have undertaken extensive surveys of the Mine Site development Envelope and surrounds, and provided this information for the EPA (and the public) to undertake a rigorous assessment of the project. Sheffield is confident that the project can be undertaken in such a way as to meet the EPA objectives for Key Environmental Factors, Other Environmental Factors, and Integrating Factors. Mitigation and management measures have been applied to minimise the residual environmental impact of the project, and an offset strategy has been proposed to provide additional mitigation to project residual impacts. Sheffield considers that the residual impacts are therefore acceptable.</p>
11	Kimberley Ports Authority BHLF-WQPC-QV1P-3	Based on the information provided it appears that the proposed export method and supporting logistics chain will have minimal environmental impact on the Port of Broome and increase trade through the Port.	Noted
12	Department of Mines and Petroleum BHLF-WQPC-QV1K-X	<p>DMP support Sheffield’s development of an AS/NZ ISO 14001:2004 Standard Environmental Management System (EMS).</p> <p>Sheffield will need to conduct ongoing studies throughout the life of the mine in order to verify the modelling and outcome assumptions used in the PER (such as groundwater drawdown and waste characterisation). If variance from the modelling or baseline data is identified throughout operations, Sheffield will need to assess whether the mine plan or management measures need to be modified in order to meet the expected/approved outcome.</p>	<p>Noted.</p> <p>Results of monitoring programs will be reported to relevant regulatory authorities as per project approval conditions. Where significant changes or deviations from predictions contained in the PER are observed, the reasons why will be investigated, discussed with regulatory authorities and changes in management measures implemented where this is required. This approach is consistent with the adaptive management approach advocated by ISO 14001 compliant environmental management systems</p>

Marine Environmental Quality

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13	Kimberley Prawn Company ANON-WQPC-QVKP-W	...all ballast water would need to be dumped in the open ocean to ensure the health of the King Sound and the continuance of good housekeeping on board the ships at anchor would need to be strictly observed.	With respect to ballast water from international shipping, the ships that will be transporting mineral sands products to international markets will be managed or contracted by Sheffield's future customers. As with all international vessels entering WA waters, these ships will be bound by WA State legislation (<i>Fish Resources Management Act 1994</i>) and Commonwealth legislation (<i>Biosecurity Act 2015</i>). A condition of the contract between Sheffield and its future customers will include compliance with all relevant WA State and Commonwealth legislation and guidance statements, including but not limited to ballast water, marine pests and marine biofouling regulations and the Department of Fisheries' Vessel Check information.
14	Mary Island Fishing Club ANON-WQPC-QVKE-J	Marine Environmental Quality has considered mooring points, marine pollution, hydrocarbon spills & radiation. The 11 mangrove species known to occur around the King Sound including the port facility although not conservation significant are spawning areas of the barramundi, threadfin salmon, green & brown crab and many other marine species. These areas are an integral part of the overall primary producer habitat. Concern is also noted in regard to marine discharge-e.g. ballast waters from international carrier ships and how this will be managed!	Regarding mangroves in King Sound and the Port facility, it should be noted that no mangroves will be removed for the project (refer to PER Section 11.1.2). With respect to ballast water from international shipping, the ships that will be transporting mineral sands products to international markets will be managed or contracted by Sheffield's future customers. As with all international vessels entering WA waters, these ships will be bound by WA State legislation (<i>Fish Resources Management Act 1994</i>) and Commonwealth legislation (<i>Biosecurity Act 2015</i>). A condition of the contract between Sheffield and its future customers will include compliance with all relevant WA State and Commonwealth legislation and guidance statements, including but not limited to ballast water, marine pests and marine biofouling regulations and the Department of Fisheries' Vessel Check information.
		The MIFC would like Sheffield Resources to provide new information including but not limited to: - Strategies for on-going monitoring of heavy metal levels in highly valued recreational species such as mud crabs, salmon, mulloway & Barramundi for the duration of the project.	The project will not contribute heavy metals to the marine environment. Mineral sand products are inert and insoluble meaning that if spilt into the marine environment, no components will become bioavailable. Monitoring of heavy metals in recreational fish species is not relevant to this project as the product does not contain elevated levels of metals (see Sections 4.2.4.4, 4.2.7.1, 9.1.2.2 and Appendix 6 of the PER).
15	Wilderness Society BHLF-WQPC-QV1N-1	Sheffield outline that the port actives should be separate from this proposal, due to the port already existing. As Derby Port is in currently highly degraded, and will need upgrading for this proposal, we recommend that the EPA seeks to bring all of the impacts associated with the upgrading of the port and dredging of King Sounds into this proposal, as a whole.	Derby Port is currently only operating at very low activity levels. It is not however highly degraded. The existing bulk product conveyor and barge loader will need maintenance and a new product storage facility will need to be constructed. These activities have been considered as part of the scope of the PER. No dredging will be required for the project, hence it has not been considered within the scope of the PER.
		We disagree with Sheffield Resources that the assessment of the port, any dredging needed and related matters of national environmental significance are up to the local shire of Derby to decide on.	No dredging in King Sound (or anywhere else) is proposed. Matters of National Environmental Significance associated with the Thunderbird Project are being assessed by the federal Department of Environment and Energy as part of the PER assessment process.
		Any dredging of King Sound close to the port could mobilise an array of harmful subsediment pollution which has remained dormant since the port was last in use. King Sound has one of the largest tidal movements on earth, and the vulnerable species which call it home like the snubfin dolphin and critical endangered sawfish (<i>Pristis pristis</i>) & dwarf sawfish (<i>Pristis clavata</i>). Any dredging of this port for the operations of this proposal could have significant consequences for these unique and endangered species - as it is known that King Sound is a significant birthing site of the dwarf sawfish as is one of the largest known populations, with 85% of the data collected at the mouth of the Fitzroy River.	No dredging in King Sound (or anywhere else) is proposed. Sheffield is proposing to transport the product from the Port in shallow draft barges to a transfer point within King Sound adjacent to Point Torment, where the product will be loaded onto oceangoing vessels for export

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16	Department of Fisheries BHLF-WQPC-QV1P-3	<p>Table 65 in the PER describes management measures for radiation spills impacting the marine environment. The measures listed under "Radiation" only describe spillages of product in the terrestrial environment, i.e. "spillages of product on land will be cleaned up as required. Spilt product will either be returned to the Product Storage Facility or returned to the Mine Site for reprocessing or disposal."</p> <p>The Department requests that the PER clearly describes the management measures (including post spill monitoring and remediation) that will be undertaken in the event of a spill of product in the marine environment. The Department notes that some detail for this is provided on p.226 of the PER, which says: "any significant incidents of spillage of packaged materials will be recovered (e.g. suction dredging) for re-processing".</p> <p>Marine Biosecurity The PER has not considered any marine biosecurity requirements, therefore the Department requests that this information be addressed and included as priority. This is concerning given the Department of Fisheries' Biosecurity Branch met with representatives from Sheffield Resources on 10th November 2016.</p> <p>All vessels associated with the project should be managed so they present a low risk of introducing and spreading aquatic pests and diseases. For this purpose, Sheffield Resources was referred to the Department's Vessel Check risk assessment tool - http://www.fish.wa.gov.au/Sustainability-and-Environment/Aquatic-Biosecurity/Vessels-And-Ports/Pages/Nessel-Check.aspx</p> <p>A biosecurity management plan (plan) should be prepared for all vessels and infrastructure associated with the project as the main prevention strategy.</p> <p>The plan should cover the following:</p> <ul style="list-style-type: none"> - vessel management before departure from overseas - vessel management before departure from interstate - cleaning and marine pest inspections of the hull and internal niches - management practices for post-departure to mitigate the vessel's residual risk including follow-up inspections - reporting requirements to the Department - incorporation of all federal ballast water, biofouling and topsides biosecurity requirements - incorporation of WA biofouling requirements. <p>The Department should be consulted directly to ensure the plan meets all the marine biosecurity requirements.</p>	<p>The risk assessment for radiation spills was conducted using product concentrations and ERICA software according to the ARPANSA Guide for Radiation Protection of the Environment 2015 (http://www.arpansa.gov.au/publications/codes/rpsg-1.cfm) for potential impacts to the marine environment. This determined the potential for impact from the NORM materials to impact the marine environment (particularly for the very low activity ilmenite products which are close to background levels) is extremely small and will not require special consideration and management. As such, detailed management measures to be undertaken in the event of a spill to the marine environment are not required to be included in the PER</p> <p>Given the insoluble nature and extremely low levels of activity of ilmenite, dredging of small quantities of ilmenite has the potential to create more environmental impact than leaving it to settle through the silt to the bottom. Baseline determinations for background concentrations at Derby and Broome will be conducted prior to operations and details of monitoring and any clean up required detailed in the Sheffield Radiation Management Plan and the Port Environmental Management Plan. These will be developed and provided to relevant stakeholders (Dept. of Fisheries, SWKD and DoT) prior to project commencement</p> <p>Sheffield notes the concern of the DoF with regard to marine biosecurity. From the DoF website, we note that: "Vessel Check is intended for use by managers of commercial, non-trading, petroleum and commercial fishing vessels, for all international and interstate vessel movements to Western Australia." However, it should be noted that Sheffield will not be the operator of the international ships. Sheffield's customers will be providing their own ships as they wish to buy Sheffield's mineral sands products. Sheffield will make their customers aware of the international, Commonwealth and state legislation that applies to marine biosecurity and compliance with these regulations will form part of Sheffield's contractual agreement with the customer. Examples of the legislation and policies are:</p> <ul style="list-style-type: none"> • International Maritime Organisation – International Convention for the Control and Management of Ships' Ballast Water and Sediments. • The Commonwealth's <i>Biosecurity Act 2015</i>. • The WA legislation <i>Fish Resources Management Act 1994</i>. • Department of Fisheries' "Vessel Check" preventative program. <p>Subsequent to the meeting with DoF in November 2016, Sheffield have discussed marine biosecurity requirements with the Port of Broome and Department of Transport to ensure the requirements were fully understood. Should any vessels such as transshipment vessels or tug boats from interstate be utilised for this project, Sheffield will comply with all stages of the DoF Vessel Check procedures.</p>

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16	Department of Fisheries BHLF-WQPC-QV1P-3	<p>The Department also requests that an invasive marine species monitoring program at the relevant ports should be implemented during the construction phase of this project, as there is an increased chance that a pest or disease could be brought in at this stage.</p> <p>The program should be designed in line with the Department's standard advice which is available at: http://www.fish.wa.gov.au/Documents/biosecurity/advice_for_designers_of_imp_monitoring_programs.pdf</p> <p>The program should also consider monitoring programs already implemented at port locations.</p> <p>For pest reporting and survey purposes, the following marine pest list should be referred to: http://www.fish.wa.gov.au/Documents/biosecurity/epa_introduced_marine_pests.pdf</p>	<p>With regard to invasive marine species monitoring program at the relevant ports, Sheffield provides the following:</p> <ul style="list-style-type: none"> • Broome Port is managed by the Kimberley Ports Authority (KPA) and already has an Environmental Management Plan and Environment Policy which explain KPAs intention to comply with all relevant legislation and policies regarding protection of the environment. The Port and Terminal Handbook briefly describes the requirement for ballast water discharge and states that in-water cleaning of biofouling is not permitted. In addition, on the KPA website states: "KPA undertakes an Early Warning System program (EWS) with the Department of Fisheries (DoF) to monitor for the presence of invasive marine pests. The EWS program involves the deployment of arrays on the wharf to monitor for growth, crab traps and shoreline searches." • Derby Port is owned by the Department of Transport and managed by the Shire of Derby/West Kimberley under a port operation agreement. Derby Port is due to come under the control of the KPA at some time during or before 2019. Currently, Derby Port does not have in place an environmental management plan or a system for monitoring invasive marine species. Sheffield will commit to assisting Shire of Derby/West Kimberley in implementing the equivalent level of environmental management and testing as currently applies in Broome Port. Sheffield will assist the Shire of Derby/West Kimberley to liaise with DoF in developing its invasive marine pests program.

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17	Public Submission ANON-WQPC-QVKC-G	<p>There is a Flatback turtle rookery on Point Torment. There is no reference to it in the Sheffield Resources EPA Referral. Flatback turtles are an EPBC listed species.</p> <p>Submitter's References Department of Sustainability, Environment, Water, Population and Communities; Marine bioregional plan for the North-west Marine Region, 2012.</p> <hr/> <p>Light pollution from shipping is a threat to nesting behaviour. [See Submitter's Reference]</p> <p>[Respondent Makes the Following Recommendation]</p> <ul style="list-style-type: none"> - The transfer anchorage mooring point should be located far enough away from the Point Torment Flatback turtle rookery to avoid disturbance to nesting behaviour. <p>Submitter's References Department of Sustainability, Environment, Water, Population and Communities; Marine bioregional plan for the North-west Marine Region, 2012.</p>	<p>The Flatback Turtle rookery on Point Torment is discussed in Section 4.3.14.2 (Table 34) of the PER</p> <p>The Commonwealth of Australia's Draft Recovery Plan for Marine Turtles in Australian Waters Commonwealth of Australia (2017) records the coastline around King Sound and the Kimberley as being sites of nesting for Flatback Turtles. The genetic stock of Flatback Turtles in this area is likely to be part of the south west Kimberley stock, and the main nesting sites are thought to be Eighty Mile Beach, Eco Beach and the Lacepede Islands and the areas within a 60 mile radius. As Point Torment is more than 200 km from the Lacepede Islands, it would appear to be outside of the most important nesting areas. The Sea Transfer Point will be 17.3 nautical miles offshore from Point Torment. No activities on land will occur at Point Torment.</p> <p>Sheffield has also clarified the presence of Flatback Turtles at Point Torment with Dr Robert Prince of DPaW. Dr Prince said that further investigations in 2014 have revealed that only small numbers of Flatback Turtles are nesting at Point Torment and this is not considered a major rookery.</p> <p>For the purposes of this PER, the likelihood of occurrence of Flatback Turtles in King Sound is recorded as 'High.' The likelihood of a ship strike was assessed to be 'Possible' and the consequence of death of turtles has been assessed as 'Minor' as it would not impact on the populations ability to survive locally. The residual risk to Flatback Turtles, even with the high likelihood of occurrence, has been assessed as 'Medium.'</p> <hr/> <p>The information from DSEWPC (2012) on light pollution is noted and this information was used in the impact assessment in the PER (see Section 11.2.2.4). The Sea Transfer Point will be 17.3 nautical miles offshore from Point Torment. Whilst the ships being loaded at this point will have on board lighting, this will be in a very focused area and there will be a low amount of light spill.</p> <p>WA EPA publication EAG5 '<i>Protecting Marine Turtles from Lighting Impacts</i>' was also considered during preparation of PER. The document is focused on managing light in coastal land areas that may adversely impact turtle breeding and hatchling survival as they emerge from onshore nests to move into the sea. Artificial lighting may affect choice of beach areas for nesting (i.e. prefer darker beaches) and disorientate hatchlings as they make their way to the sea. A radius of impact from artificial lighting of 1.5 km was conservatively used by Pendoley to estimate levels of potential impact on Flatback and Hawksbill Turtles. Implementation of the Thunderbird Mineral Sands Project will not require additional lighting at Derby Port. Flatback Turtles are also not known to nest near to Derby Port.</p> <p>Considering the fact that no additional lighting will be needed at Derby Port, the ship loading point is 17.3 nautical miles offshore from Point Torment where Flatback Turtles have been observed to nest in low numbers and on board ship lights are not known to be significant disruptor to turtle breeding activity, light pollution from ships is not considered a significant risk to turtles nesting at Point Torment.</p>
18	Mary Island Fishing Club ANON-WQPC-QVKE-J	<p>Marine Fauna, impacts have been based around conservation of significant species, what has not been addressed is the significant species to the area, the barramundi, threadfin salmon and the green & brown crab and how these species that may be impacted. The mud crab is particularly vulnerable to disease. The potential of marine pests being introduced to waters around King Sound has not been considered. The local waters have many important marine species that could potentially be put at risk.</p> <hr/> <p>The MIFC would like Sheffield Resources to provide new information including but not limited to:</p> <ul style="list-style-type: none"> - Procedures and strategies that ensure that marine pests are not introduced into local ecosystem. 	<p>Marine pollution, hydrocarbon spills and radiation have all been addressed in the PER and the risk analysis process conducted did not identify any other significant pathways for potential risk to fish or crab species</p> <p>Please see PER Sections 9.1 (Marine Environmental Quality) and 11.2 (Marine Fauna) which relate to assessment of impacts of marine pollution on marine environmental quality and marine fauna.</p> <hr/> <p>Sheffield notes the concern of the MIFC with regard to marine biosecurity and prevention of marine pest introduction.</p> <p>From the DoF website, we note that: "<i>Vessel Check is intended for use by managers of commercial, non-trading, petroleum and commercial fishing vessels, for all international and interstate vessel movements to Western Australia.</i>" However, it should be noted that Sheffield will not be the operator of the international ships. Sheffield's customers will be providing their own ships as they wish to buy Sheffield's mineral sands products. Sheffield will make their customers aware of the international, Commonwealth and state legislation that applies to marine biosecurity and compliance with these regulations will form part of Sheffield's contractual agreement with the customer. Examples of the legislation and policies are:</p> <ul style="list-style-type: none"> • International Maritime Organisation – International Convention for the Control and Management of Ships' Ballast Water and Sediments. • The Commonwealth's <i>Biosecurity Act 2015</i>. • The WA legislation <i>Fish Resources Management Act 1994</i>.

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
			<ul style="list-style-type: none"> Department of Fisheries' "Vessel Check" preventative program. <p>Sheffield will commit to assisting Shire of Derby/West Kimberley in implementing the equivalent level of environmental management and testing as currently applies in Broome Port. Sheffield will assist the Shire of Derby/West Kimberley to liaise with DoF in developing its invasive marine pests program.</p>
19	<p>Department of Fisheries BHLF-WQPC-QV1R-5</p>	<p>The Department notes that the Fish Resources Management Act (FRMA) is correctly identified under 11.2.1. However, it is not clear whether FRMA-listed Totally Protected Fish are also included as Marine Fauna (4.3.14) or as Species of Particular Concern (4.3.14.1).</p> <p>Narrow Sawfish It would appear, however, that the narrow sawfish (<i>Anoxypristis cuspidata</i>), which is a Totally Protected Fish under the FRMA but is not listed under EPBC or Wildlife Conservation Acts, is not included in the review. Therefore, three other FRMA-listed Totally Protected Fishes may also have been omitted from the scope for the same reason (Queensland groper, <i>Epinephelus lanceolatus</i>, humphead Maori wrasse, <i>Cheilinus undulatus</i> and potato cod, <i>Epinephelus tukula</i>); the Department requests that these species are assessed in the same manner as all other protected species.</p>	<p>The DoF comment regarding the four totally protected fishes (under the FRMA) that were not included in the scope of the PER is noted and information is provided here for these species:</p> <p>Narrow Sawfish (<i>Anoxypristis cuspidata</i>). The range of the Narrow Sawfish extends from the Arabian Gulf, through northern Australia and Asia, perhaps as far west as Somalia (D'Anastasi <i>et al.</i>, 2013). The species' exact range in Australia is uncertain, but is thought to be from Karratha in Western Australia around the northern coast to Rockhampton, Queensland. The species inhabits inshore and estuarine areas, particularly for juveniles and pupping females and adults are predominantly found offshore. The species does not use freshwater environments. The Narrow Sawfish reaches maturity earlier than other sawfish at around 3-5 years and the species is considered to eat a wide variety of prey (Dulvy <i>et al.</i> 2014).</p> <p>The impact assessment conducted for marine fauna including other sawfish species in Section 11 of the PER is relevant for this species and no additional impact assessment is required.</p> <p>Queensland grouper (<i>Epinephelus lanceolatus</i>). The species is distributed through many tropical oceans of the world, although being a large predator, it is locally rare. It is the largest reef dwelling species in the world. Its main threat is that juveniles are targeted for the live fish trade for food and aquarium use in Hong Kong (Shuk Man and Chuen, 2006).</p> <p>Humphead Maori wrasse (<i>Cheilinus undulatus</i>). Humphead Maori wrasse are found through much of the tropical Indo-Pacific and in Australia they are found on offshore coral reefs. The main threat to the species is fishing (Russell, 2004).</p> <p>Potato cod (<i>Epinephelus tukula</i>). The Potato Cod is widespread throughout the Indo-Pacific and is a coral reef-associated species, mostly found in areas of high current. In Australia is found on the reefs of the northwest Australian shelf and the Great Barrier Reef. The main threats to the species are fishing and loss of habitat (coral reefs) (Fennessy <i>et al.</i> 2008).</p> <p>The three species listed above (Queensland Grouper, Humphead Maori-wrasse and Potato cod) are all closely associated with coral reefs. The Thunderbird Mineral Sands Project area is not close to any coral reefs and project related vessels are unlikely to encounter any of these species. The impact assessment conducted for marine fauna in Section 11 of the PER is relevant for these species and no additional impact assessment is required.</p> <p>References: D'Anastasi, B., Simpfendorfer, C. & van Herwerden, L. 2013. <i>Anoxypristis cuspidata</i>. Te.T39389A18620409. http://dx.doi.org/10.2305/IUCN.UK.2013-1.RLTS.T39389A18620 Dulvy, N.K., Davidson, L.N.K, Kyne, P.M., Simpendorfer, C.A., Harrison, L.R., Carlson, conservation of sawfishes. <i>Aquatic Conservation: Marine and Freshwater Ecosystems</i> Fennessy, S., Pollard, D. & Myers, R. 2008. <i>Epinephelus tukula</i>. The IUCN Red List of .T132773A3447657. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T132773A3447657 Russell, B. (Grouper & Wrasse Specialist Group). 2004. <i>Cheilinus undulatus</i>. The IUC e.T4592A11023949. http://dx.doi.org/10.2305/IUCN.UK.2004.RLTS.T4592A11023949. Shuk Man, C. & Ng Wai Chuen (Grouper & Wrasse Specialist Group). 2006. <i>Epinephe</i> e.T7858A12856033. http://dx.doi.org/10.2305/IUCN.UK.2006.RLTS.T7858A12856033.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
19	Department of Fisheries BHLF-WQPC-QV1R-5	<p>Short-Nosed Sea Snake The information which describes the "significant habitat" and "likelihood of occurrence" of Short-nosed Sea snake (<i>Aipysurus apraefrontalis</i>), in Table 34 is referencing outdated information about the range and habitat association of this species. The Department requests the information is updated and the publication listed below is referenced.</p> <p>D'Anastasia, B.R., L. van Herwerden, J.A. Hobbs, C.A. Simpfendorfer & V. Lukoschek (2016) New range and habitat records for threatened Australian sea snakes raise challenges for conservation. <i>Biological Conservation</i>. 194:66-70.</p> <p>Based on the above, the leaf-scaled sea snake (<i>Aipysurus foliosquama</i>) should also be considered in scope. As these Critically-Endangered species have poorly-defined ranges, there could be consideration made for records (photos, DNA) to be kept of any sea snakes that interacts with the proposed activities.</p> <p>Shark Fishery "The Northern Shark Fishery was closed permanently in 2009" is not correct. The Ministerial exemptions expired in 2009, however there is currently active consideration for re-opening the fishery.</p>	<p>Sheffield acknowledges the existence of the newer research paper. By way of update, Sheffield offers the following information:</p> <p>Short-nosed Sea snake (<i>Aipysurus apraefrontalis</i>). A new record exists for the species in Ningaloo Reef. While this indicates that King Sound may now be potentially part of the snake's much broader range, the species is still most commonly associated with shallow coral reefs, a habitat that is not found in the wider project area.</p> <p>Leaf-scaled sea snake (<i>Aipysurus foliosquama</i>) The species has recently been discovered living in seagrass meadows in Shark Bay, representing a large extension from its previously known range of Ashmore Reef. While this indicates that King Sound may now be potentially part of the snake's broader range, its habitat preference for coral reefs or seagrass meadows, indicates the species is unlikely to be found in the Project area.</p> <p>Regarding the request to collect records of sea snakes, this is noted and where possible Sheffield will make records of any interactions between project vessels and sea snakes.</p> <p>Noted</p>

Flora and Vegetation

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
20	Mowanjum Aboriginal Corporation ANON-WQPC-QVK9-6	We are pleased that there will be progressive rehabilitation of the site, and that the area of the mine will be keeping with the surrounding landscape and vegetation after the mine is closed	Noted.
21	Public Submission ANON-WQPC-QVKX-5	The mine is on a pastoral station with low sparse eucalypts, shrubs and grass. I understand that the mining takes place as a moving pit, being constantly backfilled as the new areas are opened; it can be progressively rehabilitated over more than 40 years life of mine. This way the process can be reviewed, monitored and improved, and we shall not be left with a giant pit, as in many other mines, leading to environmental problems and erosion.	Noted.
22	Derby Landcare Group ANON-WQPC-QVK6-3	We were re-assured with the explanation given for minesite rehabilitation being undertaken on an ongoing basis because of the "moving mine" system of operation. Some members of our group believe that the rehabilitation activities have the potential to improve the existing flora/fauna conditions at the site.	Noted.
23	Kimberley Pilbara Cattlemen's Association ANON-WQPC-QVK4-1	The quality and timing of the revegetation and rehabilitation task for Thunderbird is of interests given its impacts on water quality and erosion, cattle fodder, and on soil quality. The progressive and ongoing nature of the Thunderbird rehabilitation program over more than 40 years, will effectively contain negative impacts, because at any one time, the mined area is relatively small. This is considered preferable to one large exposed pit which is rehabilitated after 40 years at the time of mine closure.	Noted. The quality of rehabilitation work undertaken will be monitored and completion criteria established for a range of factors including vegetation establishment. Sheffield welcomes input from the KPCCA regarding development of more detailed rehabilitation procedures.
24	Yeeda Pastoral Company Pty Ltd and the Burton family ANON-WQPC-QVKF-K	The area adversely impacted is of a very generic nature and has nothing of special significance.	Noted.
		I have looked at similar operations in the South West and am confident that long term issues will not arise. I see an opportunity for the Pastoralist to be involved with the Mine operator to maximize the positive production potential of the areas that have been mined.	Sheffield aims to continue to work closely with the pastoral landowner to ensure the post mining landuses are consistent with the pastoral land use of the area.
		Rather than simply go back to a low value vegetation situation we see that there may be an opportunity to develop that area into a productive asset in the form of higher value grazing land of irrigated pasture using dewatering water once the mine reaches that stage. In any event we feel that we should be involved in the rehabilitation activities.	The interest in alternative use of the excess water potentially requiring reinjection post Year 32 is noted. As part of stakeholder consultation and engagement processes, potential alternative uses for the water will be discussed closer to the likely time of generation. Where this proposed use may trigger the need for additional impact assessment and or regulatory approvals, this will be included as part of the water use decision making process

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25	Environs Kimberley BHLF-WQPC-QV1M-Z	<p>[In regard to cumulative Impacts] The area proposed to be bulldozed is very large – 1,723ha. This is the largest single land clearing proposal ever put forward in the Pindan Woodlands of the Dampier land bioregion and will have a significant negative impact on flora and fauna.</p> <p>We note that Sheffield Resources have 6 other exploration prospects surrounding the Thunderbird deposit (Argo, Bells Tower, Seagull, Nomad, Night Train and Country Downs). Should Thunderbird go into production as well as surrounding exploration prospects then there would be significant cumulative impacts to the region's biota. Should all the other mineral sands mining exploration tenements in the region prove to have significant quantities of production grade ore, there could potentially be cumulative impacts at a massive scale. We are keen to hear how the EPA would tackle this. It should be noted also that the La Grange area is being targeted by the WA government and industry for largescale irrigation and that there are a number of petroleum leases over the area which have active exploration occurring in them.</p> <p>Flora A significant number of small herbs and sedges appear to have been missed in the surveys, based on what we know about the Dampier Peninsula flora from Broome and Beyond (1996).</p> <p>The majority of the flora surveys were not done at the optimum time of year to capture the ephemeral flora (March-April is generally ideal). Also the surveys have been conducted in very dry years, when some species would simply have not put in an appearance.</p> <p>The EPA Annual Report 2015-16 stated "Recently, it was found that one in 10 plants collected in the Kimberley during the wet season was new to science."</p> <p>No declared rare flora has been recorded from the area. This partially reflects the very sparse listing of rare flora species in the Kimberley region. A search of FloraBase for Beard's entire Northern Province shows ONLY 5 Rare Flora taxa. (In comparison there are 53 taxa for the Eremean or desert province, and nearly 400 for the south-west of the state). This is clearly an underestimate and underlines the very poor knowledge of the Kimberley flora and its distribution.</p>	<p>The proposed land clearing of 2,272.8 ha is over a 40+ year project life. This is about 14.5 % of the total vegetation survey area of 15,693 ha on Mt Jowlaenga and Yeeda Stations studied as part of project baseline studies. It is known that Pindan vegetation communities are regionally very common and the extent is well beyond the boundaries of Mt Jowlaenga Station. Of the total amount of land to be cleared for the project, 639.6 ha will be cleared for long term or permanent infrastructure (i.e. access road, ore processing facilities, accommodation camp). The remaining 1,632.9 ha will be cleared to allow progressive mining with about 200 ha being open at any one time. It is misleading to imply the amount stated will remain cleared for the entire project life or that it is significant regionally.</p> <p>Cumulative impacts are assessed by looking at the interaction between a project and other past, present, and reasonably foreseeable future projects. Baseline environmental surveys undertaken for the project include the impact from past and present activities (such as pastoral grazing).</p> <p>The Thunderbird Mineral Sands Project is currently being considered by Sheffield as a standalone project. It is acknowledged that Sheffield hold other exploration licences at various stages of exploration activity, in the Kimberley's. Sheffield is currently focusing its resources on development of the Thunderbird Mineral Sands Project. If such future mineral exploration activities identify other economic deposits, proponents of these projects (whether Sheffield or others) will be required to seek their own project approvals under various State and Federal acts. Current <i>EP Act</i> requirements would require cumulative impacts to be considered as part of any such assessments.</p> <p>It is noted that the WA government has been undertaking investigations for agricultural opportunities in the La Grange Groundwater Area. This area is south of Broome and in a different DoW water allocation area to the Thunderbird Mineral Sands Project (Canning –Pender sub area of the Canning Kimberley Groundwater Area. Given the different DoW water licencing areas, there will be no cumulative impact between the potential La Grange irrigation projects and the Thunderbird Mineral Sand Project.</p> <p>Flora and vegetation surveys were carried out in April, May and June between 2012 and 2016. Timing and seasons was seen as a minor constraint to the June 2016 surveys, however not for the April 2013 survey as detailed below.</p> <p>The 2016 Gap Analysis completed by Matiske, did not identify survey timing as a gap. A copy of the gap analysis inadvertently left out of Appendix 9 of the PER when it was published has been provided as Attachment 1 to this response.</p> <p>The Matiske 2016 L2 survey was carried out in June 2016 after a period of low rainfall, and this was identified as a minor constraint to the survey (Matiske 2016). The Level 1 Haul Road survey was carried out in early May and no climatic constraints were identified (Ecologia 2016 HR survey). The Ecologia level 2 Flora and Fauna survey was carried out in 21 – 26 June 2012 (phase 1) and 4 – 15 April 2013 (phase 2). Rainfall recorded at Broome and Derby in the six months preceding the phase 1 survey (June 2012) was 591.6 and 820 mm, 62.3 mm and 238.8 mm greater than the long term mean for the same six months respectively. However, almost no rainfall was received in the three months prior to the survey (April-June) and some species were not flowering. Rainfall prior to the April 2013 survey (phase 2) was variable. Broome rainfall in January 2013 was below the monthly average; 115.0mm and 181.7mm respectively, February 2013 was above the monthly average; 259.0mm and 177.2mm respectively and March and April 20123 were below the monthly averages; 20.4mm and 98.9mm, and 10.2 and 25.9 respectively. January and February rainfall is sufficient and there was no constraint to the survey</p> <p>Matiske (2016) reported that the vegetation communities mapped and species recorded in the Thunderbird Project Area are consistent with the historical mapping of John Beard (1976) and the more recent land systems mapping of Kimberley by Schoknecht and Payne (2010). Matiske (2016) also concluded that when data from the three previous flora surveys of the Thunderbird Project Area are assessed together with the data from the present (2016) survey, approximately 81% of the species potentially present within the Thunderbird Project Area have been recorded. This, together with the fact that four surveys have been completed over a four-year period, demonstrates that the area has been thoroughly assessed floristically, and that the conditions for a Level 2 survey have been satisfied (Matiske 2016).</p> <p>The lack of scientific surveys for many areas of the Kimberley's is noted. The baseline work undertaken by Sheffield adds to the knowledge base being developed. Sheffield has made information collected in the baseline surveys publically available to assist with sharing and transfer of knowledge.</p>

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		Projects such as Sheffield need to support more detailed mapping of Kimberley vegetation, to assist in identifying rare and priority flora. Detailed mapping of Dampier Peninsula vegetation is required in order to delineate the representation of vegetation communities in the region. This is the first step in being able to determine the relative 'importance' of each vegetation type that will be impacted by this and other development proposals.	Sheffield conducted detailed vegetation mapping of a survey area of 15,693.9 ha compared to a proposed Mine Site Development Envelop of 5,875 ha in which 2,272.8 ha is proposed to be cleared. This is considered sufficient to provide project context in the absence of any other detailed vegetation mapping of the Dampier Peninsula.
		Five priority flora taxa were recorded; <i>Fuirena nodiflora</i> (P1), <i>Fuirena incrassata</i> (P3), <i>Pterocaulon intermedium</i> (P3), <i>Tephrosia valleculata</i> (P3) and <i>Triodia caelestialis</i> (P3). Again, statements about Priority flora in the Kimberley are hard to make with any certainty given the poor level of knowledge.	Baseline surveys have provided more information about conservation significant flora including the 5 priority species mentioned. This information has been provided to DPaW and may assist in future determinations of conservation significance.
		According to Ecologia "All Priority flora recorded in the study area are poorly represented within conservation reserves managed by DPaW (formerly DEC). <i>Eriachne</i> sp. Dampier Peninsula (K.F.Kenneally 5946), <i>Pterocaulon intermedium</i> and <i>Triodia caelestialis</i> are the only species known to be represented within the conservation estate, by a single record each. The remainder of the species recorded during the survey are not known to be present within a conservation reserve."	The reference to the Ecologia reports is noted. At the time of writing the statements were considered correct. Further survey work undertaken by Matiske in June 2016 gives increased clarity about the abundance of conservation significant flora and this should be used as the most recent, reliable data source.
		The matter of adequate conservation reserves in the Kimberley has languished for decades. The Conservation Through Reserves Committee (CTRC) made recommendations on reserves in the Kimberley (System 7) in 1977, subsequently, the Department of Conservation and Land Management made a submission to the Kimberley Regional Planning Study called 'Nature Conservation Reserves in the Kimberley' in 1991. Many of the recommendations for conservation reserves in this report remain to be implemented. They include recommendations for reserves on the Dampier Peninsula. There is an urgent need to revise and update the report in partnership with Traditional Owners and the wider conservation community in order to "...proclaim a truly representative series of nature conservation reserves in keeping with the World, National and State Conservation Strategies" (CALM 1991 Nature Conservation Reserves in the Kimberley)..	The concern is noted, however this is not an issue Sheffield can respond to.
		A flora study needs to be conducted at the optimum time in the Kimberley in March – April [and] [m]ore detailed mapping of vegetation communities is required in the region..	Sheffield disagrees with this statement and believes adequate flora and vegetation surveys have been undertaken to allow effective impact assessment.
		<p>Revegetation</p> <p>There are few, if any, examples of ecosystems having been successfully restored after mineral sands mining in Western Australia.</p>	<p>It should be noted that rehabilitation, rather than ecological restoration, will be undertaken within disturbed areas. Rehabilitation will aim to ensure that disturbed landforms are safe, stable, non-polluting/ non-contaminating and ecologically sustainable so that they are productive and/or self-sustaining consistent with the agreed post-mining land use (pastoral land use).</p> <p>Mineral sands mining has been undertaken within Western Australia for several decades, with innovative topsoil management and rehabilitation methods being implemented in mines in the South West of Western Australia. Sheffield recognises that research into successful rehabilitation methodology and trials will be a key part of the operational Mine Closure Plan.</p>

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		<p>There are no examples that we are aware of, of such large scale land clearing having been undertaken in the Dampierland bioregion that have been successfully rehabilitated with native vegetation. Given it appears there is no rehabilitation management plan at this stage, it is not possible to assess the likelihood of success. The problems of large scale rehabilitation in the Kimberley include a prolonged period without rain and short bursts of heavy rain when it arrives.</p>	<p>Clearing will be staged over the life of the project, and will be progressively rehabilitated as mining progresses. Clearing of the entire mining void footprint at any one time will not occur. The climate profiles experienced within the Kimberley are not dissimilar to those experienced within Queensland or the Northern Territory, where rehabilitation of mine landforms has been undertaken previously. Additionally, mine site rehabilitation has been undertaken successfully in the Kimberley for the Lennard Shelf mining project with a number of years of post-closure monitoring data having been collected. Experience gained with this operation will be reviewed as part of detailed rehabilitation planning to understand the successes and weaknesses as they may apply to the Thunderbird Project.</p>
		<p>The risks of not being able to rehabilitate the land after mining is high, the worst case scenario would be that the mined area becomes a desert - there has never been any mining project in the history of the Kimberley which has attempted revegetation on this scale on pindan soils. In other words, what is proposed is to actually pioneer new experiments in revegetation, using local provenance native species.</p>	<p>As part of the co-disposal process, it is likely a material profile analogous to the deep Pindan soils present in the area will be replicated. It is unlikely that the materials used would restrict the growth of vegetation, given that they have been characterised as benign. This material will be covered with topsoil or rehabilitated directly. Observations of exploration/track disturbance within the area shows that vegetation can recover relatively quickly.</p>
		<p>There is also a very low level of knowledge of large scale revegetation projects in this area of the Kimberley. The importance of mycorrhizal fungi for the growth of healthy Australian plants is beginning to be recognised however no work has been on this to date in the Kimberley. With such a largescale of rehabilitation required, such knowledge is essential.</p>	<p>The importance of mycorrhizal fungi in rehabilitation of native vegetation in areas of the south west of WA where bauxite mining has occurred is recognised given their role in nutrient cycling. In the Dampier peninsula nutrient cycling is thought to be more significantly influenced by fire cycles and termite activity. Sheffield will commit to conducting investigations into nutrient recycling within rehabilitated areas as part of rehabilitation monitoring activities.</p>
		<p>Sheffield Resources confidently asserts that it can revegetate after mining despite not demonstrating any understanding or experience in doing this.</p>	<p>A Preliminary Mine Closure Plan (MCP) has been developed and was included in the PER which detailed much of the information highlighted in the submission. As the project progresses an operational MCP will be developed in accordance with Guidelines for Preparing Mine Closure Plans (DMP and EPA 2015) and will include additional detail with regards to revegetation methods, monitoring, expected outcomes and rehabilitation trials etc. As mining is 'moving', the mine void will be progressively backfilled and revegetation will be carried out progressively over the life of the mine (40+ years). Regular monitoring of rehabilitated areas as detailed in the preliminary MCP will be carried out and will provide timely indication of the success or failure of rehabilitation efforts. This will allow the rehabilitation strategy to be modified towards successful rehabilitation methods.</p>
		<p>A revegetation management plan needs to be developed prior to any approvals and be subject to public comment. The plan should detail:</p> <ol style="list-style-type: none"> Topsoil handling and storage Seed collecting – timing, location, quantities, species Rehabilitation targets - % plant cover, species list, % debris reintroduction, reintroduction of fauna etc. Monitoring methods including rehabilitation and monitoring in analogue sites Fire management and reintroduction Weed control and management Feral animal and native herbivore control Erosion management Agreed standards of closure 	<p>A separate revegetation management plan is not required.</p> <p>Sheffield have submitted a Preliminary Mine Closure Plan (MCP) as part of the PER (PER Appendix 4). This is consistent with the joint EPA and DMP guidelines addressing mine closure. These plans are required to be revised and updated on a three yearly basis and as such become increasingly more detailed as projects approach closure of specific individual domains or as a whole. Consistent with regulatory requirements regarding MCP's, Sheffield will update the MCP on a 3 yearly basis. It is noted that on approval, these plans are publically available via the DMP website.</p> <p>It is noted that of the items the submitter requested be included in the Revegetation Plan, the following are included in the MCP:</p> <ul style="list-style-type: none"> Topsoil management (Section 9.1.2). Seed management (Section 9.1.3). Rehabilitation targets (more correctly termed closure criteria in the MCP). This includes targets for vegetation establishment and erosion control (Section 6.2, Table 6). Monitoring (Section 10). Closure Standards (more correctly termed closure criteria in the MCP, Section 6.2). <p>Weed and fire management and vegetation monitoring is addressed in the Preliminary Vegetation Environmental Management Plan (PER Appendix 22) and fire and rehabilitation monitoring is also addressed in the Preliminary Bilby Environmental Management Plan (PER Appendix 23). It is noted that updates to both these plans were provided to the OEPA on 12 April 2017 and detail regarding rehabilitation monitoring in particular has been strengthened in the Preliminary Bilby EMP.</p>
		<p>A fungi study should be undertaken to further the understanding of the importance of mycorrhiza in Pindan Woodland and other Kimberley ecosystems (this was done for a proposed mineral sands mine at Ludlow, Capel).</p>	<p>The importance of mycorrhizal fungi in rehabilitation of native vegetation in areas of the south west of WA where bauxite mining has occurred is recognised given their role in nutrient cycling. In the Dampier peninsula nutrient cycling is thought to be more significantly influenced by fire cycles and termite activity. Sheffield will commit to conducting investigations into nutrient recycling within rehabilitated areas as part of rehabilitation monitoring activities.</p>

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		<p>Sheffield Resources need to provide examples of successful largescale revegetation in the Kimberley to show that it is possible and show how it is possible to revegetate successfully after mineral sands mining.</p>	<p>The Thunderbird Mineral Sands Project is the first mineral sands project to be proposed for the Kimberley and thus there are no previous examples that can be shown to answer this concern. However, there is previous rehabilitation experience in the Kimberley for mining projects (Lennard Shelf operations, Kimberley Diamonds, Argyle Diamonds, Koolan Island, Cockatoo Island, Palm Springs Gold) as well as other land disturbances. Sheffield can learn from these previous projects. Sheffield has also undertaken rehabilitation of exploration disturbances within the project area including bulk borrow pits established in 2016. This work was undertaken in consultation with the pastoralist and outcomes will be considered in more detailed rehabilitation planning.</p> <p>Research into successful rehabilitation methodology and trials will be a key part of the operational MCP.</p>
		<p>Potential Groundwater Dependent Ecosystems We are concerned Sheffield Resources have not met all requirements of the environmental scoping document due to inadequate peer review, which has resulted in the likely lowering of risk associated with this proposal on Groundwater Dependent Ecosystems (GDEs), and insufficient field work including water bore sampling.</p> <p>Clearly, the Environmental Scoping Document requires a peer review of biotic surveys (see p. 9 of ESD).</p>	<p>As stated in PER Section 4.2.8, in 2016, Mattiske Consulting conducted a technical peer review of the Ecologia botanical reports, which included an assessment of potential for GDEs. Following the technical peer review, an additional survey was conducted in June 2016 to address issues and methodological gaps within earlier surveys (Mattiske 2016a). MBS Environmental conducted a gap analysis between items identified within the peer review and the Mattiske (2016a) report to ensure the key issues had been addressed. A copy of the gap analysis was inadvertently omitted from Appendix 9 in the final PER submission due to an administrative error. A copy of this gap analysis has been provided with this response.</p>
		<p>Although Mattiske has peer-reviewed earlier Ecologia vegetation surveys, it appears from the PER documents that there has not been a peer review of the final vegetation documents. This significantly influences:</p> <ol style="list-style-type: none"> 1. The interpretation of which community types should be considered as potential GDEs. This was a process in which four of six vegetation communities considered as potentially groundwater dependent, were ruled out on the basis of the landscape being flat, and the species found there not being considered characteristic of known groundwater dependent ecosystems in the Fitzroy River valley. This is not robust reasoning to rule them out. GDEs can occur on flat landscapes, and there may be different GDE types on the Dampier Peninsula than occur within the Fitzroy River valley. We note the research undertaken by NESP on the Dampier Peninsula. 	<p>It should be noted that dewatering associated with the project will be targeting the Broome Sandstone Aquifer. Any risk to potential or identified GDE communities should be assessed on their ability to access and utilise this aquifer.</p> <p>In relation to the assessment of GDEs, six vegetation communities were identified by Mattiske as associated with a drainage channel or were in a location likely to be associated with seasonal inundation. In November 2016 a field survey focused on two of these communities as they were considered to be the most likely to support GDEs, based on presence of species which are known to be dependent on groundwater and their topographical location overlying the Broome Sandstone Aquifer. Communities to the north were excluded as they are underlain by Jarlemai Siltstone (an aquiclude). Of the two communities that were assessed, the intermittent soak area was not considered as a GDE as the modelled depth to groundwater within the underlying Broome Sandstone Aquifer was deep, approximately 18 m (Rockwater 2016), and unlikely to be utilised by vegetation.</p> <p>Sheffield was unable to access specific research undertaken by NESP (assumed to be the National Environmental Science Program) on GDEs within the Dampier Peninsula relating directly to the modelled drawdown impact area, and would appreciate research references be provided to allow for review.</p>
		<ol style="list-style-type: none"> 2. The process of ruling out sites as potential GDEs, which include the two vegetation communities Mattiske considered to be potentially groundwater dependent vegetation community types. This was done on the basis of interpolated depth-to-groundwater estimates (which hydrogeologists have highlighted as requiring additional bores to confirm; see below) and on the basis of one community being in a landscape depression that would receive surface water runoff as part of its water budget. These are not robust reasons to rule out that these are, or are not, Groundwater Dependent Ecosystems. Even though these sites would receive surface water run-off, their position in a depression would put them in a position to be closer to any water table, making them more likely to be groundwater dependent. 	<p>Although there were species present that are known to be groundwater dependant (such as <i>Melaleuca viridiflora</i>) vegetation was observed to be in very poor, very stressed condition in November 2016, towards the end of the dry season; if this vegetation was groundwater dependant, it would likely be in a less stressed condition during periods of water scarcity.</p> <p>The other community assessed, Fraser River South, was deemed to be a groundwater dependant ecosystem due its location in a drainage channel and the presence of <i>Eucalyptus camaldulensis</i>. Sheffield planned to undertake a GDE monitoring bore program of this area in early 2017, based on Rockwater's recommendation. However, wet conditions have restricted site access and delayed this program. Further investigation of hydrogeological conditions and baseline vegetation monitoring is proposed for this area and will be implemented as per the Groundwater Management Plan prior to dewatering for mining commencing in Year 15 of the project.</p> <p>Drawdown within the Broome Sandstone Aquifer was modelled as gradual over the 32 year abstraction period, to a total of 2.7 m (equating to a 9 cm lowering per year, assuming consistent pumping rates), with levels rebounding relatively quickly post mining. Additionally, <i>E. camaldulensis</i> community occurs widely outside of the project area, across most of the Australian mainland.</p>
		<p>There are also significant uncertainties due to data yet-to-be collected that means that the PER should not be considered sufficient for the EPA to make its advice, until the data gaps are filled. For example, depth-to-groundwater estimates at the potential GDE sites acknowledged by Mattiske are interpolated, based on bores some distance from the GDE sites. The H3 hydrogeology report recommends that additional bores are installed in these locations to confirm depth to groundwater. This indicates that uncertainty in these estimates is sufficient to require further on-ground assessment. This information clearly should have been gathered prior to</p>	<p>See response above.</p>

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		completion of the PER, to ensure that the PER confidently represents the extent of risks to underpin an assessment of significant effects, and the establishment of achievable Ministerial Conditions. An EPA ruling on the acceptability of the proposal prior to this information being available would be premature (for example, see Lee 2014). There is legal precedent in other states (NSW and Victoria) to support this.	
		We also recognise further vegetation mapping and analysis is required. The area in which vegetation was mapped, and in which GDEs were considered, does not extend to the east of the boundary between the Jarlemai Siltstone and the Broome Sandstone aquifer, which is likely to have GDEs that could be impacted this proposal. Figure 3 indicates a very large area adjacent to mine (white dashed circle) resembles drainage patterns on the west Dampier Peninsula that have recently been shown to have unique GDEs (currently unpublished, but widely known). The mapping undertaken by Sheffield Resources consultants have only been done of the mining tenement; clearly impacts associated with water usage and impacts on aquifers needs to be undertaken at a much larger scale as impacts are likely to be widespread.	As indicated by Figure 46 on pg. 208 of the PER, significant (i.e. greater than seasonal variation) groundwater drawdown within the Broome Sandstone Aquifer is modelled to be restricted to within 10km of the mineral source area. This area is typically represented by Pindan vegetation and is unlikely to support any specialised GDE communities as are present in more coastal areas, such as Beagle Bay. Sheffield considers that the desktop and field surveys taken to date have identified possible groundwater dependant ecosystems that may be impacted by the project activities. The GDE survey conducted in November 2016 expanded approximately 2.5 km into the Jarlemai Siltstone outcrop, as illustrated in Figure 29. Further survey was not considered warranted as drawdown within the Broome Sandstone Aquifer will not impact on the Jarlemai Siltstone Aquifer to the east as they are two separate groundwater catchments. Mapping of groundwater dependant ecosystems is therefore not warranted in this area
		These circumstances indicate that the PER does not meet the scope presented in the ESD. As a result of not meeting the PER scope (and a possible spatial deficiency in the area covered), the PER may underrepresent risks to GDEs from the proposal. Therefore the PER may be insufficient for the EPA to fully understand the risks from the proposal, and therefore make recommendations on whether the expected impacts are significant effects.	Sheffield disagrees with this statement. A precautionary approach will be adopted, and additional bores will be installed as soon as site access can be safely achieved in order to characterise the relationship between the potential GDE and the groundwater in the area.
		Our recommendation is that the EPA should not consider the PER to be complete to the scope in the ESD, and to defer consideration of the PER until: a. There is a thorough peer review of the analysis of potential GDEs, and their potential risks from the proposal as required in the ESD, and these are reconsidered in the light of new groundwater information (see below); and.	See responses above. Sheffield believes sufficient baseline work has been conducted to allow assessment of impacts on the two potential GDE areas (Community W1 and W14). Given impacts on potential GDE's are unlikely to occur until after mining below the water table commences (Year 15), there is sufficient time to collect more hydrological and vegetation information over multiple seasons to determine whether the identified potential GDEs are in fact GDEs and re-evaluate drawdown impacts on these areas. Sheffield considers that the potential impacts to GDEs will be able to be adequately managed such that the EPA environmental objective for hydrological processes (to maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected) will be met, and that the residual impacts are therefore acceptable
		b. The required bores are established to confirm the depth to groundwater and potential groundwater dependency, to support dot point 1 above. That is, the recommendation in the H3 report to install additional bores should be completed prior to the PER considered by the EPA, rather than as part of the management planning process.	See responses above.
		Additional field work on GDEs at a larger spatial scale is required given the significant footprint of the mine and likely impacts on aquifers throughout the region	See responses above.

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26	Wilderness Society BHLF-WQPC-QV1N-1	<p>We are concerned Sheffield Resources have not met all requirements of the environmental scoping document due to inadequate peer review, which has resulted in the likely lowering of risk associated with this proposal on Groundwater Dependent Ecosystems (GDEs), and insufficient field work including water bore sampling.</p>	<p>See answers for item 25 as there is significant duplication between submissions from Environs Kimberley and the Wilderness Society.</p>
		<p>Clearly, the Environmental Scoping Document requires a peer review of biotic surveys (see p. 9 of ESD).</p> <p>Although Mattiske has peer-reviewed earlier Ecologia vegetation surveys, it appears from the PER documents that there has not been a peer review of the final vegetation documents. This significantly influences:</p> <ol style="list-style-type: none"> 1. The interpretation of which community types should be considered as potential GDEs. This was a process in which four of six vegetation communities considered as potentially groundwater dependent, were ruled out on the basis of the landscape being flat, and the species found there not being considered characteristic of known groundwater dependent ecosystems in the Fitzroy River valley. This is not robust reasoning to rule them out. GDEs can occur on flat landscapes, and there may be different GDE types on the Dampier Peninsula than occur within the Fitzroy River valley. We note the research undertaken by NESP on the Dampier Peninsula. 	<p>Sheffield believes sufficient baseline work has been conducted to allow assessment of impacts on the two potential GDE areas (Community W1 and W14). Given impacts on potential GDE's are unlikely to occur until after mining below the water table commences (Year 15), there is sufficient time to collect more hydrological and vegetation information over multiple seasons to determine whether the identified potential GDE's are in fact GDE's and re-evaluate drawdown impacts on these areas.</p> <p>Sheffield planned to undertake a GDE monitoring bore program in early 2017, based on Rockwater's recommendation. However, wet conditions have restricted site access and delayed this program. Bores will be installed during the dry season..</p>
		<ol style="list-style-type: none"> 2. The process of ruling out sites as potential GDEs, which include the two vegetation communities Mattiske considered to be potentially groundwater dependent vegetation community types. This was done on the basis of interpolated depth-to-groundwater estimates (which hydrogeologists have highlighted as requiring additional bores to confirm; see below) and on the basis of one community being in a landscape depression that would receive surface water runoff as part of its water budget. These are not robust reasons to rule out that these are, or are not, Groundwater Dependent Ecosystems. Even though these sites would receive surface water run-off, their position in a depression would put them in a position to be closer to any water table, making them more likely to be groundwater dependent. 	<p>As indicated by Figure 47 on pg. 209 of the PER, significant (i.e. greater than seasonal variation) groundwater drawdown within the Broome Sandstone Aquifer is modelled to be restricted to within 10km of the mineral source area. This area is typically represented by Pindan vegetation and is unlikely to support any specialised GDE communities as are present in more coastal areas, such as Beagle Bay. Sheffield considers that the desktop and field surveys taken to date have identified possible groundwater dependant ecosystems that may be impacted by the Project activities.</p>
		<p>There are also significant uncertainties due to data yet-to-be collected that means that the PER should not be considered sufficient for the EPA to make its advice, until the data gaps are filled. For example, depth-to-groundwater estimates at the potential GDE sites acknowledged by Mattiske are interpolated, based on bores some distance from the GDE sites. The H3 hydrogeology report recommends that additional bores are installed in these locations to confirm depth to groundwater. This indicates that uncertainty in these estimates is sufficient to require further on-ground assessment. This information clearly should have been gathered prior to completion of the PER, to ensure that the PER confidently represents the extent of risks to underpin an assessment of significant effects, and the establishment of achievable Ministerial Conditions. An EPA ruling on the acceptability of the proposal prior to this information being available would be premature (for example, see Lee 2014). There is legal precedent in other states (NSW and Victoria) to support this.</p>	<p>See answers for item 25 as there is significant duplication between submissions from Environs Kimberley and the Wilderness Society.</p>

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26	Wilderness Society BHLF-WQPC-QV1N-1	<p>We also recognise further vegetation mapping and analysis is required. The area in which vegetation was mapped, and in which GDEs were considered, does not extend to the east of the boundary between the Jarlemai Siltstone and the Broome Sandstone aquifer, which is likely to have GDEs that could be impacted this proposal. Figure 3 indicates a very large area adjacent to mine (white dashed circle) resembles drainage patterns on the west Dampier Peninsula that have recently been shown to have unique GDEs (currently unpublished, but widely known). The mapping undertaken by Sheffield Resources consultants have only been done of the mining tenement; clearly impacts associated with water usage and impacts on aquifers needs to be undertaken at a much larger scale as impacts are likely to be widespread.</p> <p>These circumstances indicate that the PER does not meet the scope presented in the ESD. As a result of not meeting the PER scope (and a possible spatial deficiency in the area covered), the PER may underrepresent risks to GDEs from the proposal. Therefore the PER may be insufficient for the EPA to fully understand the risks from the proposal, and therefore make recommendations on whether the expected impacts are significant effects.</p> <p>Our recommendation is that the EPA should not consider the PER to be complete to the scope in the ESD, and to defer consideration of the PER until:</p> <ol style="list-style-type: none"> There is a thorough peer review of the analysis of potential GDEs, and their potential risks from the proposal as required in the ESD, and these are reconsidered in the light of new groundwater information (see below); and The required bores are established to confirm the depth to groundwater and potential groundwater dependency, to support dot point 1 above. That is, the recommendation in the H3 report to install additional bores should be completed prior to the PER considered by the EPA, rather than as part of the management planning process. <p>Additional field work on GDEs at a larger spatial scale is required given the significant footprint of the mine and likely impacts on aquifers throughout the region.</p> <p>[In regard to cumulative impacts]</p> <p>The EPA should consider the cumulative impacts of clearing across the Kimberley, when looking specifically at the initial 1,721 hectares of planned clearing of the 6,305 hectares development site.</p>	<p>See answers for item 25 as there is significant duplication between submissions from Environs Kimberley and the Wilderness Society.</p> <p>See answers for item 25 as there is significant duplication between submissions from Environs Kimberley and the Wilderness Society.</p> <p>See answers for item 25 as there is significant duplication between submissions from Environs Kimberley and the Wilderness Society.</p> <p>Total clearing for the entire mine life of the Thunderbird project (40+ years) is 2,272.8 ha including clearing for infrastructure (PER Section 3.1). In accordance with EPA Guideline¹ 'Defining the Key Characteristics of a Proposal' a Development Envelope has been surveyed and assessed to provide flexibility for potential future changes in placement of infrastructure. The Development Envelope does not represent proposed future mining footprint and it is unlikely that the mine footprint will change as mining progresses as there are a number of constraints to mining outside of the proposed footprint such as deposit location, heritage impacts and other environmental considerations. Sheffield has provided the life of mine (40+ years) clearing footprint in the PER and trusts that the EPA will conduct their assessment of cumulative impacts in accordance with relevant EPA procedures and guidelines. There are no current plans to mine outside the proposed mining excavation extent as detailed in the PER.</p> <p>Cumulative impacts are assessed by looking at the interaction between a project and other past, present, and reasonably foreseeable future projects. Baseline environmental surveys undertaken for the project have considered the impact from past and present activities (such as pastoral grazing). Impact assessment contained in the PER considers the cumulative impact of the proposed project along with continued existence of approved land use activities for the Mine Site Development Envelope (rangeland grazing). If future mineral exploration by Sheffield or others identifies other economic mineral deposits, proponents of these projects will be required to seek their own project approvals under various State Acts. As required by EPA procedures, the cumulative impacts of these theoretical future projects when combined with the Thunderbird Mineral Sands Project would be assessed through Part IV <i>EP Act</i> processes for the future theoretical project/s. Similarly if land clearing is proposed for other industries e.g. intensive pastoral activities (centre pivot irrigation), the proponents of those projects would be required to obtain necessary approvals under various State Acts. Cumulative impacts of these theoretical future projects when combined with the Thunderbird Mineral Sands Project would be assessed by the EPA in accordance with relevant EPA Guidelines through the environmental approvals process for the future theoretical project/s.</p>

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26	Wilderness Society BHLF-WQPC-QV1N-1	We are mindful that this includes no proposal of figures of land clearing for future expansion, with the footprint within the development envelope on page 11 of the supporting documentation ² showing at least 50% of the 6,305 hectares of land earmarked for clearing.	In reference to supporting documentation ² (Ecologia 2014) showing over 50% impact of the 6,305 ha development envelope being impacted. This survey and report was completed in 2014 and since this time additional drilling to define the resource and consultation with Traditional Owners has taken place which has resulted in proposed mining footprint being revised and reduced. In Ecologia 2014, the legend refers to the 'potential' impact area rather than 'proposed' mine layout as the mine design had not been decided at this time. The final proposed clearing footprint, mining area and development envelope are detailed in the PER and any reference to these details should be obtained from the PER document only.
		We recommend that the EPA calls on the company to reassess the land clearing planned for the entire project, instead of simply the initial stages, so a full and complete assessment can be made; whilst the project is before the EPA.	The PER presents the anticipated full land clearing extent needed for implementation of the project. It has been conservative in its estimate of required clearing with the amount stated not factoring in the area of existing clearing on the site access road that supports current pastoral station activities.
27	Department of Mines and Petroleum BHLF-WQPC-QV1K-X	In the Proposed Extent Authorised (page 7 of PDF) having a set maximum hectare value for the amount of pit open at any one time (rather than an approximate value) will enable regulation of progressive rehabilitation.	Noted. The Mining Proposal to be submitted to DMP will include a maximum hectare value for the amount of pit open at any one time.
		It is not clear in the PER where the 500 person construction village is going to be located, and therefore it is assumed this will be within the proposed footprint of the permanent accommodation village, but this assumption should be verified with Sheffield.	The construction accommodation camp will be in the same location as the permanent village. Rooms no longer required after completion of construction will be removed and disturbed areas rehabilitated.
28	Department of Water BHLF-WQPC-QV1Y-C	<u>Groundwater dependent ecosystems</u> The Mattiske (2016a) survey identified two potentially groundwater dependent vegetation communities: Wi (mapped in three locations) and W14 (located along Fraser River South) based on their species composition and the associated landscape features. However, the Mattiske GDE report (2016b) concludes that only <i>Eucalyptus camaldulensis</i> within the W14 community was groundwater dependent.	It should be noted that dewatering associated with the project will be targeting the Broome Sandstone Aquifer. Any risk to potential or identified GDE communities should be assessed on their ability to access and utilise this aquifer.
		Mattiske (2016b) concluded the W1 communities at the 'Nearby Soak' and along Fraser River South were not groundwater dependent based on poor vegetation health during the 2016 dry season, interpolated groundwater depths (Rockwater 2016), topographical conditions (creating drainage basins), and a lack of <i>E. camaldulensis</i> . The Wi community north of the mining area was not surveyed or investigated any further, depths to groundwater have not been confirmed, and yet it was concluded by Mattiske (2016b) that they were not groundwater dependent.	As indicated by Figure 47 on pg. 209 of the PER, significant (i.e. greater than seasonal variation) groundwater drawdown within the Broome Sandstone Aquifer is modelled to be restricted to within 10km of the mineral source area. This area is typically represented by Pindan vegetation and is unlikely to support any specialised 'spring' GDE communities as are present in more coastal areas, such as Beagle Bay. Sheffield considers that the desktop and field surveys taken to date have identified possible groundwater dependant ecosystems that may be impacted by the Project activities. In relation to the assessment of GDEs, six vegetation communities were identified by Mattiske as associated with a drainage channel or were in a location likely to be associated with seasonal inundation. In November 2016 a field survey focused on two of these communities as they were considered to be the most likely to support GDEs, based on presence of species which are known to be dependent on groundwater and their topographical location overlying the Broome Sandstone Aquifer. Communities to the north were excluded as they are underlain by Jarlemai Siltstone and would not be impacted by abstraction from the Broome Sandstone Aquifer.
		The possibility of the W1 and W14 vegetation communities (beyond just <i>E. camaldulensis</i>) being groundwater dependent, as required in the Environmental Scoping Document, has not been determined to the satisfaction of the Department, from the on-ground investigations or the subsequent conclusions drawn.	Of the two communities that were assessed, the W1 community to the south west of the mineral deposit area, 'intermittent soak area', was not considered as a GDE as the modelled depth to groundwater within the underlying Broome Sandstone Aquifer was deep, approximately 18 m (Rockwater 2016), and unlikely to be utilised by vegetation. Additionally, although there were species present that are known to be groundwater dependant, such as <i>Melaleuca variifolia</i> , vegetation was observed to be in very poor, very stressed condition in November 2016, towards the end of the dry season; if this vegetation was groundwater dependant, it would likely be in a less stressed condition during periods of water scarcity. The other community assessed, Fraser River South, was deemed to be a groundwater dependant ecosystem due its location in a drainage channel and the presence of <i>Eucalyptus camaldulensis</i> . Colloff (2014) report that at a groundwater depths of 10-12m below ground level, decline in health of <i>Eucalyptus camaldulensis</i> would be expected. Given that modelled drawdown is not predicted to reduce groundwater levels below 10 to 12 m, it is considered unlikely that adverse impacts to trees within the vegetation community would occur. Additionally, any adverse impacts are highly unlikely to impact on the distribution of the species as <i>Eucalyptus camaldulensis</i> occurs widely outside of the project area, across most of the Australian mainland (Chippendale 1988, DPaW 2016). References: Colloff, M. 2014. Flooded forest and desert creek: Ecology and history of the river red gum. CSIRO Publishing; Chippendale, G.M. 1988. <i>Eucalyptus</i> , <i>Angophora</i> (Myrtaceae), <i>Flora of Australia</i> 19. Australian Government Publishing Service, Canberra; Department of Parks and Wildlife (DPaW). 2016. Florabase, the Western Australian Flora. http://florabase.dpaw.wa.gov.au (accessed July 11, 2016). Perth: DPaW.

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28	Department of Water BHLF-WQPC-QV1Y-C	The Department recommends the following further work to determine potential groundwater dependence of these vegetation communities prior to approval of the PER: - Actual depths to groundwater at all W1 (three locations) and W14 (one location) communities (recommendation 8).	See below.
		- Investigation into whether groundwater inputs from springs is occurring in these locations (as it does in similar systems on the western side of the peninsular) (recommendation 9).	See below.
		- Assessment of how groundwater level decline by up to 2.7m to 6m at these location by year 47 of the proposed mine life may impact the communities in any of the locations (recommendation 10).	See below.
		- Health/condition monitoring to be included in the Vegetation EMP, which does not currently address any management for these areas (recommendation II).	See below.
		[Recommendations as Numbered in Advice] 8. Depth to groundwater at W1 and W14 vegetation communities to be determined.	Depth to groundwater in river valleys associated with the Fraser River South range from less than 5 m to more than 20 m (based on monitoring locations including those shown in Figure 11 of Appendix 8 (H3 report)). To supplement this information, Sheffield planned to undertake a GDE monitoring bore program in early 2017, based on Rockwater's recommendation. However, wet conditions have restricted site access and delayed this program. Further investigation of hydrogeological conditions and baseline vegetation monitoring is proposed for this area and will be implemented as per the Groundwater Management Plan prior to dewatering for mining commencing in Year 15 of the project.
		9. Investigation into potential groundwater inputs from springs at W1 and W14 vegetation communities.	Sheffield planned to undertake a GDE monitoring bore program in early 2017, based on Rockwater's recommendation. However, wet conditions have restricted site access and delayed this program. Further investigation of hydrogeological conditions and baseline vegetation monitoring is proposed for this area and will be implemented as per the Groundwater Management Plan prior to dewatering for mining commencing in Year 15 of the project.
		10. Assess how groundwater level decline may impact W1 and W14 vegetation communities.	The vegetation community W14 was the only community to be considered a GDE (Mattiske 2016; Appendix 9). An assessment of how groundwater decline may impact on this community is provided in Section 8.3.2 of the PER.
11. Health/condition monitoring in a Vegetation EMP for groundwater dependent communities.	The Preliminary Vegetation EMP has been updated to include vegetation health monitoring and to reference the November 2016 GDE report. A copy has been provided with this response.		

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
29	Department of Mines and Petroleum BHLF-WQPC-QV1K-X	Detailed Tailing Storage Facility (TSF) construction and proposed closure designs and embankment construction material analysis will be required to be submitted to DMP with the Mining Proposal for this mine site, as required under the Mining Act. It is noted that Pindan sands are proposed to be used as the starter embankment for the TSF and the appropriateness of this material for use in TSF embankment walls will need to be justified, especially as Appendix 6 (Soil and Landform Assessment) identifies Pindan sands as having low coherence and limited wet strength.	As detailed in Section 8.4.3 of the PER, the TSF will be designed in accordance with the Code of Practice for Tailings Storage Facilities in Western Australia (DMP 2013) and ANCOLD Guidelines on Tailings Dam Planning, Design, Construction, Operation and Closure (ANCOLD 2012). A detailed engineering report which includes provision of geotechnical information will be submitted to DMP as part of the Mining Proposal process and to DER as part of the Works Approval process.
		The Mining Proposal required under the Mining Act will also have to provide geotechnical detail around the pit/extraction areas, especially with respect to the stability of pit walls as mining depth increases.	Adequate geotechnical information for the mine pit/extraction areas will be provided within the Mining Proposal.

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
30	Public Submission ANON-WQPC-QV1V-9	Please see attached report <i>Response to Thunderbird Mineral Sands Project Public Environmental Review EPA Assessment No. 2073</i> (February 2017) (Attachment 3) and respond to the comments made on stygofauna.	<p>Section 4.2.10 of the PER states that a Level 2 subterranean fauna survey was undertaken. Similarly, Item 63 of the ESD approved by the EPA on 5 July 2016 refers to a Level 2 subterranean fauna survey having been undertaken by Ecologia. These descriptions are based on the report title. Review of the Ecologia 2014 report, as identified by the OEPA does however show that in Sections 3.3.3 and 3.3.4 refer to Level 1 surveys of stygofauna and troglofauna respectively. The Level 2 information more correctly refers to the terrestrial fauna component of the report.</p> <p>A subterranean fauna survey was undertaken by Ecologia in March 2014. This report is included in Appendix 9 as "Ecologia 2014 Level 2 Terrestrial & Subterranean Fauna Survey". The survey sampled 21 drill holes (located within and outside of the Mine Site Development Envelope) from within the Broome Sandstone Aquifer for troglofauna and stygofauna. Sampling methods were consistent with EPA requirements.</p> <p>Review of the definitions of survey levels in EAG 12 (EPA June 2013) which were current at the time Ecologia undertook the work and published the report indicate that Ecologia undertook a desktop study and a reconnaissance survey. A single phase of sampling/trapping was conducted in December 2013/January 2014 for stygofauna and troglofauna respectively. This included sites within and outside of the proposed impact area. This meets the definition of a Level 1 survey. Additional rounds of sampling for both stygofauna and troglofauna would need to have been conducted to meet the definition of a Level 2 survey.</p> <p>However, the survey report concludes that "Despite widespread sampling within the potential impact area, no stygofauna were recorded during the survey. It is therefore unlikely that a significant or diverse stygofauna assemblage exists within the study area." As such it is reasonable to conclude that the project will not result in loss to the representation, diversity, viability or ecological function of subterranean fauna species, population and assemblages.</p> <p>As discussed in PER Section 4.2.10, the Broome Sandstone Aquifer is a non-karstic, unconfined aquifer. The majority of this area is dominated by clays and sand strata (pindan units), which consequently suggests limited saturated habitat space beneath the watertable (Ecologia 2014a). Should the Broome Sandstone Aquifer have secondary porosity developed in the form of fractures, and/or evidence of restricted calcareous sandstone geology with evidence of karst solution, then this could potentially provide habitat for stygofauna (Ecologia 2014a). Results of the sampling identified a low diversity and abundance of subterranean fauna with no stygofauna being recorded during the survey.</p> <p>Given the results of the Level 1 survey including knowledge of the hydrogeological setting, the amount of work undertaken is considered appropriate and sufficient to allow informed impact assessment. The conclusions drawn in the PER that the project will not result in loss to the representation, diversity, viability or ecological function of subterranean fauna species, population and assemblages are considered valid.</p>

Terrestrial Environmental Quality

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
31	Kimberley Pilbara Cattlemen's Association ANON-WQPC-QVK4-1	Minerals sands mining has been undertaken extensively in Western Australia, and across Australia. For example, in WA's south-west mineral sands mines have been successfully returned to agricultural land use, e.g. in Capel and Waroona. The quality of the soil and its suitability for agricultural purposes will be retained by Sheffield, given the nature of mining. We understand that scientific analysis has demonstrated the materials that are returned to the void, (as part of the progressive rehabilitation process), are environmentally benign, in both the short and long term.	Noted.
32	Department of Mines and Petroleum BHLF-WQPC-QV1K-X	DMP supports the commitment for additional acid sulphate soil testing before mining below the water table commences. It would be useful if future waste characterisation of the material to be disturbed could be demonstrated as being spatially representative both horizontally and vertically. Appendix 19, Mine Waste Characterisation, Figure 3, provides the horizontal distribution of samples and the report indicates sampling was representative in relation to ratios of material to be mined, but no vertical representation of the distribution of samples was provided in the PER or Appendices.	Noted. Vertical representation although not demonstrated visually as done for horizontal distribution in Figure 3 of Appendix 19, is demonstrated in Table A1-1 "Sample Descriptions" on pages 38-39 of Appendix 19. Vertical variation was minimal compared to most projects as the overburden material represents a single pindan sand soil unit of increasing depth during project life. Further cross-sectional figures showing representations of this will be provided in submissions for the Mining Proposal.
33	Department of Water BHLF-WQPC-QV1Y-C	<u>Potentially acid forming materials</u> The Department has been unable to assess potential PAF impact due to lack of materials and waste characterisation from deeper in the pit. Further work is required by Sheffield prior to any groundwater abstraction/dewatering or mineral disturbing activities occurring within the PAF area, stated as approximately 85m bgl. The Department considers this to be a high risk aspect, and may result in contamination of groundwater resources without management controls. The EPA may consider a condition requiring further investigative work be undertaken (materials and waste characterisation) including identification of the exact geochemistry, depth and extent of the PAF within a given timeframe. Dynamic geochemical characterisation (kinetic testing) or geochemical modelling should be required as part of this further work (recommendation 13). The GWMP should include an appropriately located monitoring bore, with triggers and management strategies, to monitor water levels and quality near the PAF area (recommendation 14). [Recommendations as Numbered in Advice] 13. Further characterisation of PAF materials prior to groundwater or mineral disturbance within the PAF area. 14. A monitoring bore with triggers and management strategies near the PAF area.	Noted. The need for further investigation of the depth of interception of sulfides and development of appropriate acid sulfate soil (ASS) management plans is noted and discussed in the PER in Section 8.4.2.1 and commitments made in Table 63. This includes the acknowledged need for more intensive sampling at and around the depths indicated by initial sampling and spatially to confirm the consistency of depth as well as modelling for impacts of drawdown from mine dewatering. The groundwater modelling by that late stage of the project will have the benefit of experience in aquifer behaviour and permeability gained to that point. The need for kinetic testing is uncertain and should be re-considered after further sampling and drawdown modelling – the material is acid sulfate soil rather than normal PAF mine waste and considered readily reactive to oxygen if exposed in the normal ASS fashion. Lime dosage rates would need to be calculated and applied as per standard ASS management if small volumes of material are exposed. Lime addition to the process circuit will also be required to control pH. Groundwater monitoring bores for the pit area will be placed at closer intervals around the sulfidic zone in order to capture any impacts (levels and quality) from mining of the sulfidic zone. This will form part of the GWMP and the ASS management plan and groundwater monitoring was listed for this in Table 63.

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
33	Department of Water BHLF-WQPC-QV1Y-C	<p><u>Mine waste and residue</u> Water in the Broome sandstone aquifer is used for human drinking purposes and as such, impacts to groundwater quality need to be additionally assessed against human drinking water guidelines. Sheffield reports that 'concentrations of all environmentally significant metals and metalloids in water or dilute acid conditions from residue samples were very low to non-detectable apart from minor concentrations of aluminium under acid conditions'.</p> <p>The Department requests clarification and further information as geochemical characterisation of the mine residue in Table A1-5 of Appendix 20 show exceedances of human drinking water guidelines for aluminium and chromium in water and under acid conditions (0.79mg/L compared to 0.2mg/L for Al and 0.18mg/L compared to 0.05mg/L for Cr). Table A1 -7 of Appendix 20 shows nickel and manganese exceed human drinking water guidelines by up to three times, and aluminium by up to 20 times. Furthermore, aluminium in the mine waste was mobilised in water and under acidic conditions to levels above drinking water guidelines.</p> <p>The Department recommends Sheffield demonstrate by either mathematical calculation or modelling that contaminant loads and flow direction of tailings seepage will not cause local water quality to exceed human drinking water guidelines as measured in the Broome Water Reserve, Roebuck Bay or Kilito Station (recommendation 15).</p>	<p>Mine waste was characterised across two reports and tables and discussion also presented data against drinking water guidelines. The 'Mine Waste Characterisation' report represents the properties of the bulk material as removed from the ground including the orebody material to be processed. The Mine Residue Characterisation represents analysis of various waste streams from processing of the orebody material. With the exception of the 'gypsum' residue which represents 0.025% by weight of the total waste stream, the mine residue streams have undergone only physical separation methods which will not change the properties of the material versus the original bulk orebody material – in the report they were analysed separately, in reality they will be co-disposed.</p> <p>Analysis of the mine waste and residue materials for acetic soluble species was conducted as a worst case scenario condition if significant oxidation of sulfides was allowed to occur without adequate management. This is done as part of waste characterisation to determine which species may be mobilised under such conditions and hence are important for monitoring – particularly around areas late in mine life where some sulfides have been noted. It is not a reflection of normal operating conditions and not a situation that is possible during the operation of the TSF or for the first 35 years of operations due to the absence of sulfides in that ore material and overburden. The use of flocculants in the process plant also requires maintenance of pH in the neutral range to be effective – processing could not continue if significant pH drops were to occur.</p> <p>Regardless of this, no bulk mine waste samples exceeded any health based criteria on a 1:20 basis in either water or acetic acid leachates. As expected hydrous Al and Fe were solubilised under acid conditions. In water (representative of normal conditions) aluminium and iron concentrations were lower. Neither aluminium nor iron have established human health criteria. The aesthetic criteria for aluminium of 0.2 mg/L in human drinking water is established based on 'post-filtration flocculation' – dissolved aluminium used as a flocculent in potable water treatment will form a gelatinous white precipitate which is unsightly to users and causes complaints. Likewise an aesthetic guideline of 0.3 mg/L for iron is established for brown discoloration of the water. Groundwater quality data is currently limited to three samples, but these also indicate the natural presence of iron and aluminium above these human aesthetic values in groundwater. The standard and simple practice of aeration, chlorination and filtration is suitable for treating such water for potable use within aesthetic guidelines.</p> <p>As noted in the report, the presence of chromium (0.18 mg/L) in the water extract of the gypsum is considered a result of the source of lime used for neutralisation (alternative sources would contain less). Regardless, as the groundwater naturally contains dissolved iron in the form of ferrous iron, it is not possible for chromium (VI) to persist in the environment – co-disposed with other waste and soluble ferrous ion from the pore water it will react immediately and become immobile chromium(III). Chromium(VI) is only stable under alkaline conditions in the absence of reducing agents such as ferrous iron. The gypsum also forms only 0.025% of co-disposed waste and even ignoring reactivity is not possible to exceed the drinking water guideline in overall co-disposed waste. Water soluble aluminium in the CUP MSP tails sample (0.79 mg/L) represents 4.3 % of waste – a weighted average aluminium concentration allowing for all waste streams and measured concentrations of aluminium would be 0.08 mg/L which is consistent with the 'orebody' sample water extracts in the mine waste characterisation of 0.05 mg/L. Likewise the trace concentrations of nickel (0.06 mg/L) and manganese (1.88 mg/L) in worst case scenario acetic acid extracts of the gypsum sample reduce to <0.01 mg/L and 0.047 mg/L respectively in the overall material and hence below drinking water guidelines even at source regardless of dilution.</p> <p>No contaminants of concern in mine waste material were identified overall that have potential to impact human health criteria for drinking water. Groundwater quality monitoring will be conducted for a range of parameters to monitor any changes in species such as soluble aluminium and iron versus baseline/up-gradient results.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
33	Department of Water BHLF-WQPC-QV1Y-C	<p>The proponent does not intend to line the proposed TSF facility. Soils in this area are considered to be well-draining sandy soils with relatively high infiltration rates (hydraulic conductivity). Modelling indicates some potentially significant levels of groundwater mounding from TSF seepage. Given the above, the Department considers an unlined facility may pose a contamination risk to groundwater. The Department understands that the TSF won't be rehabilitated until mine closure and as such should not be considered temporary. The Department recommends Sheffield justify why the TSF is not going to be lined and how contamination risks will be managed during operations and post-mining (recommendation 16). The management strategies outlined in the PER do not adequately address water level or quality monitoring regarding the TSF and co-disposed tailings seepage and therefore should be revised. These should be appropriately addressed in the GWMP as well (recommendation 17).</p>	<p>As per PER Section 8.4.2.1 and Appendices 19 and 20, assessments of mining wastes indicated that as the TSF will only be used in the initial years of mine life and well before any PAF/ASS material is to be encountered, all mine waste, including process residues to be stored within the TSF, will be Non Acid Forming (NAF) and Barren with no capacity for acid generation or acid neutralisation. Levels of soluble salts, metals and metalloids in any seepage from these materials will be extremely low, even under mildly acidic conditions. Lining of the TSF is, therefore, considered to be unnecessary.</p>
		<p>[Recommendations as Numbered in Advice] 15. Demonstrate that contamination loads and flow direction of tailings seepage will not exceed human drinking water guidelines.</p>	<p>See above.</p>
		<p>16. Justify why the TSF will not be lined and how contamination risks will be managed.</p>	<p>See above.</p>
		<p>17. Management of water level and quality risks regarding seepage from the TSF and co-disposed tailings required.</p>	<p>See above.</p>
34	Department of Environment Regulation	<p>Please see attached report <i>Technical Expert Report – Geochemical Aspects – Thunderbird Minerals Sands Project</i> (February 2017) (Attachment 4C) and respond to the matters raised.</p>	<p>The technical report did not identify any issues that required a response. It did note however that additional investigation work is required to determine whether historical soil contamination at Derby Port has migrated to groundwater. This comment is in relation to the previous use of the land area for storage and export of lead and zinc concentrates. As Sheffield is not the owner of the land and contamination of soil or groundwater with lead and zinc as a result of mineral sand product storage and export, responsibility for undertaking additional investigation work for this area is not with Sheffield.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
35	Buru Energy ANON-WQPC-QVKB-F	<p>The Thunderbird environmental review proposes that the residual environmental impact associated with the loss of greater bilby habitat within the project footprint is addressed through the use of environmental offsets. Buru Energy has been supporting a PhD research project at Murdoch University for three years on the subject of “Disturbance Ecology of Bilbies in the Canning Basin”. As part of this research, bilby surveys have been undertaken for the last four years at the Yulleroo area, located approx. 40 km to the south of the Thunderbird project and in similar Pindan habitat to that described in the Ecologia report (Appendix 9G to the PER). The Yulleroo population of bilbies now represents one of the longest continuously monitored populations of wild bilbies in Australia. With additional survey sites located on Yakka Munga, Dampier Downs and Yeeda pastoral stations, Buru Energy in association with Murdoch University is developing a sound regional understanding of factors impacting on bilbies in the West Kimberley. This research program is due to be completed in late 2017.</p>	Noted. Sheffield has consulted with Buru and aims to continue to work collaboratively with them regarding future work on Bilbies.
		<p>Based on the outcomes of the Buru Energy/ Murdoch University research project to date, Buru Energy considers the following matters are relevant to the assessment of impacts to the greater bilby.</p> <ul style="list-style-type: none"> - Given the historic range of bilbies covered most of mainland Australia, it is unlikely that described Pindan habitat in the Kimberley represents ‘critical habitat’ for the bilby – i.e. the habitat is not essential to the conservation of the bilby. Rather, bilbies appear to display preference for a subset of Pindan habitat described by Buru Energy as “open acacia woodland with sparse understory” which is analogous to the mature <i>Acacia tumida</i> var. <i>tumida</i> woodland micro-habitat described in the ecologia report (Appendix 9G to the PER). 	Noted.
		<ul style="list-style-type: none"> - Populations of bilbies are found to be sparsely distributed across the Canning Basin. Bilby populations are also transient, utilising a preferred area for a period of time before moving on. Bilbies may move on in response to fire, changing availability of preferred habitat, prey availability or presence of predators. This further supports that the habitat present at the Thunderbird project area is unlikely to be critical to bilbies but should be considered as “potential bilby habitat”. 	Noted.
		<ul style="list-style-type: none"> - Key threats to the bilby in the Canning Basin include inappropriate fire regimes and predation from cats and, where present, foxes. Broad scale land use patterns (such as cattle grazing) are likely to be impacting the population viability of bilbies. The effects of feral predators, inappropriate fire regimes and changing land use are likely acting in concert to magnify the impact to bilbies. 	Noted. This information was considered as part of impact assessment undertaken within the PER and the management and mitigation measures have recognised the importance of improved fire management and feral animal control. As these are regional issues, the importance of taking a co-ordinated, collaborative approach has been acknowledged in the proposed mitigation measures to minimise impacts on Bilbies.
		<ul style="list-style-type: none"> - There are known interactions between fire history and habitat, fire history and occurrence of bilby predators, response of bilbies and bilby predators to clearing and predator-prey relationships between cats, dingoes, foxes and bilbies. However, the mechanics of these in determining the suitability of an area for bilbies is only beginning to be understood. This is further complicated by overlapping land tenure (and therefore land uses) in the West Kimberley. Further research in this area will greatly benefit the understanding and management of bilbies. 	Noted. The proposed Kimberley Greater Bilby Trust would be a vehicle for continuing research in these important areas.
		<p>While the Buru Energy/ Murdoch University research project is collecting fundamental information regarding the regional ecology of bilbies and the response of bilbies to disturbance, further research will be required beyond 2017 to continue to understand the disturbance ecology and threats faced by bilbies in the West Kimberley. Future research projects will likely lead to a better understanding of the above interactions.</p>	Agreed.

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		<p>The PER includes an offsets proposal for the establishment of the Kimberley Greater Bilby Trust to facilitate research into and conservation programs for the benefit of the greater bilby. Buru Energy supports this approach. Establishment of this research trust will allow the above research priorities to be addressed and evolving research priorities to be funded over the 40-year mine life.</p> <p>It is suggested that relevant landholders be involved in setting research priorities for the Bilby Trust to encourage landholder participation in conservation efforts for the species.</p>	<p>Noted.</p> <p>Sheffield recognises that pastoralists have largely been ignored in recent Bilby research and on-ground conservation activities. Sheffield supports formation of an independent panel to administer the proposed Kimberley Greater Bilby Trust with the members representing the broad range of interests in conservation of this species.</p>
36	<p>Public Submission ANON-WQPC-QVKY-6</p>	<p>I am familiar with research into bilbies being undertaken by Murdoch University, which suggests that Bilby populations are transient, utilising a preferred area for a period of time before moving on. Bilbies may move in response to fire, changing availability of preferred habitat, prey availability or presence of predators, and hunting by traditional owners. This supports that the habitat present at the Thunderbird project area is unlikely to be critical to bilbies.</p> <p>I don't believe that the Thunderbird Project will have a significant impact on bilby populations, and that believe that Sheffield will adequately manage any impact on bilbies through their Bilby Management Plan.</p>	Noted.
37	<p>Mowanjum Aboriginal Corporation ANON-WQPC-QVK9-6</p>	<p>We support the plans for the Greater Bilby Trust, and are pleased that thought has been given to the future of the Bilbies in the area and involvement of TOs [Traditional Owners] in their management.</p>	Noted.
38	<p>Melissa Price MP Federal Member for Durack ANON-WQPC-QVK3-Z</p>	<p>The mitigation and management measures to be applied to minimise residual impacts on the Bilby I believe are adequate. However I particularly applaud the proposed offset strategy to include the establishment of the Greater Bilby Trust with an investment in research, conservation and land management.</p> <p>Some leadership in this area, including an overall Bilby management strategy, would be welcomed.</p>	Noted.
39	<p>Derby Landcare Group ANON-WQPC-QVK6-3</p>	<p>Queries were raised in relation to the Greater Bilby.</p> <p>We're confident that the measures proposed by Sheffield to ensure continuing Research into all aspects of the endangered animal's existence will ensure that during the "life of mine", more will be learned about the Bilby's existence in this particular locality. With the increased focus brought about by the need to have a mine co-exist with the nocturnal and nomadic activity of the Bilby, we're confident that the overall outcome for Bilby viability will be POSITIVE.</p> <p>We'd welcome the participation of specialist staff – Post-Grad and the like – participating in programs of ongoing research to assist Sheffield Resources in ensuring attainment of this very important goal.</p> <p>Obviously other fauna will have sporadic impact from the mining activity. We're confident that Sheffield will minimise these impacts and that the Company has engaged personnel with the appropriate expertise to ensure compliance with all relative Conservation Legislation.</p>	<p>Noted.</p> <p>Agreed. Sheffield anticipates funding of specialist staff for research as part of its program of bilby offsets.</p> <p>Impacts on other fauna have been discussed in Section 8.2 of the PER and mitigation measures proposed to minimise these impacts. Sheffield will employ appropriately experienced and qualified environmental scientists in conjunction with Traditional Owners within a ranger program to ensure fauna management is appropriately undertaken.</p>
40	<p>Public Submission ANON-WQPC-QVK5-2</p>	<p>In my experience bilbies are not that rare and found right throughout the Kimberley. The foot print of the Project is unlikely to have a significant impact of the bilby population, which is transient.</p>	Noted.
41	<p>Yeeda Pastoral Company Pty Ltd and the Burton family ANON-WQPC-QVKF-K</p>	<p>As per the vegetation the area is very generic it represents nothing out of the ordinary and will not be detrimental to any specific fauna populations. The upside is that it will allow better access in the area and availability of equipment to support out fire program therefore minimizing hot late season fires that do have a detrimental impact on fauna.</p>	Noted.

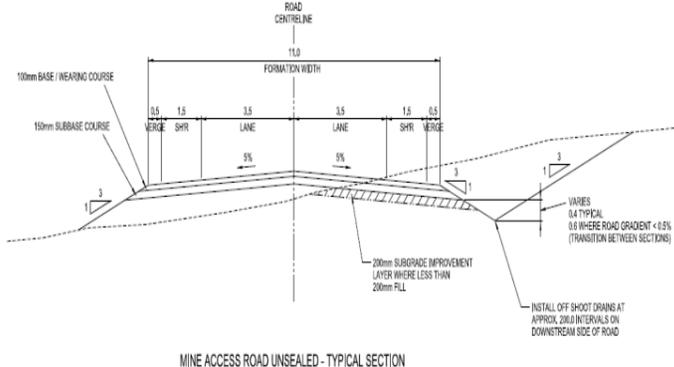
No.	Submitter	Submission and/or issue	Sheffield Response to Comment
		<p>As the land manager that has directly managed this area for the last 14 years we pride ourselves in our achievements in regard to our ecological management. We note that there are Bilbies in the area and over the years have done our utmost to preserve and enhance this. We see the development of this mine and the relationship that will be developed between us (the actual land managers) and the mine operators as a great opportunity to develop and implement a program that will not only protect existing populations but create a better environment for Bilbies to thrive. We feel that the area that will be directly affected by the mine and associated infrastructure as being insignificant but our ability to work together with the mine operator to implement such things as cat and predator control programs on our whole property will have an extreme positive outcome. This sort of relationship can deliver positive outcomes on a great scale based on creating working relationships between Pastoralist, Miner and Environment (we have already entered into discussions with Sheffield in regard to such a project). It should be noted that the project would only be achieved if the mine is developed as we have limited capacity within our own business.</p>	<p>Noted. Sheffield looks forward to a continued close working relationship with the pastoralist to achieve mutually beneficial outcomes.</p>
42	<p>Walakoo Aboriginal Corporation Registered Native Title Body Corporate ANON-WQPC-QV1H-U</p>	<p>The clearing and use of additional roads and the large trucks will result [in] various environmental impacts including:</p> <ul style="list-style-type: none"> - increased roadkill of native species and increased predation. - road corridors for feral animals and weeds, it is well known that the creation or extension to roads allows corridors which provide greater access to predators such as feral cats, dogs and dingos and even provide easier access for cane toads, all of which will impact on local species, and put more pressure on those species under threat. This increased predation potentially impacts Nyikina Mangala hunting and will then put more pressure on the already threatened Bilby and the Dampier Peninsula Goanna. <p>With the wealth of ecological knowledge that the Nyikina Mangala people hold, and the awareness of any changes in their environment and consequent impacts, we consider that the Nyikina Mangala people should be involved in developing mitigation strategies.</p> <p>Greater Bilby Of particular concern to WAC is the impact on the Bilby. As the proposed mine is going to involve the trucking of product, there is likely to be a much broader impact on the environment than simply at the mine site. The proposal involves transporting material from the mine to Derby, including an upgrade and extension of an existing road to provide an approximately 32 km long access road linking the project to the Great Northern Highway.</p> <p>The PER includes a Preliminary Bilby Environmental Management Plan, this plan does not include any reference to the traditional owners or native title holders of the area of the proposed mine or the area proximate to the mine or the proposed roads.</p>	<p>As detailed in Section 3.7 of the PER, the majority of the transport route is via existing public roads and does not represent a significant increase in traffic along these existing heavy haulage routes. The current Mt Jowlaenga Homestead Road will be upgraded and used as an access road for the project.</p> <p>Travel along the site access road by project related traffic may result in increased road kill. Mitigation measures such as speed limiting of vehicles, restricting travel during night time hours to only product trucks and fencing of the road will minimise potential vehicle strike of stock or native fauna. It is likely that predators such as birds of prey will feed on any roadkill after a vehicle strike. Roadkill will be removed from the road to minimise the risk of injury to feeding animals. Given implementation of these measures, use of the existing road by project traffic is thus considered unlikely to impact significantly on the abundance or diversity of native species or increase predation in the area generally.</p> <p>Increases in feral animal and weed populations as a result of the project have been considered in the impact assessment and mitigation measures have been proposed to address these risks. Weed management is specifically addressed in the Vegetation Management Plan. Feral animal control is addressed in the Bilby Management Plan. Proposed measures including Sheffield working co-operatively with the pastoral station lessee will increase direct action on the station in respect to weed and feral animal control compared to current land management practices. It is anticipated that through implementation of a ranger program, TO's will be directly involved in land management activities for the project area.</p> <p>Sheffield has involved Traditional Owners in baseline ecological studies and heritage studies. Knowledge conveyed during these studies has been considered and included in development of project design including management and mitigation measures. An extensive consultation program has been undertaken for the project to date. Sheffield specifically met with Aboriginal communities across the peninsula (including some where Nyikina Mangala people reside) in November and December 2016 to discuss the Draft PER and sought input into proposed management and mitigation measures. Management plans to be implemented for the project need to be adaptive and will be dynamic documents. Ongoing engagement with stakeholders, including Traditional Owners will continue to inform project implementation. Nyikina Mangala peoples knowledge and experience in Bilby management is noted and Sheffield will consult with the Nyikina Mangala people in preparation of the Bilby Management Plan. Sheffield has committed to the employment by it of two Cultural Rangers. Part of the role of the Cultural Rangers will be to facilitate this consultation.</p> <p>The potential for vehicle strike on the site access road (and elsewhere) has been considered in the PER. Section 13.2.3 of the PER contains an assessment of the potential impacts of vehicle strike on the Bilby.</p> <p>The Bilby Management Plan has been prepared in accordance with the format required by the EPA and as such it focuses on identification of mitigation measures and criteria to determine the successful implementation of these. It does not provide specific details of who would implement the management measures, so in this regard, it does not preclude involvement of Traditional Owners in Bilby management. Sheffield recognises the expertise of Traditional Owners in fauna management and anticipates close involvement of them in future land management activities, including Bilby management.</p>

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		<p>The greater Bilby is listed as vulnerable under the <i>Environmental Protection and Biodiversity Conservation Act 1999</i> (Cth) (EPBC Act). The Thunderbird Mineral Sands Project has been referred and determined to be a Controlled Action under the EPBC and is being assessed under the Bilateral Agreement between the Commonwealth of Australia and the State of Western Australia made under section 45 of that Act.</p> <p>[Submitter notes Clause 7 of the Bilateral Agreement – Transparency and Access to Information for Indigenous Peoples and the application of the clause in impact assessments, including recognition of the role and interests of Indigenous peoples in promoting conservation and ecologically sustainable use of natural resources and promote the cooperative use of Indigenous peoples’ knowledge of biodiversity and Indigenous heritage].</p> <p>Varanus Sparnus (Dampier Peninsula Goanna) The world’s smallest goanna was recently discovered (by non-Indigenous people on the Dampier Peninsula) it has been known to us and our ancestors for millennium. The ecological investigation suggests that the goanna has an extremely restricted distribution completely confined to a relatively small area on the Dampier Peninsula.</p> <p>The PER provides limited information on the management of the <i>Varanus sparnus</i>, we consider that the Thunderbird project is going to have significant impact on this rare species, and there needs to be an assessment of the impact on this newly discovered species. Whilst the PER identifies that the <i>Varanus sparnus</i> is present in the area and will be impacted upon by the Thunderbird Haul Road and Accommodation Camp Flora and Fauna assessment, no management plans are specified.</p>	<p>Noted.</p> <p>Sheffield throughout the impact assessment process have recognised the value of input from Traditional Owners and Indigenous people. Inclusion of Traditional Owners in heritage and ecological baseline surveys is a reflection of this. Consultation throughout the PER process has provided timely and transparent access to information about the proposed project and its impacts. Sheffield specifically undertook visits to a number of Aboriginal communities in November and January 2016 (Looma, Bidan, Mowanjum, Pandanus Park, Djarindjin, Lombardina, Ardyaloon and Bidyadanga) to discuss the Draft PER and seek feedback on it and associated draft management plans. This was undertaken prior to discussion of the Draft PER with other project stakeholders. Copies of the PER were also delivered to those communities when the PER was released for public comment. Informal consultation was also undertaken by Sheffield employees on 1 on 1 basis as Traditional Owners or indigenous people raised questions or asked for additional information.</p> <p>One confirmed <i>Varanus sparnus</i> individual was recorded during the haul road survey, outside of the Mine Site Development Envelope. Overall, eleven <i>Varanus</i> individuals were recorded, however they were not able to be identified definitively in the field as either <i>Varanus sparnus</i> or <i>Varanus brevicauda</i>. Overall there are relatively few <i>Varanus brevicauda/sparnus</i> records on the Dampier Peninsula, with previous records restricted to the Thunderbird study area, and in the surrounding region of the James Price Point precinct (Ecologia 2016). The lack of records is likely attributed to a lack of biological survey work utilising pitfall and funnel trap methods on Dampier Peninsula.</p> <p>Given two disjunct location records exist approximately 85 km apart, it is likely <i>Varanus sparnus</i> occurs throughout the Dampier Peninsula, wherever suitable sandy substrate habitat exists. Although limited information is available with regard to the habitat preferences of the Dampier Peninsula Goanna, this species has been reported to utilise Pindan sands and Savannah Woodland habitats. These habitats are also utilised by the Greater Bilby. To minimise potential impacts on both these conservation significant species, the proposed mining operation has been designed to ensure disturbance of these habitats is minimised. Approximately 21% of Pindan Shrubland and 7% of Savannah Woodland mapped during baseline surveys for the PER are proposed to be impacted over the 40+ year life of the project. These communities and habitat types are essentially the common Pindan vegetation of the region (Mattiske 2016). Management measures to minimise habitat fragmentation and impacts to vertebrate fauna including <i>V. sparnus</i> include limiting clearing to that which is strictly necessary and progressive rehabilitation to re-create habitat which can be colonised throughout the project life. Overall the habitat in the area will remain intact and is not anticipated to have long term effects on population viability or abundance of fauna, including <i>V. sparnus</i>. Given that <i>V. sparnus</i> habitat preferences broadly align with habitat used by the Greater Bilby, Sheffield considers the mitigation and management measures proposed for bilby management an documented in the Preliminary Bilby Environment Management Plan for the project, would also be benefit Dampierland Peninsula goanna’s in the project area and surrounding region. The management measures include but are not limited to:</p> <ul style="list-style-type: none"> • Land clearing will be undertaking progressively with the amount of active disturbance minimised. • Significant trees (especially those with hollows) will be retained where practicable. • Disturbed areas will be rehabilitated as they become available. • Speed limits will be implemented for operational areas and the Site Access Road in order to minimise the risk of fauna injury or mortality from vehicle strike. • Sheffield will undertake pest animal control in co-operation with regional control programs. • Domestic waste facilities will be fenced and putrescible wastes will be regularly covered. • A fauna spotter will be present during clearing activities. • Vehicles will not be permitted to leave access tracks or cleared areas. • Sheffield will work with the pastoralist, Traditional Owners and DFES to undertake prescribed burns and install and maintain firebreaks if required so that potential environmental damage from extreme and out of control wildfires is minimised and infrastructure and the community are protected throughout the life of the project. • Artificial water sources will have egress points installed. • Open holes, trenches, the refuse impoundment, and any water holding facilities will be inspected regularly for fauna.

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		<p>Under the Wildlife Conservation Act 1950 (WA) the <i>Varanus sparnus</i> It is listed as a Priority 1 species under the WA regulation conservation code.</p> <p>We note that the research reveals that the <i>Varanus sparnus</i> is likely to have a very limited distribution which is going to be directly impacted upon by the Thunderbird mining project proposal. The Aboriginal people of the region have a knowledge about this species of goanna and are concerned about its status and survival. We also consider that the protection of this species is not adequately provided for in the PER, which apart from Appendix 9F identifying that there is likely to be a significant impact on the species, no specific management proposals for this species are outlined. We request that your department provide us with details of what actions are being taken to review and consider what actions are required by Sheffield to minimise the impact of their proposed activities on the <i>Varanus sparnus</i>.</p>	<p>One confirmed <i>Varanus sparnus</i> individual was recorded during the haul road survey, outside of the Mine Site Development Envelope. Eleven individual animals of <i>Varanus</i> were recorded, however they were not able to be identified definitively in the field as either <i>Varanus sparnus</i> or <i>Varanus brevicauda</i>. Overall there are relatively few <i>Varanus brevicaudalsparnus</i> records on the Dampier Peninsula, with previous records restricted to the Thunderbird study area, and in the surrounding region of the James Price Point precinct (Ecologia 2016). The lack of records is likely attributed to a lack of biological survey work utilising pitfall and funnel trap methods on Dampier Peninsula. Given two disjunct location records exist approximately 85 km apart, it is likely <i>Varanus sparnus</i> occurs throughout the Dampier Peninsula, wherever suitable sandy substrate habitat exists.</p> <p><i>V. sparnus</i> habitat includes Pindan sands and Savannah Woodland. Approximately 21% of Pindan Shrubland and 7% of Savannah Woodland surveyed for the PER will be impacted over the 47 year life of mine of the project. These communities and habitat types are essentially the common pindan vegetation of the region, and hence likely impacts are considered to be low (Mattiske 2016). Management measures to minimise habitat fragmentation and impacts to vertebrate fauna including <i>V. sparnus</i> include limiting clearing to that which is strictly necessary and progressive rehabilitation to create habitat which can be colonised throughout the project life. Overall the habitat in the area will remain intact and is not anticipated to have long term effects on population viability or abundance of fauna, including <i>V. sparnus</i>.</p>
43	<p>Environs Kimberley BHLF-WQPC-QV1M-Z</p>	<p>Greater Bilby There are a high number of Bilbies with many burrows, some active, to be destroyed - it is estimated the local Greater Bilby population within the study area at the time of the targeted survey was approximately 25 individuals. This is a very high number of Bilbies. We are not aware of any other projects that have proposed to destroyed as much Bilby habitat.</p> <p>In the Bilby Management Plan it is proposed that: 'If pre-clearance surveys indicate active burrows are within the area to be cleared, a Greater Bilby capture and relocation program will be developed and implemented by a suitably qualified environmental professional.'</p> <p>It is almost certain that Bilbies will be found in the mine area. However, Bilbies are notoriously difficult to trap and it is unclear how a 'qualified environmental professional' will be able to capture and relocate bilbies. It is also unclear where Bilbies should be relocated to.</p> <p>At this stage there is no Bilby capture and relocation program to comment on. It may be more appropriate to leave known active Bilby burrows intact and undisturbed, as is the case for rare flora species which cannot be moved.</p> <p>It is also unclear how Sheffield will deal with ongoing management of bilby populations in the impact area.</p> <p>Ecologia state in the Thunderbird Project Targeted Greater Bilby Assessment (Rev 2) that: "Due to the uncertainties regarding the status of the Dampier Peninsula population, the regional significance of the Greater Bilby population within the study area is difficult to determine."</p>	<p>To appropriately manage Bilbies within the vicinity of the proposed Thunderbird Mineral Sand Project, the most critical objective was to determine the presence or absence of the species. The targeted Bilby survey undertaken by Ecologia in September 2015 (Ecologia 2016) confirmed that Bilbies were present and included scat analysis to provide an indication of potential abundance. Due to the highly mobile behaviour of Bilbies and their large home range (individuals can travel up to 5 km a night in search of food), it is difficult to determine accurate population estimates and delineate home range boundaries without considerable survey effort throughout the wider region encompassing the proposed mine site. Furthermore, spatial occurrence of bilby populations is known to be dynamic, changing in response to the availability of resources. As such, the abundance of bilbies within the Thunderbird project area may change prior to commencement of construction and prior to clearing of deposit areas over a 40+ year period. The PER took the precautionary approach and considered all of the area proposed to be disturbed within the Mine Site Development Envelope as potential Bilby habitat. Section 13.5, specifically Table 87 of the PER and Section 1.5.2 of the Bilby Management Plan states this.</p> <p>Given the extent to which the spatial extent of bilby populations can move over time, pre-clearing surveys have been proposed, particularly for the deposit area to determine if bilbies are still present immediately prior to land disturbance. A fauna spotter will be employed during land clearing. If bilbies are present, then in accordance with advice from the Department of Parks and Wildlife (DPaW), a capture and relocation program will be developed and implemented to ensure that impacts to the local population are minimised. As part of the proposed relocation program, bilby populations subject to translocation would be monitored to measure efficacy of the program and ensure impacts are minimised.</p> <p>Bilbies are highly mobile and utilise up to 12 burrows at once. They have also been known to move kilometres along broad landscapes as conditions change. Given the large home range and dynamic occurrence of Bilby populations, it would not be practical to use burrow locations identified months prior to commencing works as a tool for planning operations.</p> <p>Sheffield during consultation has discussed the challenges of Bilby capture with a range of Stakeholders, recognising that it is not easy. Expertise within locally based groups like the Malcolm Douglas Wildlife Park, DPaW and Traditional Owners as well as from people within other areas where Bilbies remain will be used to assist with the proposed capture and relocation program. This may form part of the responsibility of the rangers proposed to be employed by Sheffield. Relocation locations will be discussed with DPaW and the pastoral landowner to ensure the maximum likelihood of survival. It is anticipated that monitoring will be required for relocated individual animals to better understand the success of such relocation efforts. Results from this would be used to evaluate whether such efforts are beneficial and should be continued.</p> <p>See above.</p> <p>Sheffield acknowledges further research of the Dampier Peninsula Bilby population would be beneficial and could inform development of future strategies for management on the Dampier Peninsula and broader West Kimberley region. As such, Sheffield has proposed to establish a Kimberley Greater Bilby Trust to facilitate research into conservation programs for the benefit of the Greater Bilby, as well as providing direct logistical support for people undertaking research programs relevant to the Bilby. While ultimately the Trust would be responsible for setting specific research objectives, Sheffield anticipates that research efforts undertaken by the Trust would consider ongoing work to better understand the regional significance of the Bilby in the Kimberley.</p>

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		<p>It is essential that the regional significance of the Greater Bilby population within the study area is determined. Without understanding this, it is not possible to determine the impacts to the Bilby, this is necessary in order to be able to make a decision under the EPBC Act 1999. As is stated in the Ecologia report, Thunderbird is not the only threat to the Bilby population on the Dampier Peninsula. The Main Roads Cape Leveque proposal, Buru Energy's petroleum exploration activities, Landcorp's clearing of bushland for the Broome Industrial Estate, grazing by feral herbivores on pastoral leases are all significant threats to the regional Bilby population. It needs to be shown how the Dampier Peninsula Bilby population can be managed in the face of such large scale threats.</p> <p>The regional significance of the Greater Bilby population within the study area needs to be determined.</p>	
		<p>A Greater Bilby capture and relocation program needs to be developed prior to any approvals and be subject to public comment. The programme should show:</p> <ol style="list-style-type: none"> The feasibility of leaving Bilbies in situ Methods for capture of Bilbies that have demonstrated to be successful in the past Identification of suitable release sites Monitoring programme for any captured and released Bilbies to demonstrate the efficacy of the programme. 	<p>Sheffield has consulted key stakeholders and specialists in Bilby ecology in the West Kimberley, including the Department of Parks and Wildlife (DPaW), Murdoch University and Aboriginal people to develop an understanding of the practicalities of relocating Bilbies (if required) during disturbance. While a relocation program has not yet been developed, it was identified by DPaW as an expected requirement for managing potential impacts on Bilbies during ground disturbing activities. To ensure that appropriate methods are implemented to capture and relocate bilbies, during development and implementation of the Bilby capture and relocation plan, Sheffield will continue to consult with Aboriginal people who have had success in trapping and managing Bilby populations. This will include DPaW and other researchers such as Murdoch University who have had recent success in trapping Bilbies in nearby areas in the West Kimberley. In accordance with advice from DPaW, the capture and relocation program would consider the feasibility of relocating Bilbies to areas with and/or without extant Bilby populations, and the potential impacts on the Bilbies and receiving environments. If Bilbies are translocated, Bilby populations subject to translocation would be monitored to determine the efficacy of the program.</p>
		<p>Short Range Endemics The Ecologia survey yielded a total of 178 invertebrate specimens which represented six orders, 11 families and 28 taxa.</p> <p>As stated by Ecologia "In accordance with the precautionary principle, all potential SREs should be treated as confirmed SREs." It is important that all SREs are identified to the species level and it must be shown that they are also located outside of the disturbance footprint to make sure they do not become extinct.</p>	<p>As explained in Section 4.2.9.5 of the PER, the 200 invertebrate specimens were collected over 2 surveys (Ecologia 2014 a and 2014c). Table 58 of the PER identifies 17 confirmed potential SRE species, and 1 known SRE species (the land snail <i>Rhagada bulgana</i>). An additional 5 species which were either female, juvenile or unable to be identified to species level (there is not enough scientific evidence available to determine if they are even potential SRE) were identified. These were included in Table 58 taking into account the precautionary principle. That gives a total of 23 species. <i>Armadillidae</i> sp indet has been erroneously missed from Table 58 and thus the total for SRE should be 24.</p> <p>Of these 24 specimens:</p> <ul style="list-style-type: none"> 17 were found in similar habitats both inside and outside of the Mine Site Development Envelope. Three (<i>Olpiidae</i> 'genus indet. (Juvenile)', <i>Aname</i> 'sp. Indet.' and <i>Aname</i> 'sp. Juv.') were represented by juveniles and due to a lack of morphological data and sub-adult stage could not be identified to species level. Given that all three of these specimens were collected from the extensive Pindan Shrubland habitat throughout the impact area, they are likely to have distributions that extend well beyond the boundary of the impact area. One (<i>Urodacus</i> sp. Indet) was unable to be identified to species level based on morphological characteristics, however based on distribution patterns of <i>Urodacus</i> 'kraepelini' and given this species was collected from the extensive Pindan Shrubland habitat, its distribution is expected to extend well beyond the boundary of the impact area. One (<i>Aname</i> 'MYG387?') was represented by a single female specimen. It is possible that this female is conspecific with the male species of <i>Aname</i> 'MYG387', which would indicate that its habitat preferences includes both the extensive Pindan Shrubland and Sandstone Range and Footslopes habitats, and is therefore widespread in the area. One (<i>Lychas</i> 'JPP2') was restricted to the impact area, however utilising <i>Lychas</i> 'JPP', 'JPP1' and 'JPP3' as species surrogates and based on their distribution within the extensive Pindan Shrubland and Savannah Woodlands habitats, it can be inferred that <i>Lychas</i> 'JPP2' will have a home range that extends well beyond the impact area. <p>Based on the above results as well as the habitat preferences for the invertebrate taxa recorded within the Mine Site Development Envelope and surrounding area, no potential SRE taxa are expected to be restricted to the proposed Mine Site Development Envelope.</p>

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		<p>Varanus sparnus (Dampier Peninsula Goanna) According to the Ecologia report Level 2 Terrestrial and Subterranean Fauna Assessment, a species of <i>Varanus</i> was found in a survey for the Thunderbird project. The report states: “Several individuals of the monitor <i>Varanus</i> aff. <i>brevicauda</i> were recorded during the survey, including one specimen vouchered at the Western Australian Museum. This taxon may represent a cryptic species, and in the future could be split from the Short-tailed Monitor (<i>Varanus brevicauda</i>). <i>Varanus</i> aff. <i>brevicauda</i> is previously known from the Kimberley (P. Doughty pers. comm.)”</p> <p>It appears that this ‘cryptic species’ has subsequently been identified as <i>Varanus sparnus</i> in the paper “A new diminutive species of <i>Varanus</i> from the Dampier Peninsula, western Kimberley region, Western Australia” by Doughty et al.</p> <p>The paper states that “<i>Varanus sparnus</i> has an apparently extremely restricted distribution, completely confined to the relatively small Dampier Peninsula area” and that “As the distribution of <i>V. sparnus</i> appears to be extremely restricted, it would be prudent for wildlife and conservation agencies to consider this species for some kind of protected status until more is known about its true range and biology.”</p> <p>Further to this the EPA Annual Report 2015 – 16 states that “In 2014 environmental consultants conducting EIA surveys at James Price Point in the Kimberley discovered the world’s smallest species of goanna. <i>Varanus sparnus</i>, with a total length of 23 cm and weighing 16 gm, has been described as an ‘evolutionary marvel’ unchanged for over 6 million years and with a distribution confined to the Dampier Peninsula area.”</p>	<p>One confirmed <i>Varanus sparnus</i> individual was recorded during the haul road survey, outside of the Mine Site Development Envelope. Overall, eleven <i>Varanus</i> individuals were recorded, however they were not able to be identified definitively in the field as either <i>Varanus sparnus</i> or <i>Varanus brevicauda</i>. Overall there are relatively few <i>Varanus brevicauda/sparnus</i> records on the Dampier Peninsula, with previous records restricted to the Thunderbird study area, and in the surrounding region of the James Price Point precinct (Ecologia 2016). The lack of records is likely attributed to a lack of biological survey work utilising pitfall and funnel trap methods on the Dampier Peninsula. Given two disjunct location records exist approximately 85 km apart, it is likely <i>Varanus sparnus</i> occurs throughout the Dampier Peninsula, wherever suitable sandy substrate habitat exists.</p> <p>Although limited information is available with regard to the habitat preferences of the Dampier Peninsula Goanna, this species has been reported to utilise Pindan sands and Savannah Woodland habitats. These habitats are also utilised by the Greater Bilby. To minimise potential impacts on both these conservation significant species, the proposed mining operation has been designed to ensure disturbance of these habitats is minimised. Approximately 21% of Pindan Shrubland and 7% of Savannah Woodland mapped during baseline surveys for the PER are proposed to be impacted over the 40+ year life of the project. These communities and habitat types are essentially the common Pindan vegetation of the region (Mattiske 2016). Management measures to minimise habitat fragmentation and impacts to vertebrate fauna including <i>V. sparnus</i> include limiting clearing to that which is strictly necessary and progressive rehabilitation to re-create habitat which can be colonised throughout the project life. Overall the habitat in the area will remain intact and is not anticipated to have long term effects on population viability or abundance of fauna, including <i>V. sparnus</i>.</p> <p>Given that <i>V. sparnus</i> habitat preferences broadly align with habitat used by the Greater Bilby, Sheffield considers the mitigation and management measures proposed for bilby management and documented in the Preliminary Bilby Environment Management Plan for the project, would also benefit Dampierland Peninsula goanna’s in the project area and surrounding region. The management measures include but are not limited to:</p> <ul style="list-style-type: none"> • Land clearing will be undertaken progressively with the amount of active disturbance minimised. • Significant trees (especially those with hollows) will be retained where practicable. • Disturbed areas will be rehabilitated as they become available. • Speed limits will be implemented for operational areas and the Site Access Road in order to minimise the risk of fauna injury or mortality from vehicle strike. • Sheffield will undertake pest animal control in co-operation with regional control programs. • Domestic waste facilities will be fenced and putrescible wastes will be regularly covered. • A fauna spotter will be present during clearing activities. • Vehicles will not be permitted to leave access tracks or cleared areas. • Sheffield will work with the pastoralist, Traditional Owners and DFES to undertake prescribed burns and install and maintain firebreaks if required so that potential environmental damage from extreme and out of control wildfires is minimised and infrastructure and the community are protected throughout the life of the project. • Artificial water sources will have egress points installed. • Open holes, trenches, the refuse impoundment, and any water holding facilities will be inspected regularly for fauna.
		<p>Clearly, more research is required to understand the conservation status of <i>Varanus sparnus</i> in the Thunderbird proposal area prior to any approvals being given.</p> <p>A targeted survey is required for <i>Varanus sparnus</i> in the Thunderbird area [and] [t]he conservation status of <i>Varanus sparnus</i> needs to be determined prior to any decisions on the Thunderbird proposal.</p>	<p>The level of baseline study undertaken by Sheffield is commensurate with the species conservation status. Sheffield will be supportive of other research efforts to collect more information about this species in the future.</p>

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44	Department of Mines and Petroleum BHLF-WQPC-QV1K-X	<p>In section 8.2.2.4 (page 238), it is indicated the site access corridor will be up to 62 m wide, and Table 59 (page 240) indicates "The Site Access Road will be constructed with a 5 m buffer of cleared area on each side with topsoil stockpiles located up to 20 m away from the trafficable surface." In general DMP encourage minimising disturbance wherever possible, and therefore the benefits of having a wider road corridor, with topsoil stockpiles located further away from the trafficable surface needs to be considered against the benefits of minimising disturbance and limiting the overall width of the access corridor in relation to fauna impacts. It would be concerning to DMP if the whole 62 m wide corridor is proposed to be cleared, as the necessity of this amount of clearing has not been justified in the PER.</p> <p>A fauna impact management measure detailed in the PER is "Travel between dusk and dawn on the Site Access Road and village access road will be limited to essential travel with driving speed limits set to reduce the potential for road strikes." It is noted in Section 3.7, that truck movements will operate 24 hours per day, which appears to contradict the management measure.</p> <p>In Section 14.3.1, it is unclear how a feral animal control program within the Mine Site Development Envelope is an appropriate offset for impacts to Greater Bilby habitat. Feral animal control will manage one of the potential impacts caused by the project, but it is unlikely that it will 'offset' that impact with an environmental benefit. Feral animal control in cases where operations have resulted in an increase in the concentration of feral animals should be a standard management measure.</p>	<p>The concern about the overall width of the road corridor is noted. The actual trafficable road surface will be between 7 m and 9 m, with a final road width (after revegetation of construction areas) of approximately 25 m. The corridor will also be used for location of water pipelines, groundwater reinjection bores, power lines (between the power plant and accommodation camp), topsoil stockpiles and drains associated with the road. Since publication of the PER, Sheffield has entered into an agreement with the pastoral landowner to fence the road. The cross section below shows the proposed layout of a typical section of the road corridor. Not all areas within the road corridor will require vegetation to be cleared. Consistent with the commitments made in the PER, Sheffield will minimise land clearing.</p>  <p>MINE ACCESS ROAD UNSEALED - TYPICAL SECTION</p> <p>Sheffield will not restrict the travel time of product trucks which are estimated to be between 10 -12 return truck movements per day to Derby and 6-7 return movements per day to Broome when at full production. Placing restrictions on movement of these vehicles has significant implications for increased product storage space at the mine site and concentration of traffic on public roads. Such vehicles will be required to adhere to speed limits and driving procedures to minimise risk of fauna impact. Sheffield will however restrict other transport movements between the dusk and dawn period to essential travel. This will restrict import of supplies, people and removal of wastes to daylight hours when there is lower risk of vehicle strike with fauna.</p> <p>Predation, in particular by foxes, has been recognised as the primary factor in the decline of the Bilby in coastal regions (Cramer et al. 2016). Foxes have not been observed in the project area during fauna surveys and discussions with the landowner have not identified foxes as a threat on Mt Jowlaenga or Yeeda stations. To mitigate the threat of predation by feral animals in general, Sheffield will work cooperatively with the pastoralist on feral animal control programs and will support regional animal control programs to manage populations of predator species. The offset proposed comprises a \$5000/year (\$225,000 over 45 years) contribution to funding of control programs on Mt Jowlaenga and Yeeda Stations or regional programs, in addition to expense associated with control of pest animals within the Mine Site Development Envelope.</p>
45	Department of Parks and Wildlife	<p>Recommendation 1 That any conditions of approval for the proposal ensure that the proponent implements specific management and monitoring measures to minimise and mitigate (including offset, where appropriate) impacts on conservation significant fauna; specifically the threatened <i>Macrotis lagotis</i> (bilby) and the Priority I <i>Varanus sparnus</i> (Dampierland Peninsula goanna) and their habitat, prior to the commencement of any ground disturbing activities. These measures should be developed on the advice of Parks and Wildlife.</p> <p><u>Macrotis lagotis (bilby)</u> <i>Macrotis lagotis</i> (bilby) is listed as threatened fauna, ranked vulnerable and is the only surviving species of the Thylacomyidae family. Bilbies are largely solitary, widely dispersed and found in low numbers. This nocturnal, medium sized, omnivorous, burrow dwelling marsupial was once wide-spread throughout the arid and semi-arid regions of Australia with the species believed to occur across 70 per cent of continental Australia. The species is now restricted to 20 per cent of its former range with its geographical distribution reduced to a few small populations within the Tanami Desert of the Northern</p>	<p>Noted. Sheffield have proposed management and mitigation measures specifically to address potential impacts to the Greater Bilby, noting however that these would also minimise impacts on other fauna species. Sheffield will continue to work co-operatively with DPaW regarding formalisation of management measures.</p> <p>Although limited information is available with regard to the habitat preferences of the Dampier Peninsula Goanna, this species has been reported to utilise Pindan sands and Savannah Woodland habitats. These habitats are also utilised by the Greater Bilby. To minimise potential impacts on both these conservation significant species, the proposed mining operation has been designed to ensure disturbance of these habitats is minimised. Approximately 21% of Pindan Shrubland and 7% of Savannah Woodland mapped during baseline surveys for the PER are proposed to be impacted over the 40+ year life of the project. These communities and habitat types are essentially the common Pindan vegetation of the region (Mattiske 2016). Management measures to minimise habitat fragmentation and impacts to vertebrate fauna including <i>V. sparnus</i> include limiting clearing to that which is strictly necessary and progressive rehabilitation to re-create habitat which can be colonised throughout the project life. Overall the habitat in the area will remain intact and is not anticipated to have long term effects on population viability or abundance of fauna, including <i>V. sparnus</i>.</p> <p>Given that <i>V. sparnus</i> habitat preferences broadly align with habitat used by the Greater Bilby, Sheffield considers the mitigation and management measures proposed for bilby management and documented in the Preliminary Bilby Environment Management Plan for the project, would also benefit Dampierland Peninsula goanna's in the project area and surrounding region. The management measures include</p>

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		<p>Territory, southwest Queensland and the Pilbara and southern Kimberley (near Broome) of Western Australia.</p> <p>This proposal affects the Western Australian geographic area specifically the Dampier Peninsula. While the status of the bilby in large parts of Western Australia is unclear, the distribution of the species is considered to be highly fragmented (Friend 1990).</p>	<p>but are not limited to:</p> <ul style="list-style-type: none"> • Land clearing will be undertaken progressively with the amount of active disturbance minimised. • Significant trees (especially those with hollows) will be retained where practicable. • Disturbed areas will be rehabilitated as they become available. • Speed limits will be implemented for operational areas and the Site Access Road in order to minimise the risk of fauna injury or mortality from vehicle strike. • Sheffield will undertake pest animal control in co-operation with regional control programs. • Domestic waste facilities will be fenced and putrescible wastes will be regularly covered. • A fauna spotter will be present during clearing activities. • Vehicles will not be permitted to leave access tracks or cleared areas. • Sheffield will work with the pastoralist, Traditional Owners and DFES to undertake prescribed burns and install and maintain firebreaks if required so that potential environmental damage from extreme and out of control wildfires is minimised and infrastructure and the community are protected throughout the life of the project. • Artificial water sources will have egress points installed. • Open holes, trenches, the refuse impoundment, and any water holding facilities will be inspected regularly for fauna by the Greater Bilby.
		<p>Significant threats to the bilby are considered to include but are not limited to:</p> <ul style="list-style-type: none"> - predation by introduced predators, such as feral cats, foxes, and/or wild dogs; - competition with introduced herbivores (e.g. rabbits, etc.); - habitat degradation by introduced herbivores (e.g. cattle, camels, etc.); - habitat degradation resulting from unsuitable fire regimes; - drought; - habitat destruction and degradation resulting from mining and other development (e.g. railways, major roads, pipelines, etc.); and - road mortality. <p><u>Habitat</u></p> <p>Bilbies were formerly known to occupy habitat ranging from Eucalyptus and Acacia woodlands in the wheat belt of Western Australia to Triodia grasslands in the desert regions. They require sandy or loamy soil in which to burrow. Bilbies are now only found in areas where introduced predators do not occur or are not abundant; these include the driest and least fertile parts of their former range. The major habitats that they now occupy include sparse grasslands among clayey and stony soils (in southwest Queensland), and mulga scrub and hummock grasslands on sand plains, sandy dune systems or along drainage or salt lake systems (in Western Australia and the Northern Territory).</p> <p>The three major vegetation (habitat) types utilised by the bilby are recognised as:</p> <ul style="list-style-type: none"> - Open tussock grassland (both grasses and forbes) growing on uplands and hills. - Mulga woodland / shrubland (both pure mulga and mixed stands of mulga / witchetty bush) growing on ridges and rises. - Hummock grassland growing on sand plains and dunes, drainage systems, salt lake systems and other alluvial areas. <p>In the Kimberley region of Western Australia, bilbies have been recorded in areas typically with soft, sandy substrates, such as eolian sand dunes, swales and sandplains, which can be easily excavated to construct burrows and dig for food. The proponent's Preliminary Bilby Environmental Management Plan indicates that during the targeted bilby surveys for the proposal that "...evidence of Bilby occurrence was primarily recorded within the pindan shrub/and vegetation type ... predominantly within dense, mature <i>Acacia tumida</i> var. <i>tumida</i> woodland micro-habitat' (p. 7).</p>	<p>Agreed.</p>

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		<p>Habitat availability may not be a limiting factor for the bilby on the Dampier Peninsula, with survey information suggesting the species has a relatively high mobility and probable low density. However, large areas of suitable habitat are likely to be needed to sustain bilby populations with densities of 12-16 individuals/km² in optimal habitat, with densities of 1 -2/km² being more typical (Southgate 1987).</p>	
		<p><u>Impact assessment</u> The PER indicates that approximately 1,635 ha of native vegetation will be impacted by the proposal including an approximate 1,632.9 ha of 'potential' bilby habitat. There are also numerous records of the bilby within and surrounding the development proposal area. While not at a level that is likely to threaten the regional population of the bilby, the impacts of the proposal on the bilby and its habitat as identified in the PER warrants appropriate monitoring, management and mitigation measures. Management and mitigation actions should be developed with the primary objectives of maintaining the local resident population and improving the understanding of the species' local distribution and ecological requirements.</p>	Noted.
		<p>Given the level of scientific uncertainty surrounding the distribution and abundance of the bilby in the Dampier Peninsula and Western Australia overall, it is not possible to determine with certainty, the significance of the residual impacts of this proposal on the identified 'potential' habitat for this species at either a local or regional scale.</p>	Noted. Sheffield has proposed a Greater Bilby Trust which will provide funds towards research into the Greater Bilby, a WA Bilby Record Database, and logistical support for researchers to conduct projects in the area.
		<p>However, as the proposal would impact on a substantial area of 'potential' habitat within an apparently significant area for the species, it is recommended that the proponent:</p> <ul style="list-style-type: none"> - Avoids and minimises its impacts as far as practicable on locations where bilbies were recorded and habitat in the development proposal area. 	<p>Significant avoidance and minimisation measures have been incorporated into decision making and Mine Site design (see Section 14.2 of the PER). Key actions that have resulted in avoidance or minimisation of impacts include the following:</p> <ul style="list-style-type: none"> • Mining rate - The proposed ore mining rate has been reduced from 18 Mtpa over 40 years, to an initial 7.5 Mtpa over the first five years, ramping up to 15 Mtpa with an extended production life of over 40 years. This will reduce the area of clearing to be undertaken annually, as well as the area under rehabilitation at any one time. It will also reduce water requirements and the aquifer recovery time. • Ore processing - The initial processing stage MUPs are located within the mining void so that no additional land clearing is required. These units are skid mounted and will be relocated as the mining void advances. • Mining excavation - The initial mining location was selected based on minimising overburden removal requirements, to minimise the need for stockpiling outside the mining area. The mining footprint has been reduced from the original proposed footprint to maintain an adequate buffer for identified Aboriginal heritage sites. • Excess water – The proposed reinjection of excess water is anticipated to assist the aquifer to recover more readily as opposed to surface discharge and/or surface storage and evaporation of excess water. • Site access - Using the existing Mt Jowlaenga Rd, with modifications rather than construct a new access road will: • Avoid ephemeral watercourses and low lying areas likely to be subject to inundation during the wet season, thus minimising the need for engineered crossings. • Avoid heritage areas and any associated buffers. • Minimise additional land clearance and thus vegetation disturbance. <p>Rehabilitation will be undertaken progressively over the life of the mine, as overburden from new mining areas and waste from the processing plant will be used to backfill mined sections of pit. This would be followed by topsoil placement (resourced from recently cleared areas), deep ripping and direct seeding for final rehabilitation of the land surface.</p>
		<ul style="list-style-type: none"> - Implements management and monitoring measures developed specifically to minimise, measure and document impacts on the bilby and its habitat during project construction and operation. While it is acknowledged that a preliminary bilby management plan has been developed, it is important that explicit best practice protocols are in place to ensure that the risk to bilby and its associated habitat is managed to an appropriate standard and any impacts on the species are avoided or minimised as far as practicable. 	Noted. Sheffield have proposed management and mitigation measures specifically to address potential impacts to the Greater Bilby, noting however that these would also minimise impacts on other fauna species. Sheffield will continue to work co-operatively with DPaw regarding formalisation of management measures.
		<ul style="list-style-type: none"> - Considers commitments to conservation actions to mitigate (and potentially offset) the impact of the proposal on the approximate 1,632.9 ha of bilby habitat. 	As above.

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		<p>It would also be beneficial for the species if mitigation included actions that provided conservation benefits for the species. It is important that any offsets undertaken align with and contribute to existing government programs as outlined in the Western Australian Government Environmental Offsets Policy. This would prevent the possible duplication of work currently being undertaken as a part of the conservation of bilby within the Pilbara and Kimberley bioregions.</p>	<p>The DoEE Offsets Guide and the draft EPA offsets calculators are difficult to use in an extensive land use zone, such as the Kimberley where the project is located due to the absence of freehold land. The majority of land in the surrounding project area that is likely to provide habitat for the Greater Bilby consists of long term (99 year) pastoral leases, Aboriginal reserves or Unallocated Crown Land. As a result, Sheffield has considered ways other than the purchase of land for an offsets package.</p> <p>Of the proposed clearing, 1,632.9 ha are classified as temporary for the mine excavation. Input to the offsets guide indicates rehabilitation in situ of this area is suitable as an offset for this clearing. The remaining proposed clearing of 639.6 ha is for permanent infrastructure for the life of project (40+ years). The DoEE calculator indicates that an offset of 447.72 ha is required to adequately compensate for the long term and permanent loss of habitat. Outputs from the DoEE Offsets Guide are provided in Appendix 27.</p> <p>Recent Ministerial Statements and offset packages for the Pilbara have resulted in offset values of between \$1,500 to \$3,000 per ha being applied. Proposed offsets for the Thunderbird Mineral Sands Project have been calculated based on the residual impacts to the 639.6 ha for permanent infrastructure for the life of project. Using the DoEE calculated offset requirement of 447.72 ha and the rates of \$1,500 to \$3,000 per hectare, this equates to values of between \$671, 580 and \$1,343,160 over the life of the project. In line with other projects in the extensive land use zone, an offset will only be paid for actual clearing undertaken and this will be reconciled as part of the construction process.</p>
		<p>Noting the above, mitigation actions to benefit the species could include:</p> <ul style="list-style-type: none"> - Contributions towards the targeted and regional surveys and monitoring of bilby in alignment with the existing 2011 Department of Environment and Conservation (now Parks and Wildlife) and Department of Sustainability, Environment, Water, Population and Communities (now Department of Environment and Energy) survey and monitoring guidelines. 	<p>Sheffield recognises that there are existing government and non-government programs currently being undertaken to benefit bilby conservation. To develop an understanding of research and abatement initiatives currently underway and get an appreciation for stakeholder priorities, Sheffield has undertaken extensive consultation. Numerous stakeholders have been consulted, including a representative profile of industry and local community representatives, as well as government agencies that included the Department of Parks and Wildlife (DPaW). Feedback from the DPaW indicated that Bilby conservation is a priority to the department, and DPaW published potential bilby research priorities in Cramer et al. (2016). Other members of industry are also undertaking bilby research. In particular, Buru Energy have been undertaking a PhD research program in collaboration with Murdoch University, researching bilby ecology in the West Kimberley, as well as implementing bilby monitoring programs in their nearby tenements for a number of years.</p>
		<ul style="list-style-type: none"> - Contributions towards further work, assisting in the resolution of identified knowledge gaps including, distribution, threats, effectiveness of mitigation strategies, monitoring, habitat requirements, diet and life history, and appropriate management. 	<p>To prevent duplication of work being undertaken, Sheffield has proposed to establish the Kimberley Greater Bilby Trust (see Section 14.3.2 of the PER). The intention is to establish a Trust with representatives from local community, government, NGOs and industry to ensure that conservation programs associated with the offset provide the most benefit to bilby conservation and do not unnecessarily repeat existing/previous work, as well as provide direct logistical support to people undertaking research programs relevant to the Greater Bilby. Given the long life of the project and long-term need for protection of the species, it is anticipated that research priorities will change over time, particularly as results of initial project are published and understood. Establishment of the Kimberley Greater Bilby Trust would enable independent determination and prioritisation of research and conservation needs most effective for conservation of the species. This is likely to include research to fill current knowledge gaps and targeted/regional surveys or extant populations; however the Trust would ultimately decide research objectives.</p>
		<ul style="list-style-type: none"> - Contributions towards implementing recovery actions such as management of predation by introduced carnivores (e.g. foxes, cats, etc.), management of introduced competitors (e.g. rabbits, etc.) and management of habitat degradation through fire regimes, grazing pressure, etc. to secure and enhance the conservation status of the bilby in the wild through on-ground management actions. 	<p>Additionally, as part of the proposed offset, Sheffield will allocate \$5,000 per year for 45 years (total of \$225,000) to pest management programs outside of the area of direct impact.</p>
		<p><u>Varanus sparnus (Dampierland Peninsula goanna)</u> <i>Varanus sparnus</i> (Dampierland Peninsula goanna) is listed as Priority fauna, ranked Priority 1. This relatively new (2014) species (morphologically and genetically different to <i>Varanus brevicauda</i>) is currently only known from four individuals collected from two locations about 90 kilometres apart in the central portion of the Dampier Peninsula. One of these records is within 1 .5km of the development envelope for this proposal.</p> <p><u>Habitat</u> The species was collected from habitats broadly described as Pindan Shrubland with sandy soils associated with alluvial or sandstone deposits (Doughty et al. 2014) on the Dampier Peninsula, The species regularly excavates and lives in burrows (Doughty et al. 2014) and therefore areas on the Dampier Peninsula able to be excavated by this species could be considered as potential Dampierland Peninsula goanna habitat.</p>	<p>Although limited information is available with regard to the habitat preferences of the Dampier Peninsula goanna, this species has been reported in Pindan Shrubland with sandy soils associated with alluvial or sandstone deposits (Doughty et al. 2014). This broad habitat type is analogous with habitat used by the Greater Bilby during the Targeted Bilby Survey. Based on the contemporary information available, at a broad scale it is possible that the Dampier Peninsula goanna and bilby share a preference for Pindan Shrubland. Bilbies within the region have been reported to have a further preference for a micro-habitat of mature <i>Acacia tumida</i> var. <i>tumida</i> woodland. It is unknown if the Dampier Peninsula goanna shares this habitat preference. Regardless, at a broad scale conservation of Pindan Shrubland habitats has potential to benefit both the goanna and bilby species. The degree to which the ecology of these species is aligned is unknown and the driving processes behind their habitat preference may not be entirely analogous. Sheffield considers the mitigation and management measures proposed for bilby management would also be benefit Dampierland Peninsula goanna's in the project area and surrounding region. Where possible further synergies for conservation of these species will be considered.</p>

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		<p><u>Impact Assessment</u></p> <ul style="list-style-type: none"> - The likely habitat for the Dampierland Peninsula goanna appears similar to the bilby. Due to the similarities in habitat and relative scientific uncertainty surrounding the contemporary understanding of this species, it is recommended that the proposed management and mitigation measures for the Dampierland Peninsula goanna can be potentially aligned with those detailed above for the bilby. 	
46	<p>Department of the Environment and Energy BHLF-WQPC-QV1X-B</p>	<p>While the proponent has proposed an offset package totalling \$1.15 million over 45 years, the Department considers that the proposed offset does not meet, or may not meet, all of the offset principles of the Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy. The proponent should demonstrate how the proposed action is consistent with the Environment Protection and Biodiversity Conservation Act 1999, October 2012. Specifically:</p> <ul style="list-style-type: none"> - Principle 1: Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environmental law and affected by the proposed action. <p>It is not clear that the size of the proposed offset meets the requirements of the Offset Policy, and thus that the conservation outcome achieved will improve or maintain the viability of the Greater Bilby (<i>Macrotis lagotis</i>).</p> <ul style="list-style-type: none"> • The EPBC Offset Calculator at Appendix 27 indicates that the proponent has incorrectly used 447.72 ha (the 'total quantum of impact') as the calculated size of the offset required to compensate for the loss of 639.6 ha (the amount of permanent/long term clearing). The calculation should take into account that 100 percent of the residual impact needs to be offset, and that an offset area that is smaller than the impacted area is unlikely to maintain or improve the outcome for the protected matter. <ul style="list-style-type: none"> - Principle 4: Be of a size and scale proportionate to the residual impacts on the protected matter. <p>As indicated in our comments provided to OEPA prior to publication of the Public Environmental Review on 30 November 2016, the PER documentation frames the offset as needing to be sufficient to compensate for the amount of permanent clearing at the site. This is an understatement. For EPBC Act purposes it is necessary to compensate for the total residual impact associated with the proposal on the Greater Bilby. (The residual impact would include the permanent habitat loss due to clearing as well as other impacts including temporary loss of Greater Bilby habitat prior to the gradual rehabilitation of the mine site and mortality due to vehicle strike.</p> <ul style="list-style-type: none"> - Principle 6: Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action). <p>The proponent appears to be taking into account rehabilitation of the mine site when considering the area of Greater Bilby habitat reduction that needs to be compensated for in the offsets package. The Department considers that rehabilitation of the mine pit does not compensate for the temporary loss of habitat, but that it may be a mitigation activity (see also comment below regarding Chapter 12). Rehabilitation should certainly not be counted as an offset if rehabilitation or similar works are a requirement under WA laws, separate from any offset requirements.</p>	<p>The DoEE guidance for offset calculation states offsets are to be applied where residual impacts are considered to be significant. Mining and subsequent rehabilitation of an area on a pastoral station back to its current land use (unimproved pastoral land) within 12 to 24 months will result in disturbance of an area of potential habitat for a Threatened species that is known not to be critical to the survival of the species. These timeframes when applied to the small areas (<200 ha per annum) in a regional context will not lead to significant adverse residual impacts of the species. Application of mitigation measures such as rehabilitation contribute to the residual impacts not being seen as significant.</p> <p>The project will impact potential Bilby habitat, however it is not anticipated that it would threaten regional populations of the species. The proposed offset is compensatory in nature as direct offset is not feasible in the Kimberley where private land is not typically available for use in offsets. The proposed offset allows for both funding of research and on ground conservation efforts to directly benefit the Bilby in a local and regional context. By funding these activities, the viability of the species will be improved over time.</p> <p>The DoEE Offset calculator value for threatened species habitat area impacted of 639.6 ha was based on measurement of the disturbance area that would be either long term or permanent. The majority of the permanent impact originates from upgrade of an existing road to allow access to the site. Detailed measurement of this would result in a lower number as the amount of existing clearing was not excluded as part of efforts to be conservative in impact evaluation. Therefore the calculation is believed to be highly conservative.</p> <p>The resulting impact calculation was derived using area impacted value of 639.6 ha with a vegetation quality score of 0.7 - equalling a total of 447.72 ha impact ("adjusted hectares to be offset"). An offset of 447.72 ha (or in this case the calculated purchase price for 447.72 ha) is therefore a 100% offset.</p> <p>Recent WA Ministerial Statements & offset packages for the Pilbara have offset values between \$1,500 to \$3,000/ha. This equates to between \$671,580 and \$1,343,160 over the life of the project. A value between these (but at the higher end) of \$1,150,000 is proposed as a suitable offset.</p> <p>The offset proposed (the Greater Bilby Trust, Bilby Records Management and feral animal control) are additional to requirements under other laws.</p> <p>Rehabilitation is not being considered as an offset. Rehabilitation is a mitigation measure that affects the assessment of whether the residual impact is viewed as being significant or not.</p>

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		<p>- Principle 7: Be efficient, effective, timely, transparent, scientifically robust and reasonable.</p> <p>It is not demonstrated that the proposed offset package adequately complements, or builds on Greater Bilby conservation work planned or underway in the region/state. For example, the approval conditions for EPBC 2013/6984 Cape Leveque Road Upgrade, WA include an offset that provided for a baseline survey into the Dampier Peninsula Greater Bilby population, research into the threats to the species and presence of introduced predators and an adaptive threat management program addressing either predators, fire or grazing pressures. The resulting Dampier Peninsula Bilby Project 2016-19 is underway, coordinated by the Department of Parks and Wildlife (DPAW). The Department encourages the proponent to engage with local land owners and managers, including DPAW, in designing an offsets package that will meet this principle.</p>	<p>The offsets applied to other projects in the region has been considered. Discussions with a large number of organisations and individuals during the public consultation program undertaken for the project has identified that Bilby conservation efforts in the region are perceived to be fractured. Communication of activities being undertaken and sharing of results and knowledge is poor. This is leading to politicisation of the species for internal organisational or personal gain and a high degree of mistrust is currently evident in parts of regional communities as to use of funds and reasons for interest in Bilby preservation. Considerable concern was expressed during public consultation about failure of current programs to effectively engage with pastoral landowners particularly as the Thunderbird Project impacts to Bilby habitat are located entirely on pastoral land. Questions about use of potential offset money on non-pastoral land that would not address retention of bilbies in a pastoral landscape were raised. This concern was specifically raised with DPAW Scientific Branch in December 2016.</p> <p>The Kimberley Greater Bilby Trust proposed by Sheffield does not preclude any of the activities identified by the 2011 Kimberley Bilby Workshop. The model if well implemented will allow annual independent review of research needs and on ground conservation works prior to allocation of funds to future works over a long term period. Current funding does not allow this to occur. Current funding also does not address transfer of knowledge to land managers outside of regulators and NGO's. If DPAW or other regulators have identified research or on-ground conservation programs, these would be considered by the independent panel in the same manner as any other organisation that put forward an application for funding by the Greater Bilby Trust. Requirements relating to public availability of data of information would be applied equally to any project funded.</p>
		<p>- Principle 8: Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.</p>	<p>Sheffield supports formation of an independent panel to administer the proposed Kimberley Greater Bilby Trust with the members representing the broad range of interests in conservation of this species.</p>
		<p>It would be helpful if the proponent could provide more indication of who has been consulted in the course of developing the offsets package, and undertake to develop an Offset Strategy document, which could be approved by EPA and the Commonwealth. The purpose of the Strategy would be to provide more detail regarding the aims, administration and timing of provision of the offset funds.</p>	<p>Sheffield have implemented a detailed public consultation program and the program is ongoing. With regard to Bilbies, the follow people and organisations have specifically been consulted with:</p> <ul style="list-style-type: none"> • DPAW – Scientific branch and Broome regional office. EMB declined requests for meetings and participation in Lead Agency meetings co-ordinated by DMP. • Malcolm Douglas Wildlife Park. • Jan Martin – registered wildlife carer based in Broome. • Chris Mitchell- registered wildlife carer based in Broome and Shire of Broome Councillor. • Kimberley Pilbara Cattleman's Association – Catherine Marriott. • Jack Burton – owner and manager of Mt Jowlaenga and Yeeda Stations. • Rangelands NRM – Grey Mackay, Jon Silver • Pastoral Lands Board – Russell Shaw. • Peninsula Aboriginal communities including Looma, Bidan, Mowanjum, Pandanus Park, Djarindjin, Lombardina, Ardyaloon and Bidyadanga. • Environs Kimberley – Martin Pritchard, Bruce Goring, Peter Mitchell, Shaun Clark. • WWF (Broome) – Dr Alex Watson, Nyul Nyul Ranger. • ACF (Broome) – Wade Freeman. • Derby Landcare. • Buru Energy (Kris Waddington). • Stuart Dawson (PhD student sponsored by Buru Energy). • Alistair Winrow (Broome based Honours student). • Robin Chapple MLC. • Broome Chamber of Commerce and Industry (Board members). • Dr Bill Low – Low Ecological. <p>Copies of the Draft Bilby Management Plan were supplied in November and December 2016 prior to publication of the PER to any individual or organisation that expressed interest in the document. Feedback received during meetings or that was subsequently provided was incorporated into the Draft Plan included as Appendix 23 of the PER.</p>

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		<p>For example, the proponent has indicated that \$225,000 will be provided over 45 years for feral animal control, perhaps contributing to a broader regional program. Further strategic information could identify any existing control programs in the area; indicate criteria for selection of a partner program; clarify the feral species that will be targeted by this work and indicate the extent to which the control program is expected to impact feral animal populations in the vicinity of the mine site, and how this impact might be demonstrated.</p>	<p>The funding for feral animal control is separate to that to be undertaken on the Mine Site to address feral animal control and management within operational areas. Funding may be used either for regional feral animal control programs or more locally based programs to be implemented by the pastoralist. Target species would be cats and feral dogs for locally based programs as this is what baseline fauna programs have indicated are present on Mt Jowlaenga and Yeeda Stations.</p>
		<ul style="list-style-type: none"> - The Offsets Policy also indicates that while the primary consideration in determining suitable offsets is delivering a conservation gain for the impacted protected matter, the delivery of offsets that establish positive social or economic cobenefits is encouraged. - The proponent may therefore wish to consider entering into partnerships with local organisations including indigenous communities in delivering the offsets package. 	<p>Sheffield has committed to the development of an Aboriginal ranger program that will be an active and ongoing part of the land management activities for the project area. No ranger programs currently exist in the area. It should be noted that no Native Title claims have been lodged for areas outside of the Mount Jowlaenga No. 2 polygon whose boundaries are identical to the Mining Lease application area. One determined Native Title claim exists for the first 16 km of the access road. The remaining 12 km of the access road to the point where it meets the Mining Lease application is not in an area of Native Title Claim. The ranger program will be operated privately by Sheffield and is anticipated to be part of an Agreement with the Mount Jowlaenga #2 People. Aboriginal people including Traditional Owners of the project area are anticipated to form a large percentage of the workforce independent to the ranger program.</p>
		<p>The proponent should demonstrate how the proposed action is not inconsistent with:</p> <ul style="list-style-type: none"> - Pavey, C. (2006). National Recovery Plan for the Greater Bilby <i>Macrotis lagotis</i>. Northern Territory Department of Natural Resources, Environment and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/m-lagotis.html. In effect under the EPBC Act from 09-May-2007. 	<p>The two main aims of this National Recovery Plan are:</p> <ul style="list-style-type: none"> • To improve and at least maintain the national conservation status of the Greater Bilby (currently listed nationally as Vulnerable) over the duration of the plan. • To achieve an accurate assessment of distribution (both extent of occurrence and area of occupancy), trends in occurrence, and successfully reduce the impacts of key threatening processes. <p>The Kimberley Greater Bilby Trust (Section 14.3.2 of the PER) will provide resources to improve the national conservation status of the Bilby by:</p> <ul style="list-style-type: none"> • Facilitating priority research for the Greater Bilby in the Kimberley. • Funding on-ground environmental and conservation management at the landscape level, with emphasis on net conservation benefits to the Greater Bilby. • Facilitating indigenous involvement in land management and conservation activities relevant to the greater Bilby. • Sharing outcomes of work supported by the Trust to assist with increasing effectiveness of conservation activities. <p>Additional funds allocated to feral animal control will also benefit conservation outcomes for the Bilby.</p> <p>The establishment and implementation of the WA Bilby Records Database (Section 14.3.2.2 of the PER) will make 'an accurate assessment of distribution (both extent of occurrence and area of occupancy)', and 'trends in occurrence' of the Bilby a much easier task. The WA Bilby Records Database will provide a centralised database of survey results from a range of stakeholders, which does not currently exist.</p>
		<ul style="list-style-type: none"> - Department of the Environment (2015). Threat abatement plan for predation by feral cats. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tap/threat-abatement-plan-feral-cats. In effect under the EPBC Act from 23-Jul-2015. Department of the Environment and Energy (2016). Threat Abatement Plan for competition and land degradation by rabbits. Commonwealth of Australia. Canberra, ACT: Commonwealth of Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tap/competition-and-land-degradation-rabbits-2016. In effect under the EPBC Act from 07-Jan-2017. - Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). Threat Abatement Plan for Predation by the European Red Fox. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tap/foxes08.html. In effect under the EPBC Act from 01-Oct-2008. 	<p>Sheffield has allocated \$5,000 per year for 45 years (for a total of \$225,000) to feral animal control (Section 14.3.2 of the PER). When the detailed planning for the use of that \$5,000 per annum is undertaken, consideration will be given to EPBC Act guidance where relevant, including the threat abatement plans for competition and land degradation by rabbits, and predation by feral cats and red foxes.</p>
		<p>Chapter 11</p> <p>The proponent should demonstrate how the assessment has had regard to:</p> <ul style="list-style-type: none"> - Threatened Species Scientific Committee (TSSC) (2015). Approved Conservation Advice for Megaptera novaeangliae (humpback whale). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/38-conservation-advice-10102015.pdf. In effect under the EPBC Act from 01-Oct-2015. 	<p>Sheffield will commit to providing information to vessel operators regarding <i>EPBC Act</i> requirements for reporting of collisions with whales in Australian waters. Sheffield will also commit to informing vessel operators of best practice behaviours and regulations for interacting with humpback whales.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
		<p>Further comments in relation to the Humpback Whale:</p> <ul style="list-style-type: none"> - The proponent should undertake a quantitative risk assessment of vessel strike that looks at the change in risk that would be associated with the proposal. <ul style="list-style-type: none"> o This should be done at a sufficiently fine scale so that shipping lanes that avoid high risk areas can be identified. o This should also indicate the percentage increase in shipping in calving areas, rather than the Kimberly as a whole. 	<p>Sheffield have discussed this requirement with DoEE on 7 March 2017 subsequent to the DoEE submission being made. It was acknowledged that conducting a qualitative risk assessment would be extremely difficult given Sheffield has no control over ship movements and at this stage of project design has no knowledge of likely ship routes proximal to Broome or the entry to King Sound in sufficient detail to make the outcome of such an assessment meaningful</p> <p>Information provided to DoEE on 7 April 2016 regarding potential impacts on Humpback Whales, has been reviewed to reflect changes in proposed shipping arrangements (i.e. shipping occurring from 2 ports instead of just 1) and more recent shipping data from Kimberley Ports. Based on this:</p> <ul style="list-style-type: none"> • 20-30 ships proposed per annum for the Port of Broome represents a 2.6% increase based on the reported 1,156 vessel visits recorded for 2015/16 (DoT, 2016). • No quantitative information is publically available for vessel movements for Derby Port for 2014/15 or 2015/16. Whilst it is known that there is not currently any exporting of major freight, the Port remains active and provides berthing services to barge and landing craft tank operators working in and around King Sound; and to tourist, charter and fishing boats. The proposed 20-40 ships per annum would represent a significant increase to current shipping activity at the port, however this is within the same magnitude of usage from 1998-2003 when lead zinc concentrate was exported by Western Metals and up to 2014/15 when the Port was used to transfer materials to and from Cockatoo Island and Koolan Island iron ore projects. for about four months of the year, however ship movements associated with export from Derby will be spread throughout the year. • The west coast Humpback Whale population was estimated in 2008 to be between 26,100 and 28,830 with populations increasing between 9.7 and 13% per annum. The maximum rate of population increase is however considered to be 11.8% (DoEE, 2017). Such numbers indicate the population has recovered and may be above the pre-1940 levels (IUCN 2017). • Humpback whale calving grounds are known to occur from Broome to north of Camden Sound, with the greatest concentration of calving whales found near Camden Sound, Frost and Tasmanian Shoals and the Lacepede Islands (see Figure 1). Although Humpback Whales calve in nearby Camden Sound, they are considered unlikely to enter King Sound and King Sound is not considered a biologically important area for this species (AECOM 2014, DSEWPaC 2011i). Ships entering King Sound would need to pass through the calving area, however would not need to interact with the three areas known to have the highest calving concentrations. • Humpback Whales migrate north from their Antarctic feeding grounds around May each year, reaching the waters of the north west marine region in early June (DoE 2016). The peak of the northbound migration in the Kimberley region (Broome to Camden Sound) is thought to occur between late July and early August, with southbound migration peaking between late August and early September (Jenner et al. 2001: Jenner and Jenner 2009 as cited in RPS 2010). Ships entering or leaving King Sound will pass through the migration path. Migration occurs for about four months of the year, however ship movements associated with export from Derby will be spread throughout the year. At between 2 to 4 ships per month, the maximum number of ships interacting with Humpback Whales during migration is thus between 8 and 16. • Discussions with the Department of Fisheries North West Regional Manager in August 2016 did not identify any known instances of whale strike by commercial vessels in the Kimberley (P Godfrey pers comm). <p>It is noted that:</p> <ul style="list-style-type: none"> • The Action Plan for Australian Mammals 2012 by Woinarski et al, 2014, and a recent paper from Bejder et al, 2015 recommend that Humpback Whales no longer meet any criteria for listing as threatened under the <i>EPBC Act</i>. Despite this, current <i>EPBC Act</i> species lists still contain the Humpback Whale. • The IUCN Red List states that the observed increases in Humpback Whale abundance in recent times implies that human-caused mortality is not sufficient to threaten the populations concerned. <p>Sheffield do not believe that the proposed shipping numbers will have in adverse impact on the conservation status of Humpback Whales. The likelihood of ship strike is considered Rare (i.e. <5% probability) and the consequences Incidental (death of an individual animal of conservation significant species that does not impact on population's ability to survive locally) with the overall risk being Low using the risk assessment methodology described in Section 7 of the PER (Tables 51, 52 and 53).</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
		<ul style="list-style-type: none"> - The PER states 'the ocean-going vessels are not expected to pass through any of the three zones where the highest concentrations of whales occur, which are the Lacepede Islands, the Frost and Tasmanian Shoals and Camden Sound (ellipses as shown on Figure 42, section 4.1.3). Given that Humpback Whales are only present in the area for four to five months per year, this would mean a maximum of an additional 16 vessels would be crossing the whale migration path each year'. o This statement is misleading as the whole area bounded by Beagle Bay to the South and Camden Sound to the North (roughly) is calving habitat for the Humpback Whale, and pregnant mothers or nursing mothers with calves are found throughout the whole area. The Department is concerned about the potential impacts of vessel strike and disturbance during such a biologically important activity. 	Noted.
		<ul style="list-style-type: none"> o Humpback Whale numbers have been increasing at about 10 per cent per year in WA. The three zones identified as having the highest concentration of Humpback Whales appears to be based on a report by K.C.S. Jenner, M-N.M. Jenner and K.A. McCabe from 2001 which uses survey data from 1997. Given the age of this data the conclusion that vessel traffic may avoid the highest concentrations of Humpback Whale at these locations may be erroneous. 	Noted.
		<ul style="list-style-type: none"> - The PER indicates that Sheffield operated vessels will report cetacean sightings to other vessels so that the other vessels can take appropriate precautions to prevent strike. Further information should be provided regarding the extent to which Sheffield operated vessels will operate in calving areas/migration paths, the proportion of proposed vessel movements that are under Sheffield's control, and indicate the extent to which this measure will meaningfully contribute to vessel strike reduction. 	Sheffield may commission some of the ocean going vessels from Derby Port for product export. As yet the proportion of vessels directly controlled by Sheffield in this area is not known.
		<ul style="list-style-type: none"> - The proponent may wish to confirm that shipping under its control will comply with relevant provisions of Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000, including those providing speed limits and safety distances from whales and applying those provisions in both Commonwealth and State waters. 	Shipping under Sheffield control will comply with the relevant provisions of Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000.
		<ul style="list-style-type: none"> - Depending on the results of the above, the proponent may wish to suggest further measures it can take that will reduce shipping related impacts for the Humpback Whales in their calving areas/migration path. For example, ensuring that relevant shipping (whether or not controlled by Sheffield) have in place marine mammal observers when travelling through migration/calving areas at relevant times of year. 	It is necessary to take on board a pilot with local knowledge of the islands and topography of the Buccaneer Archipelago, the Sunday Straits, and King Sound. This will assist the ocean-going vessel to navigate from King Sound out into the open water. The pilot's local knowledge will assist the vessel in reducing the risk of a collision with a whale.
		<p><u>Chapter 12</u> The proponent should demonstrate that the gradual rehabilitation of the mine pit will result in restoration of habitat for the Greater Bilby. This should extend beyond revegetation to include discussion of the soil profile and its suitability for burrowing. Unless information that demonstrates that rehabilitation (for the purpose of providing greater Bilby burrowing habitat) will be successful, rehabilitation should not be considered as a mitigation measure.</p>	In the Kimberley region of Western Australia, Bilbies have typically been recorded in areas with soft, sandy substrates, such as eolian sand dunes, swales and sandplains, which can be easily excavated to construct burrows and dig for food. It is likely that bilbies have a preference for habitats with easily excavated substrates. Materials characterisation work has been completed on project soils and mine waste, including overburden and process residues. This work determined that overburden material, including the local Pindan soils, has a low coherence and limited wet strength. The use of this sandy material to backfill the mine pit will provide Greater Bilby burrowing habitat. Monitoring of soil bulk density within the reinstated soil profile will be included within rehabilitation monitoring program and results compared to undisturbed areas.
		<p><u>Chapter 13</u> The PER could be more detailed regarding the reduced speed limit that will be applied to vehicles within the mine site development envelope for the purpose of preventing injury or mortality to the Greater Bilby (<i>Macrotis lagotis</i>), and the rationale for why that speed limit is expected to be effective in achieving a sufficient reduction in incidents of vehicle strike. In this regard we note that approval conditions for EPBC 2013/6984 Cape Leveque Road Upgrade, WA provided for a speed limit of 60 km/hour in any 6 ha area known to have a Greater Bilby population, and for monitoring, trigger levels and adaptive management of roadkill for this species in the proposal area.</p>	A speed limit of 60 km/h is proposed on the unsealed site access road.

Hydrological Processes

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
47	Public Submission ANON-WQPC-QVKY-6	Given the annual rainfall in the Kimberley, while there is some drawdown I am comfortable that the Project will not have a significant effect on aquifers, other aquifer users, or the water supply of nearby population centres. With consistent monitoring per the Preliminary Groundwater Management Plan, the Project's impact on water can be appropriately managed.	Noted.
48	Derby Landcare Group ANON-WQPC-QVK6-3	DLG is confident that with ongoing monitoring for the life of the mine, the water will be used efficiently, recycled (where appropriate), and aquifers re-charged. Again, this will potentially enhance the water resource of the area. Given the reliance of all residents in this area on availability of bore water, this is an extremely important issue.	Noted.
49	Public Submission ANON-WQPC-QVK5-2	The Kimberley receives an enormous amount of water every year. The water usage of the project may sound large, but is insignificant when viewed next to the annual rainfall of the project area and of the Kimberley. I do not believe that the Project will have any significant impact on aquifer levels, the environment, or others who are reliant on aquifers in the Project area.	Noted.
50	Kimberley Pilbara Cattlemen's Association ANON-WQPC-QVK4-1	We understand the requirement to dewater after year 15 to enable dry mining. Essentially a large amount of water will be moved from one part of the aquifer (mine) to another (downstream), by pumps and hoses; and shall not be used but simply moved to another aquifer, it will not be dewatered and sent down a river. Having studied the modelled ground water use including the modelled rates of seepage back into the Broome Aquifer, we support Sheffield's water management approach, which of course needs to be monitored and regulated by the Government.	Noted.
51	Yeeda Pastoral Company Pty Ltd and the Burton family ANON-WQPC-QVKF-K	This is an area that we have a great deal of interest in. We are users of the same water aquifer in our capacity as Irrigators at Kildo Station and as Pastoralists on the surrounding areas. We plan to increase our irrigation footprint in the future and would hope that this development is compatible with that end. That said we see only a small potential threat as the mine development is located high up the aquifer and draws at the top end of the saturated sandstone. The area has relatively high rainfall and a rapid recharge. The rigorous monitoring that will no doubt be applied by the mine will give us a good window into the upper reaches of our aquifer and as such a good early warning system.	Noted.
		I would appreciate in regard to all water information that we as potentially effected users would be provided with all monitoring results.	Agreed. Sheffield believes in openness and transparency, and will provide monitoring results to Yeeda Pastoral Company.
		It should be noted that the water information gathered to date has been very helpful to our expansion of our cattle operation. The continued ability for us to share water infrastructure is very important to us.	Noted.
		Dewatering - we would think that when the mine gets to the stage that it has excess water, the least beneficial way to deal with that water is to reinject. This water asset has the potential to underwrite a major irrigation development that we would gladly be part of that process.	Noted. Any proposed re-use of the excess water that differs from reinjection documented as part of the PER would need to be considered to determine whether it would be subject to other impact assessment requirements.
		Other than the above comments we feel comfortable with the process and risks. The clean nature of water returns is critical to us as it would adversely impact our Organic status of our cattle.	Noted.
52	Bidan Aboriginal Corporation ANON-WQPC-QV1C-P	The groundwater modelling illustrated on pages 206-209 and associated data reported within section 8.3 Hydrological Processes does not consider the closest permanent settlement of Bidan Aboriginal Community, which is closer than the illustrated tenement held by Kimberley Quarries. We assert that, although outside predicted drawdown areas, the community is only 28km from the mine footprint and should modelling be negatively incorrect, the community's water supply may be affected. While hydrological mapping indicates that the community sits on the division between the Broome Sandstone Aquifer and the Canning-Wallal Basin, the community bore is shallow (approximately 10ft below ground level) indicating that the drawdown comes from the shallower Broome Aquifer than the deeper basin.	Bidan Aboriginal Community was considered in the groundwater assessment and is specifically mentioned in PER Section 4.2.5.7 (Other Groundwater Users) and Figure 24 under a previous name of Bedanburru Aboriginal Community. As specified in Section 8.3.2.1, reduction in groundwater availability to other users has been screened out from assessment as not likely to occur or unlikely to have any discernible consequence on any factor different to background levels. Bidan is located 28 km from proposed water abstraction activities and approximately 12 km from the closest modelled 1 metre drawdown. Groundwater reinjection at later stages of mining (approximately Year 32 onwards) will occur between the mine and Bidan, reducing the drawdown. Sheffield have committed to installation of over 20 monitoring bores which will identify any departure from modelled drawdown.
		We suggest that Sheffield provide a monitoring bore for the community to monitor our water supply that	Sheffield are willing to provide a monitoring bore for the Bidan community and either incorporate it in the monitoring network or

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		<p>expertise is given to establish the bore and train community members in the monitoring regime required. We also want to see mitigation strategies developed should the predictive modelling be incorrect and our water supply be affected.</p>	<p>provide training to allow the community to carry out monitoring.</p>
		<p>The Hydrological Processes identified in the initial table at the front of the document indicate that the Fraser River South won't be impacted, yet the source of the river is within the impact zones of the hydrological maps provided in Section 8.3. This should be considered further prior to approval.</p>	<p>The hydrological processes section of the initial table does not indicate there will be no impact on Fraser River South. The table identifies the most significant potential impact of groundwater abstraction on the Fraser River South, which is possibility of lowered groundwater levels causing vegetation decline in groundwater dependent ecosystems. At the headwaters of Fraser River South, groundwater levels are approximately 30 metres below ground level, so reductions in groundwater level due to abstraction will not affect the surface and near surface hydrological processes which generate flow in Fraser River South. The only location on Fraser River South where groundwater is shallow enough for abstraction to affect river flows in in the valleys about 10.5 km south east of the mine area which was identified (PER Section 4.2.5.5) as containing potential groundwater dependent ecosystems. As this is a very small proportion of the Fraser River South valleys, the potential effect on overall river flows is negligible. The proposed measures to monitor and maintain water levels in this area while focused on groundwater dependent ecosystems will also ensure minimal impact on Fraser River South hydrology.</p>
53	<p>Walalakoo Aboriginal Corporation Registered Native Title Body Corporate ANON-WQPC-QV1H-U</p>	<p>The clearing and use of additional roads and the large trucks will result [in] various environmental impacts including:</p> <ul style="list-style-type: none"> - Control of dust on the unsealed sections of the road. - Use of ground water to control the dust problems increasing the use of water sources in an area subject to arid conditions. <p>With the wealth of ecological knowledge that the Nyikina Mangala people hold, and the awareness of any changes in their environment and consequent impacts, we consider that the Nyikina Mangala people should be involved in developing mitigation strategies.</p> <p>In relation to the use of water we are also concerned that the PER provides that the area has current low water use, and therefore there is likely to be limited impact from groundwater extraction. This region particularly the Fitzroy catchment is currently subject to extensive assessments and surveys in order to consider if more groundwater can be extracted for agricultural and other purposes. The PER does not refer to these and the likelihood of far more extensive water extraction in the near future over this region. Given the proposed life of the mine and the likely further extensive extractions the PER needs to take into consideration that the use of water must be monitored very closely and have more detailed management strategies if the current assessment result in increased water usage in the surrounding area.</p>	<p>As detailed in Section 3.7 of the PER, the majority of the transport route is via existing public roads and does not represent a significant increase in traffic along these existing heavy haulage routes. The current Mt Jowlaenga Homestead Road will be upgraded and used as an access road for the project.</p> <p>Dust management as detailed in Section 8.1.3 of the PER is considered adequate to minimise dust to an acceptable level.</p> <p>Groundwater is the only source of water available to the project. Application of water to suppress dust on the site access road will be managed to maximise efficient use of the resource. The water balance prepared for the project has included provision of water estimated to be required for dust suppression for the whole project. Sufficient allocation exists within the DoW groundwater area the project is situated within for the project to source its required water volumes.</p> <p>Sheffield acknowledge that the Nyikina Mangala people are Traditional Owners for parts of the Mine Site Development Envelope. They have had specific representation in baseline studies and their contributions to management measures since included in the PER document are recognised. They will continue to have opportunity for involvement through stakeholder consultation programs, inclusion within the Ranger Program, and employment by Sheffield in other capacities. Sheffield welcomes positive contributions to the project from a wide range of people including the Nyikina Mangala.</p> <p>Sheffield has involved Traditional Owners in baseline ecological studies and heritage studies. Knowledge conveyed during these studies has been considered and included in development of project design including management and mitigation measures. An extensive consultation program has been undertaken for the project to date. Sheffield specifically met with Aboriginal communities across the peninsula in November and December 2016 to discuss the Draft PER and sought input into proposed management and mitigation measures. Management plans to be implemented for the project need to be adaptive and will be dynamic documents. Ongoing engagement with stakeholders, including Traditional Owners will continue to inform project implementation.</p> <p>As detailed in Section 4.2.5.7 of the PER, the project is located in the Canning–Pender sub-area of the Canning-Kimberley Groundwater Area, which has 95.4% of its available groundwater resources (50 GL/yr) available for allocation. The Thunderbird Project may abstract up to 13 GL per annum for Mine Site use during commissioning (26% of allocation) and up to 33 GL per annum (66% of allocation) after mining below the water table commences (after Year 32). Excess water not required for the project will be reinjected into the same aquifer downgradient of the project, meaning the actual water take is constant at about 10.7 GL per annum for the life of the project. This is within the available groundwater resources of the area and will be subject to approval and regulation under the appropriate Department of Water processes, including monitoring and reporting on abstraction against approved allocations. Any further activities in the region that are likely to impact on available water resources will also need to undergo assessment and approval, taking into consideration other groundwater users.</p>

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54	Public Submission ANON-WQPC-QV1B-N	<p>The Broome Sandstone Aquifer is an unconfined aquifer therefore the water is connected throughout the aquifer. Water finds its own level and therefore cutting the side out of the aquifer and constantly pumping huge volumes of water out of the aquifer will have an impact on other parts of the aquifer.</p>	<p>The Broome Sandstone Aquifer is hosted in the Broome Sandstone and the saturated parts of the overlying Emeriau Sandstone and Mowanjum Sand, which are generally in hydraulic continuity. It is a major unconfined to semi-confined aquifer.</p> <p>Groundwater levels in the Broome Sandstone Aquifer range from about 75 m AHD near the centre of the Dampier Peninsula to about 0–1 m AHD at the coast. The water table elevation over the mineral deposit area ranges from about 62 m AHD in the south to about 75 m AHD at its northern edge, with groundwater in the Broome Sandstone Aquifer flowing to the south. The depth to groundwater is in excess of 20 m over most of the area.</p> <p>The project is located in the Canning–Pender sub-area of the Canning–Kimberley Groundwater Area, which encompasses the majority of the Dampier Peninsula except for the area near Broome which classified as the Broome Groundwater Area (PER Figure 24). This area has 95.4% of its available groundwater resources (50 GL/yr) available for allocation. Licence entitlements within the sub-area total 2.3 GL/yr, with one major user (Kilto Station, 2 GL/yr) located about 40 km southwest of the project. The closest users to the Mine Site Development Envelope are water bores located at the abandoned Mt Jowlaenga homestead, at the Bidan Aboriginal Community and the recently developed Yeeda Abattoir (Figure 24 of the PER).</p> <p>As described in Section 3.5.1 of the PER, water will be abstracted via a borefield for the first 15 years of project life as mining will be above the water table. From year 15 onwards, mining will move below the water table and groundwater abstraction will be both from bores and inflows into the mine void. As shown in Table 9 of the PER, the volumes of groundwater Sheffield propose to use (i.e. the total amount withdrawn considering both abstraction, seepage after return of process wastes to the mine void and after Year 32, reinjection of excess water not required for project use) are well within the remaining allocated amount for the Canning–Pender sub-area of the Canning–Kimberley Groundwater Area and sufficient remains for other potential users in the future.</p> <p>Drawdown of the groundwater table resulting from mine dewatering and abstraction as shown in PER Figures 44, 45 and 46 is predicted to be contained largely within the mining lease and it is anticipated that any impacts will be gradual and minimal. For these reasons Sheffield believes their proposed activity will not have significant adverse impacts on other parts of the aquifer and other beneficial users will not be adversely impacted.</p>
		<p>The PER is a deeply flawed document in regards to the omission of data or discussion regarding the cumulative impacts on water in the Broome Sandstone Aquifer from the proposed mine. The PER tries to downplay the extent of the current users of the aquifer and the subsequent risk to them by restricting references to decommissioned resource industry projects at Irvine Island and the Kimberley Diamond Mine (KDM). There are many water users within the circumference of the circle around the proposed mine site and Irvine Is. and KDM.</p>	<p>The H3 report does assess potential cumulative impacts (including Water Corporation, Skuthorpe, Kilto Station). As outlined in Table 15 of the H3 report, other users' abstraction is included in the modelling assessment. The magnitude of other users' abstraction was modelled as follows:</p> <ul style="list-style-type: none"> • Water Corporation Broome Borefield: for calibration purposes, historical abstraction data were used; however, for forward projections, this borefield's licence limit was used. • For all other licenced users, the licence allocation was used in the modelling assessment.
		<p>Other users of the aquifer such as the Bidan and other Aboriginal Communities, Ungani oil well, the Kimberley Beef Processing Facility and fracking at Noonkanbah were from the PER. Furthermore the Port of Broome fills water tanker ships with water from the Broome Sandstone Aquifer to supply water to southern industries as well as off-shore oil and gas fields. The CEO of the Broome Port Authority, Captain Vic Justice acknowledges that there is expected to be an "increased demand for water over the next few years in line with offshore resource industry development."</p> <p>Sheffield's plan to inject produced water and contaminated water used for processing ore back into the aquifer is a very risky activity. Aquifers are very complex living structures. There are layers of fresh, brackish and salty water that are held in place by a delicate balance of pressure and volume. Disrupting the balance of an aquifer can cause the layers to mix and the loss of fresh water. Risking damage to the aquifer would have server implications for the economic growth and environmental sustainability of the region that is supplied by the Broome Sandstone Aquifer. "It would seem that if Broome can avoid damaging its aquifer, water won't be the limiting factor in the size of the town blessed with an oasis in the hot dry north".</p> <p>An unconfined aquifer is like a secret lake. There's a vast water body out there that grows with the rain and falls when we take from it. Hidden from view, it can be a bit harder to get a feel for this impressive water body. But like any surface water, Broome's little know water source is able to be polluted. A 2001</p>	<p>The submitters concerns are noted. Two Groundwater Areas are proclaimed for the Dampier Peninsula namely the Broome and Canning–Kimberley. Water abstracted from the Broome Groundwater Area used to supply Broome is not within the Groundwater Area that the Thunderbird Mineral Sands Projects licence allocation would come from (Canning–Kimberley Area, specifically the Canning Pender Sub Area). Allocations for each Groundwater Area are set by DoW based on understanding of sustainable aquifer use over time. DoW will not issue Sheffield with a Groundwater Licence if the proposed use is not sustainable or would adversely impact other groundwater users in the area. Conditions of such licences typically require a Groundwater Operating Strategy (GWOS) to be submitted and approved by DoW prior to abstraction being allowed to commence. These detail monitoring and reporting requirements, allowing DoW to ensure abstraction volumes are compliant with that allowed and actual dewatering impacts are consistent with predictions.</p>

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		<p>Water and River's Commission report describes Broome's water supply as vulnerable to industrial contamination.</p> <p>Broome and Derby are both projected to grow, for example Broome has just sunk 3 new production bores. These new bores will each have a capacity of 1.5 million litres per day.</p> <p>[DoW Licensing] An application for a Groundwater Licence under section 5C of the RIWI Act has been made to DoW for abstraction of groundwater from the Broome Sandstone Aquifer required for the project. Permits to construct and/or alter wells (Section 26D of RIWI Act) will also be obtained from DoW as required.</p> <p>Water abstraction and use under the licence will be managed and monitored according to an approved Groundwater Operating Strategy to assure that environmental values including vegetation and features of cultural significance are appropriately protected from the impacts of abstraction. Monitoring will incorporate abstraction volumes, levels and quality at the mine and borefields, and while this is primarily for operational purposes, the data collected will also be relevant to closure (Section 4.2.5).</p> <p>The application for an abstraction of groundwater licence must include the all of the predicted water use for the entire 40 year life of the project. To this end the application must include the volume of water that is going to be extracted from the Broome Sandstone Aquifer as a dewatering operation following the mine cutting the side out of the aquifer after operating for 15 years. There is no capacity to repair a damaged aquifer which will continue to drain precious water long after the mine closure.</p>	<p>Groundwater taken for the project whilst from the same aquifer as the Broome water supply, is not from the same groundwater management area as defined by DoW. The DoW groundwater licence process considers the availability of water for abstraction in each groundwater area and ensures this is sustainable. Considerations also include impacts of the proposed abstraction on underlying or over lying aquifers.</p> <p>As mine dewatering supply exceeds demand for water for the project, excess water will be reinjected within the Broome Sandstone Aquifer. Water to be reinjected will be that abstracted by bores ahead of mining activities. This will have no contact with operational areas (mine pits, ore processing plants or other infrastructure). Utilising bores, pumps and a pipeline, the reinjection process is contained, meaning that the water is not used or exposed, but transferred and relocated within a closed system (see Section 3.5.1 of the PER). This transfer within a closed system means that there is no opportunity for contamination of the water.</p> <p>A groundwater abstraction license granted under section 5C of the <i>Rights in Water and Irrigation Act 1914</i> by the Department of Water is granted on the basis of an annual allocation of water (please refer to the Department of Water website at www.water.wa.gov.au). Licences are typically granted for 10 year periods. Given the long life of the Thunderbird Mineral Sands Project, the initial licence would require multiple renewals. Each renewal application will be subject to technical assessment by DoW based on project specific monitoring data and updated hydrogeological models. The volume approved for annual abstraction would also consider the total allocation for each groundwater area and the cumulative impacts of abstraction on the aquifer.</p>
55	Wilderness Society BHLF-WQPC-QV1N-1	<p>There are also several references throughout the PER, which refers to the 'initial' tailings dam. Thus, another concern is the expansion of this mine, once approved, which could have a significant impact on the ground water sources in there region.</p> <p>Recently there has been a new abattoir which has just been set up, very close to the proposed site, and there have been documented low levels of access to groundwater for cultural and environmental flows, due to the nature of the climate in the Kimberley - of a boom and bust cycle. There were reports of masses of fish kills on the western coast of the Dampier Peninsular, where water dried up from the springs used for cultural activities and environmental flows.</p> <p>Climate change is leading to more sporadic weather patterns across the north of Australia. In the Kimberley we've seen the 2014-2015 & 2015-2016 wet seasons deliver little to no rain needed to recharge the groundwater across there region. Now, over the 2016-2017 wet season, we've seen record rain hit the region, which means that the groundwater will no doubt begin to recharge, but we need much more science to inform the mechanics of the groundwater surface interaction of water flows, to determine if this proposal will have significant impact on the cycle, based on the regions hydrogeology.</p> <p>The proposal to extract a baseline 12 Gigalitres per annum is a significant amount of water to extract, from a region without greater understanding as mentioned above, to determine how not just this proposal but cumulative impact this will have combined with the extraction planned for the abattoir will have on water quality and quantity across the Dampier Peninsula's groundwater dependent ecosystems and fresh water springs relied upon by several Traditional Owner groups for cultural activities.</p> <p>Another key issue when the wet season is booming, is the problem of overflow from the tailings dams proposed for this project. The overflow of other tailings dams for waste water has been well documented in Parliament, such as the case of Buru Energy's fracking operations where photographic evidence of pipes siphoning water from the tailings dams out towards local remnant bushland during wet season, south of this project on the Roebuck plains.</p>	<p>The term 'initial tailings storage facility' has been used because it will store the process wastes from processing of the ore from the initial excavation of the mine pit. Following the initial excavation, the mine pit will move and be backfilled with process wastes excavated from earlier stages (not including the materials within the TSF).</p> <p>The water table elevation over the mineral deposit area ranges from about 62 m AHD in the south to about 75 m AHD at its northern edge. No interaction between surface water and groundwater in the Broome Aquifer in the area around the project (other than recharge) is predicted. In addition, as indicated by Figure 47 on pg. 209 of the PER, significant (i.e. greater than seasonal variation) groundwater drawdown within the Broome Sandstone Aquifer is modelled to be restricted to within 10km of the mineral source area. This is therefore unlikely to impact any groundwater springs.</p> <p>Although the 2014-2015 and 2015-2016 wet seasons were particularly dry, and the region is now experiencing high rainfall, long term data shows these are still within the normal variation experienced in the Kimberley.</p> <p>The project is located in the Canning–Pender sub-area of the Canning-Kimberley Groundwater Area, which encompasses the majority of the Dampier Peninsula except for the area near Broome which classified as the Broome Groundwater Area (Figure 24 of the PER). This area has 95.4% of its available groundwater resources (50 GL/yr) available for allocation in the Broome Aquifer. This indicates that there are very few water users over this sub-area, and a lot of water still remaining.</p> <p>As discussed in Section 4.2.7.2 of the PER, mine waste materials, including process residues, are environmentally benign. In addition, the tailings storage facility will be designed to allow capture of rainfall from a one in one hundred year 72 hour ARI (average recurrence interval) event.</p>

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		<p>One of the most concerning parts of this proposal is the planned sub-groundwater sand mining, which has potential to impact water quality and quantity of all freshwater users across the Dampier Peninsular. This would pose an unacceptable and significant risk to the water source across the region, and we strongly recommend against approving the project on this basis.</p>	<p>As indicated by Figure 47 on pg. 209 of the PER, significant (i.e. greater than seasonal variation) groundwater drawdown within the Broome Sandstone Aquifer is modelled to be restricted to within 10km of the mineral source area. This is therefore unlikely to significantly impact any other groundwater users. The risk of water quality impacts to the groundwater is low as mine waste materials, including process residues, are environmentally benign. The need for further investigation of the depth of interception of sulfides and development of appropriate acid sulfate soil (ASS) management plans is noted and discussed in the PER in Section 8.4.2.1 and commitments made in Table 63.</p>
56	Department of Water BHLF-WQPC-QV1Y-C	<p><u>Hydrological modelling</u> There is a lack of long term baseline data available for assessment and incorporation in to the model, therefore model predictions can only be considered as preliminary. This is acceptable at PER stage as assessment can be based on worst case groundwater drawdown scenarios and mounding predictions suitable as trigger levels for an appropriate adaptive management approach. The impacts presented in Figure 44 (prior to mine dewatering) and Figure 46 (end of LOM) of the PER, should be accepted as long term triggers which do not reverse hydraulic gradients (and potentially impact) at Broome Drinking water sources, Roebuck Bay, or Kilito Station (recommendation 1). The model requires refinement as further data becomes available. The EPA may consider an approval Condition requiring the model be reviewed every three years (which will be consistent with the groundwater licence triennial reporting requirement) to incorporate new monitoring data and assess the accuracy of predicted model outcomes (recommendation 2).</p> <p>There are inconsistencies regarding predicted groundwater mounding from tailings seepage. Modelling suggests that in the first 15 years, mounding may be up to 24m, however Table 60 states this may be less than 20m. The PER must be consistent and clear with correct numbers clarified.</p> <p>The potential impact to other groundwater users has been assessed with justification that the distance from the mining area to the nearest licensed user is approximately 30km. The Department advises there are other groundwater users within 20km of the mining area, as stated in Table 8 and Figure 15 of the H3 report (Appendix 8). These bores need to be included in the drawdown and mounding prediction maps (including Figures 44-46 of the PER) to assess potential impacts and appropriate management responses (recommendation 3). Monitoring and management of impacts to these users' should be included in the Preliminary Groundwater Management Plan (GWMP) with documented agreement with the bore owners (recommendation 4).</p> <p>The PER does not assess potential cumulative impact from Thunderbirds proposed abstraction with other existing licensed users (Water Corporation, Skuthorpe, Kilito Station) as required in the Environmental Scoping Document. It is also unclear what abstraction figures have been used in the various modelling components for the other users. The PER and the H3 report at Appendix 8 give differing figures. The modelling work needs to use consistent figures so modelling outcomes are not incorrectly affected. The Department requires Sheffield to consider licensed entitlements (not actual use) in modelling and assessment of cumulative impacts from abstraction (recommendation 5).</p> <p>The modelling indicates a low risk of salt water interface migration and appears to assume a static salt water interface. Increased abstraction may cause the salt water interface to move inland and potentially upwards introducing saline water into other bores. Given there are other groundwater users/abstraction in the area (included that for drinking water) a static salt water interface assumption may not be appropriate when considering cumulative impacts from abstraction and may be underestimating possible impacts. This is acceptable for the PER stage but if future modelling reviews indicate a potential for salt water migration, Sheffield should carry out specific salt water migration modelling prior to commencing mine dewatering (recommendation 6). Any management outcomes required to monitor and mitigate salt water migration risks should be incorporated into a Condition Environment Management Plan (CEMP) which will also be required under a groundwater licence (recommendation 7).</p>	<p>Agreed.</p> <p>The modelled groundwater mounding of 24m within the text on page 204 is incorrect, and should be as stated in Table 60 ($\leq 20m$).</p> <p>The PER information about groundwater is based on the H3 report prepared by Rockwater for the DoW Licence application process. The H3 report does assess potential cumulative impacts (including Water Corporation, Skuthorpe, Kilito Station). As outlined in Table 15 of the H3 report, other users' abstraction is included in the modelling assessment. The magnitude of other users' abstraction was modelled as follows:</p> <ul style="list-style-type: none"> Water Corporation Broome Borefield: for calibration purposes historical abstraction data were used; however, for forward projections this borefield's licence limit was used. For all other licenced users the licence allocation was used in the modelling assessment. <p>Other groundwater users are near the project, but licenced users are ≥ 30 km away. Figure 15 in the H3 report includes all other known groundwater users, including un-licensed users. PER Figures 44-46 can be updated if required.</p> <p>Noted.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
		<p>[Recommendations as Numbered in Advice]</p> <p>1. Predicted groundwater drawdown and mounding impacts should be accepted as long term triggers.</p>	
		<p>2. An approval Condition to require groundwater model be reviewed every three years.</p>	<p>Sheffield will comply with DoW requirements of any Groundwater Licence issued to it. It is understood that such a licence is likely to include a condition requiring a review of the groundwater model on a three yearly basis. Sheffield would not challenge such a requirement.</p>
		<p>3. All groundwater bores should be included in drawdown and mounding predictions.</p>	<p>Other groundwater users are near the project, but licenced users are ≥ 30 km away. Figure 15 in the H3 report includes all other known groundwater users, including un-licensed users. PER Figures 44-46 can be updated if required.</p>
		<p>4. Management strategies for impacts to other users should be included in the GWMP.</p>	<p>The GWMP can be updated to include monitoring and or management of impacts to other users if required.</p>
		<p>5. Cumulative impacts of abstraction from all bores to be assessed.</p>	<p>The H3 report does assess potential cumulative impacts (including Water Corporation, Skuthorpe, Kילו Station). Table 15 of the H3 report includes other users' abstraction within modelling assessment, with the magnitude of other users' abstraction modelled as follows:</p> <ul style="list-style-type: none"> • Water Corporation Broome Borefield: for calibration purposes historical abstraction data were used; however, for forward projections, this borefield's licence limit was used. • For all other licenced users, the licence allocation was used in the modelling assessment.
		<p>6. Possible salt water migration modelling prior to commencing mine dewatering.</p>	<p>Noted. A saltwater interface occurs within the Broome Sandstone Aquifer along the coastline. The Department of Water areal electromagnetic survey (AEM) indicates it is typically situated about 3 km inland, but can also extend much further inland beneath the Roebuck Plains. As indicated by Figure 46 on pg. 210 of the PER, significant (i.e. greater than seasonal variation) groundwater drawdown within the Broome Sandstone Aquifer at the end of project life is modelled to be restricted to within 10km of the mineral source area. As the mine site is located 95 km from Broome, no interaction with areas of saltwater intrusion are predicted.</p>
		<p>7. CEMP to include any management outcomes related to salt water migration risks.</p>	<p>Noted.</p>
		<p><u>Preliminary groundwater management plan</u> The GWMP is acceptable at this stage. The lack of knowledge regarding GDE's, geochemical understanding of mine waste and residue, and PAF material requires the GWMP to be refined and updated as mining progresses. Trigger and threshold levels need to be refined, and can be done during development of the Groundwater Licence Operating Strategy (GLOS). The PER identifies only one round of water quality data collected in the study area which is insufficient to understand baseline water quality or suitable trigger or threshold levels.</p> <p>Quarterly water quality data needs to be collected for at least three years to establish a baseline and set triggers and thresholds. The Department recommends that the water quality suite outlined in Table 6 of Appendix 8 should also include hydrocarbons. The requirement for baseline water quality data collection and determination of appropriate trigger and threshold levels should be a requirement of approval (recommendation 18). The Department recommends consultation in the development and finalisation of a CEMP, if required, to ensure appropriate triggers and thresholds are developed based on potential impacts to water resources and GDE's.</p> <p>The Department recommends the broader groundwater monitoring plan included in a CEMP and will be advising Sheffield of these requirements in conjunction with the development of their GLOS to ensure consistency (recommendation 19).</p> <p>[Recommendations as Numbered in Advice]</p> <p>8. An approval Condition for appropriate groundwater quality baseline, triggers and thresholds.</p>	<p>Sheffield accepts inclusion of hydrocarbons for the groundwater quality monitoring suite.</p> <p>Similarly Sheffield accepts the DoW recommendation that groundwater quality data is collected for at least three years to allow determination of site specific trigger and threshold levels.</p>
		<p>9. Broader groundwater monitoring plan to be included in a CEMP.</p>	<p>Noted.</p>
		<p><u>Surface water</u> The proposed mine location is not within any major surface water or drainage catchments, rather it is in general headwater areas. Given the small catchment areas, and Sheffield's intention to divert flows around the mine pit and infrastructure, the Department is not concerned that flows will be reduced significantly. The Department will provide further advice to the Department of Mines and Petroleum (DMP) regarding infrastructure design during the Mining Proposal stage if required.</p>	<p>Noted. Sufficient freeboard will be maintained in water storages to allow capture of a 1 in 100 year 72 hour Average Recurrence Interval rainfall event.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
		<p><u>Stormwater management</u> The PER does not provide any specific details on how infrastructure will be designed to manage high rainfall events and flooding to prevent potential downstream contamination or erosion and sedimentation issues. The PER lacks of local data to determine accurate peak rainfall event scales, but uses suitably applicable nearby locations.</p> <p>The Department expects infrastructure design to be sufficient for a 1 in 100 year 72 hour Average Recurrence Interval (ARI) rainfall event (recommendation 12). While the summary table under the executive summary of the PER makes references to this, there is no further mention throughout the PER. The Department will provide further advice to DMP regarding infrastructure design during the Mining Proposal stage if required.</p> <p>[Recommendations as Numbered in Advice] 12. Infrastructure designed to meet a 1 in 100 year 72 hour ARI rainfall event.</p>	
		<p><u>Mine closure plan</u> The Department does not have any direct regulatory control over closure and rehabilitation of mine sites under the R1WI Act. However, the Department will be working in close association with the EPA and DMP through the provision of technical advice to ensure mine closure outcomes appropriately consider the impacts to surface and groundwater.</p> <p>The Department is concerned that the closure objectives and completion criteria outlined in Section 6 and Table 6 are not specific enough. It is unclear how the objectives will be met by the criteria, especially in regards to groundwater and surface water as they are unclear and not well defined. The Department recommends that Sheffield review this section and develop specific and targeted objectives which cover only a single issue each, with specific criteria that are measurable and tangible so achievement of the objective can be clearly demonstrated (recommendation 20).</p> <p>The Department recommends some further work on the following matters within the MOP:</p> <ul style="list-style-type: none"> - The proposed co-disposal of tailings in the mine pit void will create seepage which will be similar in the TSF (from using wet tailings). The MOP should be updated to include a commitment to provide a more extensive management approach to ensure the final TSF is a safe, stable, and sustaining landform which will not impact surface or groundwater water flows or quality (recommendation 21). 	Noted.
		<ul style="list-style-type: none"> - The potential for dewatering to expose PAF material should be a principal risk within the MOP given the lack of knowledge of the PAF materials and the likely major consequences without management controls. The MOP should include a commitment to update the control and management measures required for managing contamination from PAF following further investigations into the materials (recommendation 22). 	Noted.
		<ul style="list-style-type: none"> - The MOP should be updated with further information, as it becomes available, detailing how the rehabilitation will create sustainable and stable surface water drainage consistent with the pre-mining environment in a way that does not require on-going management (recommendation 23). 	Noted.
		<ul style="list-style-type: none"> - The proposal for the closure groundwater monitoring program to be consistent with the operational monitoring program is acceptable and encouraged to continue until parameters reach target levels which need to be outlined in the MOP once further data is available to determine these levels (recommendation 24). 	Noted.
		<p>[Recommendations as Numbered in Advice] 18. PER Section 6 and Table 6 requires more specific objectives and completion criteria.</p>	Noted. It is anticipated that the Mine Closure Plan will be reviewed and resubmitted at a frequency that meets the requirements under the Mining Act. Future iterations of the Mine Closure Plan will include further detail.
		<p>19. A more extensive management approach to ensure a safe and stable final TSF landform is recommended.</p>	See above.
		<p>20. A commitment to update the control and management measure for contamination from PAF materials following further investigations.</p>	See above.
		<p>21. Update how rehabilitation will create stable surface water drainage.</p>	See above.
		<p>22. A closure groundwater monitoring program until parameters reach target levels.</p>	See above.

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
57	Madjulla Inc. ANON-WQPC-QVKD-H	Please see attached report <i>Critical Review of Sheffield Resources Ltd PER on the Proposed Thunderbird Mineral Sands Project at Mt Jowlaenga, South-Eastern Dampier Peninsula</i> (February 2017) (Attachment 2) and respond to the comments made on hydrological processes.	<p>The hydrological processes section of the initial table does not indicate there will be no impact on Fraser River South. The table identifies the most significant potential impact of groundwater abstraction on the Fraser River South, which is possibility of lowered groundwater levels causing vegetation decline in groundwater dependent ecosystems. At the source of the Fraser River South groundwater levels are approximately 30 metres below ground level, so reductions in groundwater level due to abstraction will not affect the surface and near surface hydrological processes which generate flow in Fraser River South. The only location on Fraser River South where groundwater is shallow enough for abstraction to affect river flows in in the valleys about 10.5 km southeast of the mine area which was identified (Section 4.2.5.5 of the PER) as containing potential groundwater dependent ecosystems. As this is a very small proportion of the Fraser River South valleys the potential effect on overall river flows is negligible. The proposed measures to monitor and maintain water levels in this area while focused on groundwater dependent ecosystems will also ensure minimal impact on Fraser River South hydrology.</p> <p>The Department of Water acknowledges the lack of baseline data for the groundwater drawdown model, but states that it is "acceptable at PER stage as assessment can be based on worst case groundwater drawdown scenarios and mounding predictions suitable as trigger levels for an appropriate adaptive management approach".</p> <p>The Department of Water also acknowledges that the Groundwater Management Plan is acceptable at this stage.</p> <p>Infrastructure will be designed to be sufficient for a 1 in 100 year 72 hour Average Recurrence Interval rainfall event. Specific commitments are made to provide freeboard in all lined water storages for this rainfall event (summary table, Section 8.4.2.4 and 8.4.3 of the PER). Spillways, diversions and watercourse crossings will also be designed to this event. The PER contains commitments in Section 8.3.3 to design infrastructure to manage high rainfall events and flooding to prevent potential downstream contamination or sedimentation issues. Detailed designs of specific measures have not been provided in the PER. The flood and erosion risks are low and will not require any unusual design measures.</p> <p>Process residue characterisation (PER Appendix 18) indicates a low risk for groundwater contamination. The risk of water quality impacts to the groundwater is low as mine waste materials, including process residues, are environmentally benign.</p> <p>Residue from the Hot Acid Leach process is predicted to contribute 0.025% of all process residues and its potential to contaminate groundwater was assessed as low (PER Appendix 18). This is the only waste stream containing process chemicals.</p> <p>The need for further investigation of the depth of interception of sulfides and development of appropriate acid sulfate soil (ASS) management plans is noted and discussed in the PER in Section 8.4.2.1 and commitments made in Table 63.</p> <p>Please refer to answers to Points 25 and 28.</p>
	Madjulla Inc. ANON-WQPC-QVKD-H	Do the reports list down-stream impacts on King Sound (Fraser River and Fraser River drainage basin, King Sound shore).	
		The matter of being below the water table with its attendant effect of needing to dewater and remove this water has not been assessed by the proponent in sufficient detail.	
		Contamination of water resulting from episodic and catastrophic natural intense events, including: <ul style="list-style-type: none"> • process residue sediments • Hot Acid Leach process residue • Contaminated or sediment charged water (specifically entering the Fraser River north and Fraser river South catchments). 	
		This waste water has the potential to contribute contamination ton ground water and surface water – episodic and catastrophic natural intense events don't seem to be addressed.	
	How much water will be extracted?		

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
58	Public Submission ANON-WQPC-QV1V-9	<p>Please see attached report <i>Response to Thunderbird Mineral Sands Project Public Environmental Review EPA Assessment No. 2073</i> (February 2017) (Attachment 3) and respond to the comments made on hydrological processes.</p> <p>Eventually extraction from surface aquifers will impact on connected deeper aquifers. What these impacts will be is not known, suggesting that there is a need for considerable further research before irrevocable steps are taken.</p>	<p>The project is located in the Canning–Pender sub-area of the Canning-Kimberley Groundwater Area, which encompasses the majority of the Dampier Peninsula except for the area near Broome which classified as the Broome Groundwater Area (Figure 24). This area has 95.4% of its available groundwater resources (50 GL/yr) available for allocation in the Broome Aquifer. As the project water take is such a small proportion of the available groundwater from the Broome Aquifer, no impacts to deeper aquifers from abstraction related to the project are predicted.</p>
		<p>Rockwater Hydrogeological and Environmental Consultants tended to dismiss the connectivity between ground and surface water systems without any sound scientific basis for doing so.</p>	<p>Sheffield disagrees with this statement. The depth to groundwater is in excess of 20 m over most of the area. Interaction between surface water and groundwater in the Broome Sandstone Aquifer in the area around the project (other than recharge) is not predicted.</p> <p>Sheffield has based its understanding of the hydrogeology of the project area and its surrounds including potential interactions with surface water resources considering the following technical reports:</p> <ul style="list-style-type: none"> • Geological Survey of Western Australia Mapping (Laws 1991). • DoW Dampier Peninsula Review (Searle 2012). • Pennington Scott hydrogeological assessment 2015. • Rockwater Hydrogeological Assessment 2016. <p>From these it is apparent that the main geological units in the project area and surrounds are the Broome Sandstone and the Mowanjum Sand. The Broome Sandstone is concealed at the surface by the younger units. The Mowanjum Sand occurs at the surface or beneath a veneer of other superficial units within the project area. It consists of Pindan Sands generally between 8 – 14 m thick. At Thunderbird this has been measured to be typically 6 - 12 m thick and unsaturated. The Mowanjum Sand is a widespread sheet deposit and unconformably overlies a weathered contact on the Broome Sandstone. The Broome Aquifer is hosted within the Broome Sandstone and saturated parts of the Mowanjum Sand. The Jarlemari Siltstone underlies the Broome Aquifer and acts as a major aquiclude between it and the Wallal Aquifer below.</p> <p>Site specific hydrogeological investigations considered surface water resources and the interactions between groundwater and surface water. The only area where the surface water systems (drainage lines and possible seasonal ponding) may interact with groundwater is on the far south eastern edge of the project area. Two potential interactions were identified:</p> <ul style="list-style-type: none"> • Seasonal Soak – this was identified by Traditional Owners and is located 3km south east of the deposit. Investigations showed that groundwater levels in this location are 18 m below surface, indicating groundwater is part of the Broome Sandstone Aquifer. The soak is thus not fed from the Broome Aquifer, but from surface water ponding. • Fraser River South river valley – this is located about 8 km south east of the deposit area. Depths to groundwater range from less than 5 m to more than 20 m. Sheffield plan to install monitoring bores in this river valley in 2017 to further understand the hydrogeology of the river valley. <p>Impacts on these areas were discussed in Sections 8.3.2 of the PER.</p> <p>References: Laws, A.T., 1991, Broome, W.A.: Western Australia Geological Survey, 1:250,000 Hydrogeological Series, Map and explanatory notes. Pennington Scott, 2015, H3 hydrogeological assessment – Thunderbird Mineral Sands Project, Unpublished report for Sheffield Resources, Ref. 2022 Rev 2, March 2015. Searle, J.A., 2012, Groundwater resource review, Dampier Peninsula: Hydrogeological Record Series, Report No. HG57, Department of Water, Perth.</p>
		<p>Similarly, Rockwater Hydrogeological and Environmental Consultants were dismissive of any potential impact on saltwater intrusion on the basis of the distance from the proposed mine site and specifically excluded the possibility from their model.</p>	<p>A saltwater interface occurs within the Broome Sandstone Aquifer along the coastline. The Department of Water areal electromagnetic survey (AEM) indicates it is typically situated about 3 km inland, but can also extend much further inland beneath the Roebuck Plains. As indicated by Figure 47 on pg. 209 of the PER, significant (i.e. greater than seasonal variation) groundwater drawdown within the Broome Sandstone Aquifer is modelled to be restricted to within 10km of the mineral source area. As the mine site is located 95 km from Broome, no interaction with areas of saltwater intrusion are predicted.</p>

Inland Waters Environmental Quality

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
59	Mowanjum Aboriginal Corporation ANON-WQPC-QVK9-6	<p>MAC [Mowanjum Aboriginal Corporation] is mainly concerned with water use, land clearing and rehabilitation.</p> <p>I understand that Sheffield water use will not impact the water supply of our communities, not the quality nor quantity. This is very reassuring.</p>	Noted.
60	Yeeda Pastoral Company Pty Ltd and the Burton family ANON-WQPC-QVKF-K	There are limited or no areas that we are aware of that indicate a direct relationship between the ground water and any surface ecosystems. I do see potential smaller localized impact where road runoff will be observed but we have this sort of thing on all our stations and it is not an issue.	Noted.
61	Public Submission ANON-WQPC-QV1B-N	<p>The processing of ore will produce a range of toxic by-products. Position of the PER is to pump the toxins back into the aquifer. This type of mine management procedure is no longer acceptable. There is lots of talk about the benefits from the products that are going to be extracted however there is little comment in the PER regarding managing the polluted water. At the Broome presentation of the PER in August 2016 the Sheffield geologist talked about the flat topography that provided little opportunity of constructing storage dams. Sheffield intend constructing small dams as part of the surface water management. The experience at the nearby Ungani oil well a year or two ago demonstrated no capacity to manage toxic waste water in the wet season by pumping polluted water out into the environment during monsoonal storms. There is no clear plan for managing surface water as there is no way that Sheffield can manage water safely on the surface or under the ground.</p>	<p>Materials characterisation has been undertaken for mine wastes and process residues consistent with WA and international guidelines (PER Appendices 19 and 20). Results of this have demonstrated that disposal of process residues in the TSF and mine voids will not cause pollution of land, groundwater or surface water.</p> <p>The comment in the August 2016 community presentation was in relation to flat topography not lending itself to collection of surface water runoff in dams to provide a water supply for the project, hence the water source for the project was to be from the Broome Sandstone Aquifer. Small water storage and transfer dams will be constructed as described in Section 3.5.2.5 of the PER. This includes HDPE lined storages where process water will be the primary input. The design freeboard for these structures is stated to be sufficient to hold a 1 in 100 year 72 hour ARI event (PER Section 8.4.2). This freeboard is consistent with regulatory requirements. The contents of these storages will predominantly be groundwater. Given ore processing is based on physical properties of the minerals with the only chemical addition to be in the hot acid leach step within secondary processing, the potential for pollution from these dams in wet season events or accidental overflows is considered extremely low.</p> <p>In the event of significant rainfall, the volume within water storages will be closely monitored. Actions such as reducing or stopping inputs to storages to prevent overflow will be taken as necessary. Where safe to do so, excess water may be discharged to the environment. If this is required, it will be in accordance with regulatory requirements and regulators would be notified as per conditions of any approval/permit.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
62	Public Submission ANON-WQPC-QVKC-G	<p>There is not one mention of the impact on air quality in Derby from diesel engine exhaust from the fleet of trucks operating through the centre of Derby to get to Derby Wharf.</p> <p>The research on the health impacts of diesel engine exhaust is extensive and conclusive, and in total adds up to there being a major and unacceptable increase in damage to Derby's public health from diesel engine exhaust pollution created by the movement of Sheffield's road trains through the centre of Derby. [See Submitters References]</p> <p>This additional air pollution violates the right of Derby's people, under Schedule 4, Clause 1 of the Intergovernmental Agreement on the Environment... that people enjoy the benefit of equivalent protection from air, water and soil pollution and from noise, wherever they live (Department of Environment, Australian Government May 1992).</p> <p>Within about 300 metres of the Loch St route through the centre of Derby [...] are [sensitive receptors such as schools, hospitals, and residential dwellings]:</p> <p>...all the town's main services, including the services used by the most vulnerable (children and the sick, as identified by the Washington Dept. of Ecology) are within the 300 metre range of especial exposure to the health impacts of the diesel engine exhaust pollution. These services are used by most of Derby's population daily.</p>	<p>Section 11.4.2.5 of the PER assesses the potential impact of diesel particulate and gaseous vehicle emissions exposure on the health of members of the public. This addresses the emissions from trucks transporting product through Derby.</p> <p>The IARC/WHO position on diesel exhaust is well understood and considered entirely valid and referenced in the first sentence of Section 11.4.2.5 of the PER. The same and other references as given in the PER note the significant changes in diesel engine technology and emissions over the period of 2004 to 2007, but this change in risk profile is not acknowledged in this public comment. In summary the key points to note are that:</p> <ul style="list-style-type: none"> • DPM measured as elemental carbon has reduced by approximately 100 fold in 2007 vehicles versus 2004. For older engines the difference would be greater. • The IARC classification of DPM from primarily pre-2004 vehicles as a carcinogen is considered entirely valid and a significant cause of health effects in exposed populations. The recognition of this (amongst other factors) drove the introduction of diesel emissions laws in Europe which has flowed on worldwide. • As a result of the above ideally all pre-2007 diesel engines (4WDs, trucks, mobile plant, ships and boats) would be banned from use or subject to retrospective emissions controls in order to protect public health. It would take approximately 100 modern (post-2007) engines of similar size to cause similar DPM emissions to an older diesel engine. Lack of political will in Australia has prevented this or the introduction of any ambient air quality guidelines for DPM but to rather rely on the gradual phasing out with age and replacement of older engines. • Trying to estimate risk in an urban air shed from diesel particulate is one of the currently hardest things to do from an environmental health perspective – it is partly why all governments including the EU have been hesitant to set airborne standards. Guidelines and monitoring internationally are set instead for general particulate matter (PM) in the 10 micron and 2.5 micron range (PM10 and PM2.5). • The health effects of high levels of airborne PM10 and PM2.5 are well known (WHO, DoH) and include distinct correlations with increased mortality from heart disease, stroke and pulmonary effects etc. Establishing clear effects from modern (post 2007) engines has not been possible in any study given the lower emissions, long latency period of at least 20 years between exposure and effect and the confounding factors of smoking, diet and especially in Derby the high level of ambient airborne PM10 and PM2.5. Also the assumption that dose-response is linear at the very low environmental versus occupational exposure levels is not established for modern engines. • Given the above, an independent investigation into potential health effects from a 2.4% increase in truck movements of modern engine trucks versus the ambient air dust background and presence of existing older diesel engines could not possibly determine evidence for a health impact in comparison to other factors and based on available post-2007 engine data. Many older references indicate DPM forms the majority dust in urban air sheds, but this proportion is changing (decreasing) with more modern engines and is especially not true for Northern Australia which has high levels of ambient dust background. • The above can be seen in European ambient air monitoring (Annex1) where results from Spanish air monitoring as 'EBC' (an estimate of DPM) is much lower (e.g. Huelva) as proportion of the PM10 in Southern Spain than in other European sites or Barcelona where the vehicle density is higher. http://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0ahUKEwiYxZ_w6bnRAhUDGJQKHccCDtsQjBAITAB&url=http%3A%2F%2Fwww.eea.europa.eu%2Fpublications%2Fstatus-of-black-carbon-monitoring%2Fdownload&usq=AFQjCNH2UC_RDvqC4DAGvr0FPT2jjiNqCg&bvm=bv.143423383,d.dGo/ <p>Derby would have far higher proportions of PM10 to DPM and the majority of DPM would be from existing older engine sources.</p> <p>Based on the additional 10 return trip truck movements per day along Loch Street (an approximate 2.4% increase on 2013/14 levels) for modern diesel trucks generally operating at optimum temperatures, any increases in DPM and gaseous vehicle emissions are not likely to be measurable. Isolated and infrequent acute impacts to the health of members of the public is considered 'Unlikely'. The potential residual impact of diesel particulate and gaseous vehicle emissions on the health of members of the public, after implementation of management measures, is assessed as 'Low'.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
		<p>[Respondent Makes the Following Recommendation]</p> <ul style="list-style-type: none"> - Prior to commencement of mining, the EPA should require an independent investigation into the potential impacts on the health of Derby's people from diesel engine exhaust pollution. The results should be made publicly available. If it is found that the diesel engine exhaust has the potential significantly to damage the health of Derby's people, then the EPA should declare that to be a fatal flaw and refuse to allow the project to proceed. 	<p>Investigations worldwide into the potential health impacts of diesel engine exhaust on public health for post 2007 manufactured engines have failed to find any evidence of significant impact compared to pre 2007 vehicles. The clear difference between pre and post 2007 vehicles is outlined in the following references:</p> <p>World Health Organisation International Agency for Research on Cancer (IARC) (pages 47 to 54): http://monographs.iarc.fr/ENG/Monographs/vol105/</p> <p>Review Paper: 'Particulate Matter in New Technology Diesel Exhaust (NTDE) is Quantitatively and Qualitatively Very Different that Found in Traditional Diesel Exhaust (TDE)' http://www.tandfonline.com/doi/abs/10.1080/10473289.2011.599277</p> <p>Where is was found "Numerous emissions characterization studies have demonstrated marked differences in regulated and unregulated emissions between NTDE and "traditional diesel exhaust" (TDE) from pre-1988 diesel engines. Now there exist even more data demonstrating significant chemical and physical distinctions between the diesel exhaust particulate (DEP) in NTDE versus DEP from pre-2007 diesel technology, and its greater resemblance to particulate emissions from compressed natural gas (CNG) or gasoline engines." Furthermore, preliminary toxicological data suggest that the changes to the physical and chemical composition of NTDE lead to differences in biological responses between NTDE versus TDE exposure." "...there is now sufficient evidence to conclude that health effects studies of pre-2007 DE likely have little relevance in assessing the potential health risks of NTDE exposures."</p> <p>Based on the above scientific understanding of the potential impacts of diesel exhaust emissions of post 2007 diesel engines (Euro IV emission standards compliant), the legislative controls on diesel fuel constituents, current number of vehicle movements and the number of confounding factors in any public health study (including general dust, smoking and other air pollutants) in a relatively small population which is very difficult to account for these factors, we do not believe such an investigation is warranted.</p> <p>As described in Section 11.4 of the PER, Sheffield believe the EPA objective relevant to Human Health can be met for Derby if the project is implemented.</p>
		<ul style="list-style-type: none"> - If the mine is allowed to proceed, then one year prior to the commencement of mining, air quality monitoring equipment should be installed along the Loch Street route through Derby, and at sensitive sites within 300 metres of Loch Street such as at the health centres and schools, to capture a full year's baseline measurement of air quality before Sheffield's trucks start driving through the town. This monitoring should be done by the Dept. of Health's Public Health Unit, and the results should be made publicly available. 	<p>Sheffield will conduct baseline air quality monitoring prior to commencement of road haulage at sensitive receptors to determine baseline particulate and radiation concentrations. Such monitoring will be undertaken in a manner consistent with Australian Standards and any regulatory requirements.</p>
		<ul style="list-style-type: none"> - Once the trucks start driving through Derby, the air quality monitoring should be continuous, with the results being made publically available each month. 	<p>Sheffield will undertake air quality monitoring during operations. Results will be made publically available. This is consistent with Sheffield's commitment to transparency in its operations.</p>
		<ul style="list-style-type: none"> - The public health statistical information on the conditions in Derby known to be caused by diesel engine exhaust should be carefully recorded prior to commencement of the project, and then followed up by Public Health so that longitudinal statistics can demonstrate the health impacts of the pollution. The information should be made publicly available. <p>Submitter's References: Department of Ecology, State of Washington, USA. Concerns about Adverse Health Effects of Diesel Engine Emissions White Paper, December 3, 2008. Publication No. 08-02-032</p> <p>Department of Environment, Australian Government, May 1992. http://www.environment.gov.au/node/13008 Intergovernmental Agreement on the Environment, Schedule 4.</p> <p>World Health Organisation. International Agency for Research on Cancer. DIESEL ENGINE EXHAUST CARCINOGENIC. Press release 213, 12 June 2012</p> <p>World Health Organisation. http://www.who.int/mediacentre/news/releases/2014/air-pollution/en/. News release, 7 million premature deaths annually linked to air pollution. 25 March 2014.</p>	<p>The request for involvement of the Department of Health in additional studies to determine impacts of diesel engine exhaust emissions on the population of Derby is noted.</p> <p>Based on the reasons explained above, Sheffield do not believe studies such as those stated are necessary as post 2007 vehicles and legislative controls on fuel standards implemented in Australia are considered adequate to minimise impacts from diesel exhaust engines on human health (as described above). Further it is noted that the population of Derby (< 5,000) is likely to be considered too small for any meaningful statistics from short (cross-sectional) or long term (longitudinal/cohort) studies once confounding higher risk factors of smoking, airborne dust, fires and occupational exposures are accounted for. Such studies normally require major cities or national statistics to be considered relevant.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
63	Public Submission ANON-WQPC-QV1B-N	<p>The PER identifies there is a genuine risk to local people due to the high levels of airborne radiation in the dust that would be created transport and loading of the ore. The PER attempts to dismiss the significance of the risk to the public by adding little comments saying there are no receptors or residents in the area. The truth is residents and visitors use the area on a regular basis. Ambient dust accumulates on the surface of the built environment and in the mangroves where people hunt and fish as part of their cultural connection to the spirit of 'country' and as part of the hybrid economy that sustains people living in poverty.</p> <p>On Page 279 the PER claims "The export products have limited potential for dust generation as they are granular, do not contain fine, and have high specific gravities." The assumption that the granular size of the sand will prevent it from being blow around in the wind does not take factor in the local conditions. The Derby Jetty is the windiest place in Derby, it is the place the Derby locals (who don't have air-conditioning) go to cool down following a sweltering Kimberley day, to catch the breeze. Then there are the cyclones, gales and sandstorms that move large deposits of granular sand.</p> <p>The constant downplaying of the risks to local human health is typical of the PER and good reason for it to be rejected. I urge the EPA to reject this PER and request Sheffield to go through the proper processes of reporting the genuine risks to the local people and the environment. It is too late to start to re-evaluate the project after there is an epidemic of radiation illness or some other impact on local human health.</p>	<p>The PER and subsequent re-calculations of expected radiation dose from worst case conditions of ilmenite export through Derby indicate an extremely low level of possible dose (0.0082 mSv/year) which is several thousand fold lower than is received from other sources for any member of the public. The Radiation Fact Sheet recently produced for the project explains the expected dose in relation to other exposure sources.</p> <p>The specific gravity of the ilmenite products will be approximately double that of simple sand and will not contain significant fines material. A particle size determination of the material prior to export will confirm this and can be used to confirm the lack of dusting potential. The 'sandstorms' in the area are caused by the silts and clay material of surrounding mudflats are not an indication of how ilmenite will behave under the same conditions where the high specific gravity significantly reduces the capacity to become airborne. Demonstrated experience of ilmenite loading at other locations has not indicated significant dust issues compared to other materials.</p> <p>Sheffield have not attempted to downplay the risk to human health whether associated with dust, noise or radiation. These have been considered and risks assessed based on valid scientific information.</p>
64	Wilderness Society BHLF-WQPC-QV1N-1	<p>A recent report completed by C023, outlined that across Australia from the decade between 2014-2013 over 3.5million hectares was cleared, combining in a release of 637 million tonnes of carbon dioxide entering out atmosphere.</p>	<p>Noted.</p>
65	Department of Environment Regulation	<p>Please see attached report <i>Technical Expert Report – Air Quality – Thunderbird Minerals Sands Project</i> (February 2017) (Attachment 4A) and respond to the matters raised.</p> <p>The proponent states that background data used for TSP, PM10 and PM2.5 are based on monitoring data from the Kimberley and Pilbara regions, which the proponent considers to be conservative. This seems reasonable, noting that the monitoring reports were not provided for review.</p> <p>Previous DER advice on the ESD suggested the inclusion of a discussion on dust composition with respect to air quality. Dust composition is not considered in the mine or port modelling assessments. It is noted that the PER Section 4.2.7) states that:</p> <ul style="list-style-type: none"> • Testing of overburden samples showed low concentrations of As, Cd, Cr, Cu, Fe, Ni, Pb, Se, U and Zn (Table 12 of soil and landform assessment). • Testing of mine waste (samples from below the overburden layer) showed minor enrichment in selenium levels. • Testing of process residue (samples from the Mineral Separation Plant) showed some enrichment in lead and selenium levels. • The mineral sands do not contain "Heavy Metals". <p>The discussion appears to relate to solubilisation and seepage with respect to the aquatic environment, rather than metal concentrations in dust and potential health impacts.</p> <p>The TSP 90 ug/m³ annual standard adopted in modelling is based on published guidance from EPA NSW (Approved Methods for the Modelling and Assessment of Air pollutants in NSW, 2005). The TSP standard generally adopted in WA is the 90 ug/m³ 24-hour standard as per the Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999. Re-modelling against the 24 hour criterion would be expected to show increased TSP Ground Level concentrations (GLC's) compared to the annual average GLC's.</p>	<p>In Section 5 of both reports, the source of the data was stated to be Reference 15 and 16. Section 7 provides the details of the source data considered to derive the background data. Specifically these were the air quality assessments undertaken by Northern Minerals (2014) and Rey Resources (2014), both of which were submitted to the EPA as part of formal assessments.</p> <p>The final ESD does not require dust composition to be specifically investigated. Similarly the copy of DER advice to the EPA on the draft ESD dated 7 June 2016 does not contain any information in regards to the inclusion of dust composition investigations for either the mine or port areas. PER Section 4.2.7 provides baseline information about mine waste characterisation, specifically overburden, mine waste and process residues planned to be returned to the mine void. The discussion on geochemical characteristics is related to their behaviour when they are disposed of within the mine void. In such circumstances, understanding the leaching potential is critically important. In no way was this information attempted to be applied to potential air quality and human health impacts. Given the information is specific to materials that will be handled at the Mine Site and not the port, this information is not applicable to consideration of human health impacts within Derby or the Derby Port. Human health impacts for Derby and the Port were addressed in Section 11.4 of the PER. The mineral sands products after separation from waste clays are particularly chemically inert and very low in heavy metals due to extensive environmental leaching. For example the primary ilmenite products to be exported through Derby will be approximately 93 to 95% ilmenite (FeTiO₃ with minor amounts of Mg and Mn) and the residual mostly rutile (TiO₂), quartz (SiO₂), zircon (ZrO₂) and minor aluminosilicates. The potential for health impacts from airborne ilmenite dust is therefore considered only to be total levels of dust (particularly PM10) and radiation (inhalation of radionuclides) and these were considered and addressed in the PER by consideration of modelling and uranium and thorium content determinations.</p> <p>The EPA NSW TSP annual standard was adopted for the modelling in the absence of anything being specified for use in WA. It was felt the 24-hour standard applied to the Kwinana air shed (a densely populated urban environment) and as stated by DER being informally applied elsewhere across the State was not particularly useful given the rural conditions experienced at the Mine Site and Derby. Use of the TSP annual standard in conjunction with 24-hour average PM10 and PM2.5 modelling results provides an effective assessment of likely impacts to air quality at both locations.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
		<p>Discussion of PM10 allowable exceedances are not relevant as they are not part of the current National Environment Protection (Ambient Air Quality) Measure (NEPM) and in any case were previously applied to natural events such as wind-blown dust and smoke from bushfires. Therefor the maximum predicted GLC for PM10 should be considered for assessment purposes and not the 6th highest.</p>	<p>Figure 5-3 of Appendix 12 (Minesite Air Quality Assessment) shows the maximum ambient PM10 concentrations for a 24-hour period and Figure 5-4 shows the 6th highest PM10 GLC for a 24-hour period. The text below this figure states that both the highest and 6th highest GLC's were considered. The modelling results showed that PM10 levels are elevated in the immediate vicinity of the mine site and unpaved road, however quickly fall below the 50 ug/m³ standard within a short distance. Similarly, Figures 5-3 and 5-4 of Appendix 17 (Derby Port Air Quality Assessment) show the maximum and 6th highest ambient PM10 concentrations for a 24-hour period with the following text stating that PM10 levels are expected to be well below the criteria of 50 µg/m³ on a 24 hour average at the nearby sensitive receptors and within the town of Derby, with elevated dust concentrations restricted to the immediate vicinity of the port.</p>
		<p>The maximum predicted GLC's for 24-hour average PM10 and to a lesser extent PM2.5 at the camp site are close to the NEPM standards (Figures 1 and 2). Given the uncertainty present in model predictions, this receptor may be impacted by dust.</p>	<p>The accommodation camp will be located about 4km from the mine site and 3km from the power plant. Modelling shows that exceedances of PM10 and PM2.5 for 24-hour periods will not occur at the accommodation camp. The results of the modelling are the primary assessment tool and these are considered conservative in nature and still indicate acceptable concentrations for 24 hour camp site/community exposures.</p> <p>Additionally, the majority of the time people spend in the camp will be indoors in air conditioned facilities as they sleep and eat, the likelihood of adverse health impacts arising if the modelling is incorrect and particulate concentrations are higher than anticipated is considered low. Given the highly conservative nature of the modelling undertaken, Sheffield believe the likelihood of it underestimating potential exposure is low.</p>
		<p>Model results for PM2.5 annual averages are not included in the air quality assessment reports. Therefore comparison with the NEPM standards is not possible.</p>	<p>PM2.5 is included in the NEPM as an advisory reporting standard and is used as a goal to facilitate information collection rather than being considered as a limit. Despite this, PM2.5 24-hour average GLC plots were included in Appendix 12 and 17 as Figures Y and 5-5 respectively with the results compared to the NEPM 24-hour advisory standard of 25 ug/m³. Model results for the annual averaging period were not included to be consistent with PM10 results and limits (PM10 does not have an annual average limit).</p>
		<p>Dust control measures for all sources are not clearly articulated in the PER modelling appendices and it is unclear, for some of the emissions estimates used, if these apply with or without controls. The PER main document refers to the Product Storage Facility having a drive-through enclosed unloading area to ensure product is contained within the facility during unloading activities, and that transfer of product to the barge will be via a conveyor. No discussion of how these measures were integrated into the emission estimates was included in the reports.</p>	<p>Dust control measures which have been applied for the modelling have been explicitly stated in Section 3 of both PER Appendix 12 and 17:</p> <ul style="list-style-type: none"> • Appendix 12 (Mine Site) -in Table 1, sub note 1. • Appendix 17 (Port) - Paragraphs 5 and 6 and also in Table 1, sub notes 2 and 3. <p>No other credit has been applied for dust control measures - only what is clearly stated in the report.</p>
		<p>There is an apparent inconsistency in the 3rd paragraph of Section 3 of the mine air quality assessment report (page 4 or 22) regarding the number of truck trips per day, truck capacity and total tonnage moved per day. Five road trains of capacity 115 tons making two trips per day results in 1150 tons per day being moved. However, the report states that 2,300 tons of products will be transported per day at peak production. It is not known if this discrepancy impacts the assumptions adopted for road emissions.</p>	<p>There is an error in the text of the report in Appendix 12. The maximum number of trucks that will transport bulk mineral sand product to Derby in Stage 1 is 10 meaning 20 road movements per 24 hour period and for Stage 2 this will be 20 meaning 40 road movements per 24 hour period. These will be quad road trains. The model parameters have been checked and the input was for 20 return truck movements.</p>
		<p>A restaurant appears to be present at the Derby Port according to Google Earth Street View (Figure 3) If this restaurant is operational during the mining, the dispersion modelling predictions suggest that there may be a risk of dust impacts at this location (Figure 4).</p>	<p>A restaurant /cafe does exist about 300 m north east of the ship loading facility. This facility has co-existed with ship loading previously in various forms as a dine in or take away only venue. Currently it operates as a restaurant with an outdoor eating and viewing area. Typically it closes in the wet season (December to March). It is noted that the restaurant is not in the prevailing wind direction from the ship loader, but rather cross wind. Product trucks will unload either in an enclosed shed or directly to a silo structure meaning the risk of particulate emissions is low. It is estimated that 20-40 sailings per annum of ocean going vessels will be required at Derby Port, meaning that a vessel will be scheduled every 1 to 3 weeks. With an average vessel load of 15,000 tonnes, this will require loading of around 3 barges per vessel. Modelling predicts GLC for the PM10 24-hour average to be between 40-45 ug/m³ which is below the 24-hour average limit. Air monitoring during the last ship loading events in 2007/2008 for zinc concentrate (similar density to mineral sands, but much finer particle size) by the DER and Lennard Shelf suggests much lower actual concentrations than air modelling predicts. Sheffield will conduct air quality monitoring at the restaurant/café during ship loading operations for the first 12 month period to ensure actual particulate emissions are consistent with modelled predictions.</p>

No.	Submitter	Submission and/or issue	Response to comment
66	Public Submission ANON-WQPC-QVKY-6	The engagement of Indigenous rangers per the Aboriginal Heritage Management – Operations Framework is a very practical and realistic measure for the Company to avoid breaches of the Aboriginal Heritage Act 1972 and also any potential effect on culturally significant areas.	Sheffield has committed to the development of an Aboriginal ranger program that will be an active and ongoing part of the land management activities for the project area. No ranger programs currently exist in the area. It should be noted that no Native Title claims have been lodged for areas outside of the Mount Jowlaenga No. 2 polygon whose boundaries are identical to the Mining Lease application area. One determined Native Title claim exists for the first 16 km of the access road. The remaining 12 km of the access road to the point where it meets the Mining Lease application is not in an area of Native Title Claim. The ranger program will be operated privately by Sheffield and is anticipated to form part of an Agreement with the Mount Jowlaenga #2 People. Aboriginal people including Traditional Owners of the project area are anticipated to form a large percentage of the workforce independent to the ranger program.
67	Shire of Derby/West Kimberley ANON-WQPC-QVKG-M	<p>In addition to the management measures detailed under Section 9.2.3 – Table 71 – Proposed Management Measures for Protection of Amenity for the Derby Port Development Envelope – the proponent be required to prepare Noise and Traffic Management Plans to the satisfaction of the Shire of Derby/West Kimberley.</p> <p>The Council acknowledges that the PER details a set of management measures to be put in place that responds to the suite of identified environmental impacts and that the measures as they apply to the issues specifically impacting on the Derby town site are considered appropriate and justify the project approach. Notwithstanding, the Shire has sought to adopt a more proactive approach in respect to management impacts upon the community and in particular in regard to the issue of noise and traffic management.</p> <p>To this end, it has been put to the proponent that the Shire would seek the EPA to apply a condition to any future approval that requires the proponent to prepare and implement Noise and Traffic Management Plans which would be to the satisfaction of the Shire of Derby/West Kimberley. It is envisaged that this plan would provide the Shire with a better ability to manage the issue of trucking movements to and from the wharf along Loch Street.</p> <p>This would extend to implementing quarantine periods and a greater ability to manage noise issues through defined management practices.</p> <p>The proponent has acknowledged this intent and the matter is foreshadowed within the proposed Management Measures, Section 9.2.3 – Table 71 of the PER.</p> <p>We trust that the EPA will be able to support the submission of the Council and have any approval issued with the condition requiring the proponent to prepare Noise and Traffic Management Plans which would be to the satisfaction of the Shire of Derby/West Kimberley.</p>	Sheffield has discussed this with the Department of Transport and the Shire of Derby West Kimberley and will commit to preparing a Traffic and Transport Management Plan in conjunction with both organisations. Such a plan has not been prepared as part of the PER as the type of material to be included is significantly more detailed than required at this stage of the project development. As project development progresses and greater project certainty is obtained, such a plan will be drafted and input sought from potentially impacted stakeholders. Sheffield recognises the importance of establishing and maintaining an effective working relationship with the Shire such that any concerns associated with its operations can be rapidly acted on.
68	Mary Island Fishing Club ANON-WQPC-QVKE-J	<p>The Preliminary Port Environmental Management Plan addresses potential impacts to Amenity, Marine Environmental Quality and Marine Fauna.</p> <p>Amenity addresses vehicle movements, noise, dust and visual amenity. The jetty, boat launch and retrieval facility and the mangroves around the port are used regularly by locals (including traditional & business purposes) and tourists alike.</p> <p>A 24/7 operation may impact on these daily occurrences with nuisance noise at a time that is normally not impacted, heavy vehicle movement in and out of the facility, creation of dust,(unloading of material), movement of heavy vehicles outside the bituminised areas and possible road degradation of access road to boat launch & retrieval facility.</p> <p>The MIFC would like Sheffield Resources to provide new information including but not limited to [a] traffic management plans that ensure safe access to the recreational launching facility at all times.</p>	Sheffield has committed to preparing a Traffic and Transport Management Plan in conjunction with the Department of Transport and the Shire of Derby West Kimberley. This plan will take into account the need for access to the recreational launching facility.

No.	Submitter	Submission and/or issue	Response to comment
69	Yeeda Pastoral Company Pty Ltd and the Burton family ANON-WQPC-QVKF-K	<p>With the number of vehicles we would envisage that the road and the mine would be fully fenced to reduce risk to staff and stock.</p> <p>We see no other adverse impacts from the traffic generated by this mine</p>	Noted.
70	Bidan Aboriginal Corporation ANON-WQPC-QV1C-P	<p>[The preface to the PER should reference] 'Traditional Owners, both past, present and future'.</p> <p>[The preface to the PER should] acknowledge and reference the cultural heritage management mechanisms that are identified within the document to support the protection of cultural heritage as developed with Aboriginal people, particularly the Aboriginal Heritage Management Operations Framework, the Cultural Heritage Management Plan and the implementation of the Aboriginal Cultural Heritage Rangers.</p> <p>Point 4.3.15 (Heritage) on Page 152 states that searches of both the Aboriginal and European heritage registers were undertaken of the Derby Port and that no sites were found in or near the Port Development Envelope. A quick review of both the local planning scheme and the DAA register show that there are sites in close proximity to the Port and these should have been considered in the heritage study for the Port itself.</p> <p>The stakeholders identified for the project in Table 44 (pg. 163-165) does identify 'Indigenous Groups' but only lists the Prescribed Body Corporates and regional bodies such as the Kimberley Land Council and Kimberley Regional Economic Development. The proximal Aboriginal communities, the closest neighbours and permanent settlements of both Bidan (formerly Bedunburru) and Pandanus Park should also be acknowledged as stakeholders in the process.</p>	<p>Noted. However the PER has now been published, and we are unable to make changes to the document following publication.</p> <p>Noted.</p> <p>A supplementary search of the Department of Aboriginal Affairs 'Aboriginal Heritage Inquiry System' undertaken on 22 February 2017 confirmed that there are no known Registered Aboriginal Sites or Other Heritage Places within the Port Development Envelope or its immediate surrounds. The nearest Registered Aboriginal Site (ID 12391) is located within the Derby town site, approximately 2 km south east of the Port Development Envelope. A collection of additional Registered Aboriginal Heritage Sites also occur within the Derby town site. Given the separation distance between the Port Development Envelope and these heritage places, development proposed within the Port Development Envelope will not result in impacts on heritage values.</p> <p>The transport route travels along Derby Highway, Loch Street and Jetty Road, through the Derby town site. This route passes through three Registered Heritage Sites within the Derby town site, namely Bindjarnurru (ID 12391), Maradja (ID 12392) and Boorulla (ID 12394). The transport route through the Derby town site will be restricted to existing roads and as such no impacts on heritage values along the transport route are likely.</p> <p>Sheffield acknowledges that the settlements of Bidan and Pandanus Park as stakeholders in the process. Sheffield personnel and their environmental consultants met with these communities in November 2016 and delivered copies of the PER in January 2017 in order to ensure that any concerns and input on the process could be heard and discussed.</p>
71	Walalakoo Aboriginal Corporation Registered Native Title Body Corporate	<p>The PER includes an assessment of the heritage sites that may be impacted upon by the project.</p> <p>WAC would like to remind you that although we manage the for the native title for native title holders in the area of the mine, our members also many of the people that live in this area and will be affected by impacts on the natural environment, as native title holders, but also as members of the local public who should be consulted with the overall heritage impacts that the project is likely to have.</p> <p>Apart from the specific impacts that the project may have on Aboriginal sites as defined under the Aboriginal Heritage Act 1972 (WA), there will be impacts on the surrounding environment and impacts on the activities that native title holders undertake, such as hunting and visiting country.</p> <p>WAC has not been consulted with in accordance with EPA Guidance 41 in relation to general heritage and the impact the project may have on large areas, the native habitat, potential changes to the water table all of which are likely to impact on species found in the area. WAC on behalf of the Nyikina Mangala people assert that the project will have a large impact on areas of traditional hunting, and there has been no consultation with the native title holders as to how these impacts can be avoided or minimised.</p>	<p>Agreed.</p> <p>The project does not impact any Aboriginal sites especially within the Nyikina Mangala lands represented by the Walalakoo Aboriginal Corporation, nor will it alter the Native Title holders ability to hunt on and visit their country. The mine, and all of the infrastructure associated with the mine, apart from a section of the access road, is located outside the Nyikina Mangala determined Native Title area.</p> <p>WAC, and the Nyikina Mangala people themselves prior to the formation of WAC, have been consulted on several occasions including participation in a joint environmental survey and a number of heritage surveys. Sheffield will not have any impact on the Nyikana Mangala Peoples ability to hunt on and visit their country</p> <p>Sheffield apologises for the typographical error</p>

No.	Submitter	Submission and/or issue	Response to comment
72	KRED Enterprises Pty Ltd	<p>Sheffield seeking the grant of Tenement M04/459 without a Native Title consent</p> <p>On page 12 of the PER document, Sheffield states: “Sheffield is seeking an agreement with the Mt Jowlaenga Polygon #2 Claimant Group to facilitate granting of M04/459.”</p> <p>This statement is not correct. Sheffield is not seeking an agreement with Mt Jowlaenga Polygon #2 Claimant Group to facilitate granting of M04/459, nor was Sheffield seeking such an agreement at the date the PER was prepared in January 2017.</p>	<p>Sheffield was seeking to enter into an agreement, however negotiations failed and the matter is now being determined by the National Native Title Tribunal (NNTT).</p>
		<p>In fact, 3 months prior to the date of the PER, on 24 October 2016, Sheffield applied to the National Native Title Tribunal (‘Tribunal’) for a Future Act Determination Application (‘FADA’) in respect of the Tenement, which explicitly seeks the grant of the Tenement without an agreement with the Mount Jowlaenga People.</p>	<p>Agreed. See above. However, Sheffield has indicated to the Claimant Group that it is prepared to stand by the terms of its offer (made during the negotiation phase, and again on 26 October 2016), so that the Claimant Group will still be entitled to monetary and non-monetary benefits, including employment of two cultural heritage rangers and consultation on environmental management if the Mining Lease, and all other necessary approvals are granted.</p>
		<p>In addition, despite repeated requests from the Mount Jowlaenga People for a meeting and the Tribunal’s offer to mediate that meeting, Sheffield refused to agree to meet with the Mount Jowlaenga People for a period of 7 months before proceeding with the making the Future Act Determination Application in October 2016.</p>	<p>Parties attended several mediation meetings in 2016 organised by the NNTT before it was confirmed the parties could not reach an agreement and the matter was referred for determination.</p>
		<p>On page 12 of the PER document, the Sheffield goes on to state: “This agreement provides for the Claimant Group’s input into cultural awareness programs, cultural and environmental management and monitoring, as well as for employment and contracting opportunities in addition to upfront and production-based payments.”</p> <p>As Sheffield has applied to the Tribunal for a FADA allowing for the grant of the Tenement without an agreement with the Mount Jowlaenga People, there is no such agreement that provides for the matters that Sheffield refers to at page 12.</p>	<p>Earlier in 2016 the parties were attempting to negotiate an agreement containing the benefits and undertakings referred to, however as previously stated, the negotiations came to an impasse and the matter was eventually referred to determination. As stated above, Sheffield has communicated to KRED that, subject grant of the Mining Lease and other necessary approvals, Sheffield will stand by its 26 October 2016 offer. If the Claimant Group indicates its support for the Project by signing an agreement containing those terms, the offer will remain unchanged. If the Claimant Group does not wish to support the Project, Sheffield will execute a unilateral Deed of Covenant by which it will be legally bound, and the only change to the 26 October offer will be that the milestone payments will not be made.</p>
		<p>On page 117 of the PER, Sheffield states that: “Sheffield is working in close consultation with Traditional Owners to reach a Mining Agreement for the project. Details of the consultations are necessarily subject to a confidentiality agreement and therefore cannot be released for public review.”</p> <p>Again- this statement is incorrect for the reasons stated above- i.e.- that Sheffield has not met with the Traditional Owners since 11 March 2016, is not in any consultation with Traditional Owners about the ‘a Mining Agreement for the project’ and in fact applied on 24 October 2016 for the grant of the Tenement without a Mining Agreement to which it refers as being the subject of confidential consultation.</p> <p>As such, there are no terms of agreement between Sheffield and the Mount Jowlaenga People regarding any of the PER environmental protection measures proposed by Sheffield, nor have there been consultations about the PER with the Mount Jowlaenga people.</p>	<p>As indicated, Sheffield has communicated its intentions in relation to the offer referred to above and it will be confirmed by way of deed/agreement after the NNTT determination.</p> <p>Sheffield has undertaken significant consultation with the Mount Jowlaenga People including discussion on heritage, environment and future land use. Post the collapse of negotiations and the matter going to determination, face to face consultations ceased. The proposed Deed/agreement referred to above will contain provisions relating to environmental consultation.</p> <p>Since the commencement of native title negotiations in relation to the grant of the mining lease for the Thunderbird Mineral Sands Project Sheffield was repeatedly advised by KRED Legal, the appointed legal representatives for the Mount Jowlaenga #2 People, that all communications by Sheffield had to be directed to KRED Legal, and that no direct contact was to be made with the Mount Jowlaenga #2 People.</p> <p>The Mount Jowlaenga #2 People are represented by six named applicants for the purposes of their native title claim. These named applicants participated (together with KRED Legal) in a number of the negotiation meetings held between Sheffield and the Mount Jowlaenga #2 People at which meetings Sheffield provided power point presentations about the Project. As negotiations continued, however, the named applicants did not participate in many of the meetings and the Mount Jowlaenga #2 People were represented only by KRED Legal.</p>
		<p>Mischaracterisation of Activity Specific Heritage Surveys</p> <p>On page 115 of the PER, Sheffield refers to a Summary of Aboriginal Heritage Surveys, Outcomes and Actions Table 25 page 115 19.</p> <p>At Table 25, in the final row at the fourth column of the PER, Sheffield states that the: “second survey was completed to determine the ground available for mining purposes within the mining Operation.... Avoidance buffers around sites of significance were established and approved by Traditional Owners [and] Survey clearance was to assist with heritage understanding within the Public Environmental Review.”</p>	<p>The comprehensive heritage survey work completed on the project both, prior to the PER and during the earlier part of preparing the PER, was used in making reference to heritage in the PER. There was no “new” survey work conducted specifically for the PER.</p> <p>As Aboriginal heritage formed an integral part of the native title negotiations (and is also a relevant environmental factor for the purposes of the EP Act) Sheffield requested and the Mount Jowlaenga #2 People agreed, that a comprehensive heritage clearance survey of the proposed mine development works and mining operation activities would be undertaken. This survey took place over a period of a week in 2016, with the participation of authorised representatives of the Mount Jowlaenga #2 People. As a consequence of that survey, Sheffield agreed to a number of exclusion zones so that the proposed mining operations could proceed.</p>

No.	Submitter	Submission and/or issue	Response to comment
		<p>This is not correct. No survey has been commissioned by Sheffield of the Mount Jowlaenga People to assist with heritage understanding within the Public Environmental Review.</p> <p>There is no approval by Traditional Owners of a heritage clearance or buffers referred to by Sheffield in respect of the Thunderbird Project, the Tenement nor the PER process.</p> <p>Any such Traditional Owner approval would require an authorization meeting of the Mount Jowlaenga People.</p> <p>I confirm that no such meeting has taken place.</p> <p>In addition, Figure 35 of the PER, Sheffield claims to represent areas of "Heritage Survey Coverage".</p> <p>I note that any heritage survey conducted on Sheffield's tenure in the years referred to at Figure 35 has been undertaken on an activities basis, such that where Sheffield has proposed specific exploration activity in a specific location, that specific activity in the identified location is the subject of the survey. This is done in accordance with the terms of Heritage Protection Agreement that govern the tenure Sheffield holds in the location mapped at Figure 35.</p> <p>There is no basis to Sheffield's claim that the areas it has mapped at Figure 35 have been the subject of 'heritage survey coverage'.</p>	<p>This is only required for a negotiated outcome.</p> <p>Agreed.</p> <p>Heritage surveys have taken place in those areas, which are the same areas as the proposed operations, and in all that time heritage places requiring avoidance/exclusion have been identified. The surveys have been specific, depending on the year conducted, to specifically cover Mine Access roads (2014), borefields and Mining Operations (including site infrastructure) (2016).</p>
73	Public Submission ANON-WQPC-QV1B-N	<p>[T]he WA Aboriginal Heritage Act 1972 (AH Act) explicitly refer to the provision for 'the preservation ... of places ... customarily used by or traditional to the original inhabitants of Australia or their descendants. The proposed mine would break the AH Act because it would remove Indigenous access to the area. The mine would further break the AH Act as it would destroy rather than preserve the amenity of the area.</p> <p>The heritage values of any given area are usually assessed in consultation with the Traditional Owners associated with that area. Unfortunately the Sheffield executive have continued the legacy of colonisation by ignoring the AH Act and entering into a conflict relationship with Traditional Owners.</p> <p>Local Indigenous people in the region are facing a myriad of issues from the continual colonial practices of governments so they do not need the imposition of a destructive force that risks killing vast sections of their 'country' including the King Sound. Local Indigenous people have seen the evidence from around the Australia and the world where the best strategies for overcoming the complexity of issues facing Indigenous youth is grounded in going out on their 'country' and connecting the land with songs and stories of their ancestors from traditional time and the colonial period. Young Indigenous people learn about how the songs connect the landscapes and the people. The West Kimberley is one of the few places left in Australia and the world where people are still connected to ancient history and culture.</p> <p>The priority use for the land that is proposed for the mine must be preserved for wilderness and pastoral and Indigenous cultural use. Not mining should be seen as an investment in the future wilderness and pastoral industries and the maintenance of Indigenous law and culture, knowledge and practice.</p> <p>The mine planning and development process has demonstrate a lack of concern for local community interests. This is evidenced by the lack of engagement and constructive discussions with the Traditional Owners by Sheffield.</p>	<p>There were no heritage places identified where the mining activities are to occur in any of the heritage surveys conducted. It is our understanding that access to the area is already restricted by the pastoralist due to maintenance of security of the property in order to maintain its organic beef status. Except where necessary for mine safety requirements, access to the area will not be prevented by Sheffield to any greater extent than it is currently restricted by the pastoralist.</p> <p>To the extent where access to the mining area may be restricted from time to time as a result of mine safety requirements, such restriction is not, in any event, a breach of the provisions of the AH Act.</p> <p>All heritage values were identified and discussed in the heritage surveys conducted with Traditional Owners. The obligations and responsibilities required under the <i>Aboriginal Heritage Act (1972)</i> were always observed.</p> <p>The proposed area for the Mine Site Development Envelope is located entirely on land allocated for pastoral use. Land within the Derby Port Development Envelope is designated for industrial use.</p> <p>Sheffield has engaged extensively with Traditional Owners and believes they developed trust and comfort with all those involved over the course of its exploration and proposed development of the land. The disappointing aspect has been the fractured negotiation process in moving the project forwards.</p>

No.	Submitter	Submission and/or issue	Response to comment
74	Department of Transport BHLF-WQPC-QV18-B	<p>The Derby Port Area is currently subject to a Port Management Agreement and Lease between the Minister for Transport and the Shire of Derby West Kimberley pursuant to the Marine and Harbours Act 1981 and DoT has provided the Shire Of Derby West Kimberley the following comments to assist in its review and any submission it makes concerning the PER .</p> <ul style="list-style-type: none"> - At present concentration seems to be on not creating a nuisance or health risk to townsites residences without too much emphasis on preventing or minimising to the extent possible nuisance etc. to other current and potential future port users and preventing product pollution/contamination of the port area, - Reviewing complaints received on a quarterly basis would also not necessarily be seen as an adequate or timely response to incidents or complaints and the PER should in my opinion include more undertakings related to the immediate response to any issues that may occur. - The Port Operator (SDWK) and Head Lessor's representative as landowner (DoT currently and KPA at some future date to be determined) should also receive copies of exceedance reports (and actions taken) in addition to Sheffield's undertaking to supply this information to the environmental agency. - The expectation should be for no or absolute minimal dust, spillages, contamination within the port area with the infrastructure being designed and built or modified to meet this objective and for immediate response/corrective actions to address any non-compliance (Including periodic environmental assessments of certain port areas throughout the duration of the overall project to identify and remediate any contamination that may be occurring, not just allow a build-up to occur until the end of the project/port use. - Some major contamination risks based on past knowledge would be: <ul style="list-style-type: none"> o Spillages from trucks delivering product to the port or carried/tracked by truck wheels /truck body sections when exiting the storage facility and port after delivering product. o Inadequate shed design allowing escape of dust during product delivery, stockpile maintenance and or export. o Conveyor not being adequately covered/contained. o Incorrect conveyor speed causing spillage. o Blockages on conveyor or loader transfer points causing spillage. 	<p>Given the industrial zoning of the Derby Port and that the nature of the port is to provide port services such as loading/unloading, barging and transshipment services, Sheffield understands that there is unlikely to be a conflict of interest with other port users. This is supported by previous discussions with SWKD regarding use of the wharf. Sheffield will consult with SWKD and DoT to minimise any conflicts or nuisance issues regarding use of the Derby Port and other Port users. It is anticipated that any such issues will be resolved initially through the sub-lease agreement process and ongoing communication throughout the life of the project.</p> <p>Sheffield notes that quarterly complaint review is not sufficient. Sheffield will respond to any complaint as soon as possible and aim to resolve the complaint within a specified timeframe. In addition to this, quarterly review of the Complaint Register will be carried out to determine any trends or chronic issues that require a more coordinated approach to resolving and to assist in future improvement planning.</p> <p>The expectation is for no or minimal dust generation, spillages and / or contamination within the port area. The granular nature of the product means that dust generation is inherently low and the product is environmentally benign. Section 9.1.2.2 of the PER details loading, barging and transshipment methods and assesses the potential for dust or spillage to impact the marine environment as low and can be managed effectively through the EP Act Part V (Works Approval and Licencing) approvals process. Infrastructure design and operation will be detailed in the Works Approval and Licence application to be submitted to DER for this infrastructure. This will include a commitment for immediate response/corrective actions to address any non-compliance. Periodic environmental assessments of loading, barging and transshipment activities and inspections of relevant port areas throughout the duration of the project to identify and remediate any contamination will be included in the works approval and licence application.</p> <p>The risks identified by DoT in the submission are noted and will be used to inform loading/unloading, barging and transshipment facilities design and operation. Sheffield will make these documents available to DoT as draft prior to submission to DER. However, overall it is considered that dust generation and / or the potential for spillage will not result in any discernible changes to the quality of water, sediment or biota in King Sound or adjacent waters.</p>
75	Department of Aboriginal Affairs BHLF-WQPC-QV1S-6	<p>SRL [Sheffield Resources Limited] states the Project area has been extensively and comprehensively surveys for Aboriginal sites, during a period from 2012 until 2016, and significant sites have been identified and mapped. The Register of Aboriginal Sites and Objects, managed by the Department of Aboriginal Affairs (DAA), does not have information about Aboriginal sites or other Aboriginal heritage places for the Project area.</p> <p>To allow an assessment on the Aboriginal heritage of the development footprint, the DAA requested the proponent to supply a copy of the heritage survey reports. The proponent did not provide the reports and indicated they are confidential. As the DAA does not have any information regarding the nature of Aboriginal heritage within the Project area, the DAA is unable to provide comment regarding the potential impacts to Aboriginal heritage. The DAA is aware the proponent has entered into heritage protection agreements with representatives of the Traditional Owners.</p>	<p>Noted. This has subsequently been discussed with DAA as part of the lead agency meeting held on 21 February 2017.</p>

No.	Submitter	Submission and/or issue	Response to comment
76	Department of Environment Regulation	<p>Please see attached report <i>Technical Expert Report – Noise – Thunderbird Minerals Sands Project</i> (February 2017) (Attachment 4B) and respond to the matters raised.</p> <p>The sound power level is quoted as 120 dB(A) for a road train in the environmental noise assessment for port operation. However, in assessing the traffic noise impact, the sound pressure level of 87 bB(A) at 7.5 m as per the Vehicle Standard (Australian Design Rule 28/01 – External Noise for Motor Vehicles) 2006 (ADR 28/01) is quoted for the same road train. It can be shown that these two sound level quotations represent two different sound power levels for the same road train/ I note that ADR 28/01 was superceded by ADR 83/00 for new vehicles as from October 2006.</p> <p>WSP predicts that road train noise levels will be $L_{Aeq(Day)} = 38.5$ dB and $L_{Aeq(night)} = 41.5$ dB at 30 m along Derby Highway, and $L_{Aeq(Day)} = 42.5$ dB and $L_{Aeq(night)} = 44.5$ dB at 20 m along Loch Street. These predictions are based on the assumption that daily road train movements are 40 (equivalent to 1.7 road train pass-bys per hour) and the pass-by by duration is 30 seconds per road train As there is no difference for day and night in terms of the number of train pass-bys per hour and duration of each train pass-by, it would be reasonable to expect that L_{Aeq} traffic noise levels for day and night are exactly the same. It is difficult to understand why the predicted traffic noise levels for day and night are different, as WSP indicated in its traffic noise assessment results.</p> <p>WSP only assessed the traffic noise impact at 30 m setback along Derby Highway and 20 m setback along Loch Street, which are the average distances to receivers along these two roads, as stated by WSP Traffic noise impact is not usually assessed at an average distance to receivers, Instead it is generally conducted at the most exposed residence, which normally responds to the residence closest to the road. It has been identified by acoustics consultant Lloyd George Acoustics, when assessing the traffic noise impact associated with the proposed Duchess Paradise Project that the closest house to the dual carriageway section of Loch Street) north of Ashley Street) is only 10m, and the closest noise sensitive premises is 18 m from the traffic couth of Ashley Street adjacent to the single carriageway section of Loch Street. The same situation also occurs along Derby Highway, where a residence within 30m of the road can be identified.</p> <p>The traffic noise impact depends on the speed of the vehicles. However, there is no indication as to what speed limit was used by WSP in its traffic noise impact assessment. It is noted that the speed limits for the road trains through Derby have not been determined yet, as the Public Environmental Review state that “Road train speed limits through the town of Derby will be determined in consultation with the Shire of Derby/West Kimberly, Main Roads WA and other Stakeholders”. OPEA may wish to clarify what speed/speeds were assumed by WSP in its traffic noise modelling.</p>	<p>The ADR 28/01 SPL was used for the traffic assessment as this related to on road conditions and was deemed more appropriate for the traffic noise assessment. The SWL of 120 dBA was used for the assessment at the port and was based on a slower moving road train under higher load on an unsealed road to be more conservative. This is viewed to be more representative for vehicle movement on site. According to the Australian Government Federal register of legislation ADR 28/01 is "in force - latest version" https://www.legislation.gov.au/Details/F2006L01279/Html/Text#_Toc129579546</p> <p>Section 4.2 of the WSP Parsons Brinckerhoff assessment (Appendix 18 of the PER) describes the modelling undertaken: ‘The received noise levels associated with the road trains for the day and night time period were logarithmically added to the existing traffic noise conditions’. As there is less other traffic on the roads during night-time periods, the noise level is lower.</p> <p>The WSP Parsons Brinckerhoff's assessment was based on separation distances from the receiver to the centre of the carriage way as opposed to from the receiver to the kerb within the survey. 117 Loch St is the nearest receiver to the roadway identified in the survey at 10 m between the receiver and the kerb. A measurement on Google Earth estimates that to the centre of the carriageway in this instance is 15 m, compared to 20 m used in the noise assessment. On the other hand, the nearest sensitive receiver identified by the survey on Derby Highway is 28 m from the road as opposed to 30 m in the WSP Parsons Brinckerhoff report. Changes in the overall predicted noise levels were generally negligible from an acoustic perspective. For the noise levels at 117 Loch Street, the predicted noise levels increase by up to 2 dB, but remains within relevant limit criteria.</p> <p>A vehicle speed of 50 km/h was used as per the SPL referenced in ADR 28/01.</p>

Human health

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
77	Kimberley Prawn Company (Aust) Pty Ltd ANON-WQPC-QVKP-W	It is noted that radiation hazards are dealt with in the PER. As the levels are much lower than world standards demand, there would appear to be no reason for this to be of concern...	Noted.
78	Citizen XX ANON-WQPC-QVKY-6	Mineral sands, like many substances, can contain naturally occurring radioactive material. The exposure and risk to workers and to the public from radiation from the various stages of production of the mineral sands product are minimal and well below established dose rate limits. Therefore I believe that the risk to the public and environment from radiation from the Project is negligible and acceptable.	Noted.
79	Public Submission ANON-WQPC-QV1B-N	<p>There is community concern about the potential contamination of the mudflats near the jetty and at the transfer station because there has not been open and transparent information made available regarding the impacts of the previous mining operation using the facility. The risk of contamination is genuine as stated on page 276,</p> <p>Although radiation exposure to members of the public is considered 'Possible' within the Derby Port Development Envelope and transport route to the Port, the total exposure is considered 'Incidental'. The potential residual impact of radiation on the health of members of the public, after implementation of the RMP, is assessed as 'Low'.</p> <p>I have seen the extent of time young people in Derby spend down on the mud near the Derby Jetty. It is [their] culture. Derby people catch and gather fish, crab, shellfish and prawns in close proximity of the loading facility. The PER claim that the exposure to radiation 'Low' does not take into account the local Indigenous and broader community use of the Port area. Mining company notoriously underestimate risk assessments, given the PER has identified there is a genuine risk, the EPA needs to appreciate the real risk is more than 'Low' and needs to be considered a serious threat to human health and safety.</p>	<p>Ownership and control of the site for the construction of the product storage facility at Derby rests with SWKD/DoT not Sheffield. Sheffield will enter into a sub-lease agreement with the owners for use of the site. Although a baseline study of this facility was conducted prior to Sheffield taking on a lease of this site from the Shire, the primary purpose was to validate the immediate area of the lease was not contaminated above industrial land use criteria and that acid sulfate soils would not be disturbed during construction of the storage facility. Only two very limited locations (DS2 and DS4) immediately adjacent to the culverts on the mudflats east of the lease area exceeded the ISQG low guidelines for lead or zinc (Table 8, Figure 3). Nickel was regionally elevated and copper (likely due to use of copper anti-fouling paints) was noted to exceed the ISQG lows at both boat ramp locations (DMS1 and DMS2). No sediment exceedances of ISQG highs were found which is normally the trigger for further investigation and/or cleanup based on risk to the environment. Although residual lead and zinc on the lease area is not considered a risk by MBS or DER or a Sheffield responsibility, construction of the facility will seal a large portion of the lease area soil and reduce potential for any mobilisation. Environmental monitoring for the project at the Port will also provide if anything an opportunity to further define if lead and zinc concentrations in sediment pose a risk and for remedial works to be planned if this is determined – at this stage no risk has been indicated.</p> <p>During the Feasibility Study process, the mined products were chosen to be split such that packaged zircon and leucoxene products will be shipped from Broome Port and bulk ilmenite products from Derby Port. A radiation fact sheet is attached to this response which outlines the updated radiation exposure estimates for Derby Port workers (0.134 mSv/year) and members of the public (0.0082 mSv/year). Even if a member of the public spends the equivalent time as a shift worker (2,000 hours per year) in the closest possible proximity to loading operations and dust levels are expected worst case at this distance (1.5 mg/m³, 10 m), the effective dose is still only 0.065 mSv/year due to the very low levels of activity of the ilmenite products. ARPANSA and the <i>Radiation Safety Act</i> do not consider there is any potential risk to members of the public below 1 mSv.year and the potential dose for members of the public are insignificant compared to other sources. Actual dust levels, time and distances are all expected to be significantly less than this after implementation of dust suppression strategies and ongoing dust monitoring which will include determination of radioactivity levels.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
80	Radiological Council BHLF-WQPC-QV1U-8	<ul style="list-style-type: none"> - In several areas, the document refers to Sheffield Resources appointing "a Radiation Safety Officer (RSO) to implement a Radiation Management Plan (RMP) and the Radiation Waste Management Plan (RWMP) on behalf of Sheffield". The RMP and RWMP must be implemented by Sheffield at all levels (management and employees) to control the risks from radiation. This cannot simply be implemented on behalf of Sheffield. - In several areas, the document references "environmental screening criteria (10 μGy/h)". The figure of 10 μGy/h used throughout the document is erroneous when used in the context of radiation monitoring following rehabilitation. It appears that this figure may have been taken out of context from the screening levels used in ERICA assessments for non-human biota. These references must be revised. - In several areas, replace "Radiation Safety Management Act 1975" with "Radiation Safety Act 1975". - Section 3.8.1 (page 43) references "radiation concentration greater than 1 Bq/g' under the "Radiation Safety Management Act 1975'. This does not reflect the definitions specified for radioactive substances under Regulation 5 of the Radiation Safety Act 1975. - Section 9.1.2.2 (page 228) states for the mineral sands products, "while being slightly radioactive, their low levels of radiation do not require regulation under the Radiation Safety Act 1975 for the purpose of transport, storage and export". As doses to workers in some cases have been shown to be above 1 mSv/year (e.g., 1.62 mSv for port workers), this operation will clearly require regulation under the Radiation Safety Act 1975. The intent of this paragraph may be to imply the exclusion provisions for transport, but this has not been referenced. - The second paragraph of Section 9.1.2.4 (page 230) is misleading in that it does not reflect the full provisions for exclusion from regulation. - The fourth paragraph of Section 10.5.2.3 (page 254) references that radiation post mining will be rehabilitated to 1 mSv/year. The commitments should reference the need to ensure that radiation levels are at or below pre-mining levels (as also established elsewhere in the document). If this cannot be met, then dose constraints would also need to be applied. 	<p>Noted, this was an error in wording. The RSO will be a direct employee of Sheffield.</p> <p>The intention was to achieve best practice in final radiation levels post rehabilitation to protect both human receptors and biota, hence the reference to this figure from screening assessments. It is noted that no single criteria to cover both of these receptors appears to be currently established and no baseline radiation data was available during preparation of the PER. As per response 83, rehabilitation criteria to protect both human and environmental receptors – possibly with a dose constraint will be established after discussion with the Radiological Council, DER and DMP.</p> <p>Noted.</p> <p>This source of the 1 Bq/g criteria was incorrectly referenced during editing of the document and subsequently corrected in most locations but missed in this instance. It is noted in general however that as the Radiation Safety Act (General) Regulations 1983 regulation 5 refers to a higher (30 Bq/g definition) as well as a quantity based definition by radionuclide (Schedule V), the concept of this definition and the need to also allow for effective dose to assess risk, it is harder to explain to the general public in particular. The 1 Bq/g for U/Th head of chain total activity usage from IAEA is therefore more common.</p> <p>The intent of the paragraph was for exclusion provisions for transport. Monitoring of Port workers at least initially is intended under the RSA 1975. It should be noted however that the value for Port workers of 1.63 mSv/year was based on the assumption of all shipping through Derby. During the feasibility Study process, the decision was made to split export for Ilmenite bulk products through Derby and bagged zircon concentrates through Broome. A re-assessment of dose for the two different groups of workers has now been completed and gave results of less than 0.5 mSv/year for both Broome and Derby workers. As these results are below the criteria of 1 mSv/year under the RSA 1975, monitoring may not be required but will be conducted at least initially to confirm this in consultation with the Radiological Council.</p> <p>See above.</p> <p>Noted. Additional criteria for human health (1 mSv/year) and maximum concentrations above background (air and water) under the RSA Schedule VIII will be addressed in the subsequent approvals documentation and management plans. A risk assessment screening using ERICA software was also conducted for marine sediment.</p> <p>Sheffield will be conducting a baseline radiation survey to establish pre-mining radiation levels (See Radiation Monitoring Regime, p36 in Radiation Professionals, Appendix 21). The intended aim is to achieve these levels following rehabilitation. Particular areas may be more difficult to achieve this and a dose constraint is likely – these are to be established as part of the RMP and RWMP. Although it is a requirement that the dose to post mine users of the land remain below 1 mSv/year, a suggested suitable target dose constraint would be something like 0.33 mSv/year.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
81	Department of Health BHLF-WQPC-QV1J-W	<p><u>Wastewater</u></p> <ul style="list-style-type: none"> - Installation of wastewater treatment and disposal system/s associated with the accommodation village and mine site facilities requiring either Local Government Authority (LGA) or DOH approval as per the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974. - Design and installation, of a wastewater treatment and disposal system/s associated with the accommodation village and mine site facilities in compliance with Australian/New Zealand Standards 1547:2012. - If any wastewater is used for beneficial purposes such as dust suppression or the maintenance of grounds or garden beds, a separate approval for water recycling of sewage effluent is required. Submissions need to be made to the Environmental Health Directorate of DOH in accordance with the Guidelines for the Non-potable Uses of Recycled Water in Western Australia, August 2011. - Design and installation of wash down and waste oil facilities to be approved by either LGA or DOH and managed in accordance with the DOH Guidance note for wash down facilities using recycled water. <p><u>Potable Water</u></p> <ul style="list-style-type: none"> - Drinking water quality to satisfy the health-related criteria specified under the most recent update of the Australian Drinking Water Guidelines 2011. - Establish and implement a Drinking Water Quality Risk Management Plan that is consistent with the risk management framework set out in the Australian Drinking Water Guidelines 2011 and endorsed by the DOH. <p><u>Aquatic Facilities</u></p> <ul style="list-style-type: none"> - Construction of the accommodation village aquatic facility requiring DOH approval in accordance with the Code of Practice for the Design, Construction, Operation, Management and Maintenance of Aquatic Facilities December 2015. 	<p>Noted.</p> <p>Noted.</p> <p>Noted.</p> <p>Noted.</p> <p>Noted.</p> <p>Noted.</p> <p>Noted.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
82	Walalakoo Aboriginal Corporation Registered Native Title Body Corporate ANON-WQPC-QV1H-U	<p><u>Lack of Consultation with Nyikina Mangala to date</u> In relation to consultation the PER states that the “Stakeholder consultation commenced in 2014 with the introduction of the project to the traditional owner groups. This consultation was enhanced throughout the exploration phase of the project; the function was strengthened with the appointment of a Community Relations Advisor and remains and integral part of the current project and development phase” (p.162).</p> <p>WAC [Walalakoo Aboriginal Corporation] do not consider that this is an accurate statement in relation to WAC, and to date there has been insufficient consultation with the Nyikina Mangala native title holders.</p>	<p>The proposed Thunderbird mining operations are not on Nyikina Mangala lands. Only the first 15 km of the site access road are on Nyikina Mangala lands. However Sheffield has communicated with and involved Nyikina Mangala people in the process throughout its activity on the project. All the heritage surveys conducted have included representative members of the Nyikina Mangala group from when first exploration works commenced right up to and including the mining operations heritage survey concluded in mid 2016.</p> <p>Since the commencement of Native Title negotiations in relation to the grant of the Mining Lease for the Thunderbird Mineral Sands Project Sheffield was repeatedly advised by KRED Legal, the appointed legal representatives for the Mount Jowlaenga #2 People, that all communications by Sheffield had to be directed to KRED Legal, and that no direct contact was to be made with the Mount Jowlaenga #2 People.</p> <p>The Mount Jowlaenga #2 People are represented by six named applicants for the purposes of their Native Title claim. These named applicants participated (together with KRED Legal) in a number of the negotiation meetings held between Sheffield and the Mount Jowlaenga #2 People at which meetings Sheffield provided power point presentations about the Project. As negotiations continued, however, the named applicants did not participate in many of the meetings and the Mount Jowlaenga #2 People were represented only by KRED Legal.</p> <p>As Aboriginal heritage formed an integral part of the negotiations (and is also a relevant environmental factor for the purposes of the EP Act) Sheffield requested and the Mount Jowlaenga #2 People agreed, that a comprehensive heritage clearance survey of the proposed mine development works and mining operation activities would be undertaken. This survey took place over a period of a week in 2016, with the participation of authorised representatives of the Mount Jowlaenga #2 People. As a consequence of that survey, Sheffield agreed to a number of exclusion zones so that the proposed mining operations could proceed</p> <p>Sheffield has also implemented an Aboriginal Heritage Management Operations Framework (Appendix 26 of the PER) which will address Aboriginal heritage issues which may arise as the Project progresses.</p> <p>In terms of any possible “social impact”, no Aboriginal community lives on the Project area, nor is the Project area accessible for hunting or other cultural purposes as it is a fully fenced pastoral lease owned and operated by Yeeda Pastoral Company Pty Ltd.</p>
		The PER also states that “there is no community that will be directly affected” (p.163) we consider that the community of Nyikina Mangala native title holders will be directly affected by the impacts on the environment and the construction and increased use of roads, some of which will be very close to where Nyikina Mangala people exercise their native title rights and interests. We believe that this statement provides a lack of understanding by Sheffield of indigenous attachment to land and environment, and any impacts on that land and environment.	As above.
		Table 47 provides that Consultation Requirements with Nyikina Mangala people are “consultation during project feasibility and construction, operation phases”. As noted to date there has been a lack of adequate consultation and we want to be assured that consultation with Nyikina Mangala people is not considered a rubberstamping process, we seek to be consulted and engaged with in a collaborative way so that we can raise concerns and have these considered and any potential impacts on our native title rights and interests mitigated, prior to any construction and operation stages.	As above. Consultations are still continuing. As previously stated, if the Mining Lease is granted, Sheffield has committed to employ two Cultural Rangers whose role will specifically include Traditional Owner consultation in relation to the development of the Project going forward.
		WAC does not believe there has been sufficient or adequate consultation with the Nyikina Mangala people on the Environmental impacts of the proposed mine and the resulting impacts on the Nyikina Mangala peoples native title rights and interests, as the traditional owners of the region proximate to the proposed mine, we are not simply a stakeholder group but have significant interests in the area, that need to be fully taken into consideration in Environmental planning over our traditional country.	As above.

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83	KRED Enterprises Pty Ltd	<p>The Mount Jowlaenga People- Key Stakeholder</p> <p>Table 44 at page 164 of Sheffield's PER lists various indigenous groups as being primary stakeholders (i.e.- those stakeholders Sheffield has identified as having "a direct involvement or may be subject to direct impacts from the project" and "more likely to have a high level of interest in the project and its impacts."</p> <p>Sheffield notes these primary stakeholders "are engaged and consulted more regularly to achieve high levels of understanding."</p> <p>Sheffield lists the Indigenous groups referred to in the following order:</p> <ul style="list-style-type: none"> - Indigenous Groups - Yawuru People - Nyikina Mangala People - Bindinbur Claimants - Mt Jowlanga #2 Claimants - Kimberley Land Council - KRED <p>I assume Sheffield intended to refer in that list to the Mount Jowlaenga rather than Mount Jowlanga and Bindunbur rather than Bindinbur.</p>	<p>Sheffield apologises for the spelling/typographical errors.</p>
		<p>With respect to the other groups listed by Sheffield, it would seem that no groups are more directly impacted by the Thunderbird Project than those on whose lands the Mine Site Development Envelope is proposed and identified in the PER, i.e. the Mount Jowlaenga People in respect of the Tenement (M04/459) and Nyikina Mangala in respect of the Site Access Road and Reinjection Bores.</p>	<p>Sheffield consulted consistently with the Mount Jowlaenga People and their representatives throughout the negotiation phase and provided details of mining and processing procedures, environmental management, rehabilitation techniques, benefits and opportunities that would occur during the life of the project.</p> <p>Since the commencement of Native Title negotiations in relation to the grant of the Mining Lease for the Thunderbird Mineral Sands Project, Sheffield was repeatedly advised by KRED Legal, the appointed legal representatives for the Mount Jowlaenga #2 People, that all communications by Sheffield had to be directed to KRED Legal, and that no direct contact was to be made with the Mount Jowlaenga #2 People.</p> <p>The Mount Jowlaenga #2 People are represented by six named applicants for the purposes of their Native Title claim. These named applicants participated (together with KRED Legal) in a number of the negotiation meetings held between Sheffield and the Mount Jowlaenga #2 People at which meetings Sheffield provided power point presentations about the project. As negotiations continued, however, the named applicants did not participate in many of the meetings and the Mount Jowlaenga #2 People were represented only by KRED Legal.</p> <p>As Aboriginal heritage formed an integral part of the negotiations (and is also a relevant environmental factor for the purposes of the EP Act) Sheffield requested and the Mount Jowlaenga #2 People agreed, that a comprehensive heritage clearance survey of the proposed mine development works and mining operation activities would be undertaken. This survey took place over a period of a week in 2016, with the participation of authorised representatives of the Mount Jowlaenga #2 People. As a consequence of that survey, Sheffield agreed to a number of exclusion zones so that the proposed mining operations could proceed.</p> <p>Sheffield has also implemented an Aboriginal Heritage Management Operations Framework (Appendix 26 of the PER) which will address Aboriginal heritage issues which may arise as the project progresses.</p>
		<p>Sheffield has then itemised what, in the absence of any consultation with Mount Jowlaenga People, we can only assume it considers to be the key interests of the Indigenous Groups it has listed, being</p> <ul style="list-style-type: none"> - Access to and use of Traditional Owner land. - Indigenous rangers. - Cultural heritage values. - Land management (weeds, feral animals, fire). - Water abstraction and use and impacts. - Native Title rights. 	<p>Sheffield throughout the impact assessment process have recognised the value of input from Traditional Owners and Indigenous people. Inclusion of Traditional Owners in heritage and ecological baseline surveys is a reflection of this. Consultation throughout the PER process has provided timely and transparent access to information about the proposed project and its impacts. Sheffield specifically undertook visits to a number of Aboriginal communities in November and January 2016 (Looma, Bidan, Mowanjum, Pandanus Park, Djarindjin, Lombardina, Ardyaloon and Bidyadanga) to discuss the Draft PER and seek feedback on it and associated draft management plans. This was undertaken prior to discussion of the Draft PER with other project stakeholders. Informal consultation was also undertaken by Sheffield employees on 1 on 1 basis as Traditional Owners or indigenous people raised questions or asked for additional information.</p>

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		<p>On page 165 of the PER, Sheffield states that "Initial Consultation with ... Traditional Owners commenced in 2014/15, with increased consultation occurring during 2016.</p> <p>This is not correct. The Mount Jowlaenga People have made repeated requests of Sheffield to consult with them regarding the PER process and the proposed environmental protection measures. Despite these requests, Sheffield has continually excluded the Mount Jowlaenga People from the PER process.</p>	
		<p>Sheffield then summaries at Table 45 the stakeholder engagement it has conducted, and lists those stakeholders it has engaged with, being:</p> <ol style="list-style-type: none"> Government stakeholders, State, Federal, Local; elected and administrative Decision Making Authorities Environs Kimberley CEO Shire of Derby/ West Kimberley Derby community Broome community Residents Loch Street Derby Marine stakeholders (e.g. Western Australian Fishing Industry Council, licensees fishing, pearls, peak bodies) Derby Port users Kimberley Pilbara Pastoralists Association Presentation Mt Jowlaenga Pastoral Lease Holder" (sic) <p>Notably- there is no reference at Table 45 to Sheffield having engaged with the Traditional Owners affected by the Mine Development Envelope- being the Mount Jowlaenga People and the Nyikina Mangala People.</p> <p>In fact there is no reference to engagement with any of the Indigenous groups Sheffield lists as key stakeholders at Table 44.</p> <p>Certainly in the case of the Mount Jowlaenga People, this is due to the fact that there has been no engagement with Mount Jowlaenga People on the PER.</p>	<p>Sheffield acknowledges that indigenous stakeholders should have been included in Table 45 of the PER. This was an oversight and was not deliberate. As can be seen in Tables 44 (Stakeholder Identification) and Table 46 (Summary of Stakeholder Comments), Sheffield recognise indigenous people as primary stakeholders and addressed comments on Aboriginal cultural heritage that were raised during the stakeholder engagement process.</p>
		<p>More concerning, Table 46 of the PER goes on to summarise the "stakeholder comments", which has been collated completely in the absence of consultation with the Mount Jowlaenga People, and lists "impacts of the project on Aboriginal cultural heritage" as being one of the stakeholder comments Sheffield claims it has address at Section 8.5 of the PER.</p>	<p>Stakeholder comments reflect comments made by the Mount Jowlaenga people during the heritage surveys and negotiations. A copy of the PER was provided directly to the Mount Jowlaenga People in January 2017 to discuss anything further they may have wanted to raise or discuss. It is noted that Sheffield was specifically instructed by the Traditional Owners representatives on numerous occasions in 2016 that they could not communicate directly with the Traditional Owners. The matter of dealing in good faith is currently the subject of the NNTT determination process being managed by the NNTT.</p>
		<p>Proposed Ongoing Stakeholder Consultation</p> <p>Sheffield refers at page 168, Table 47 to "Proposed Ongoing Stakeholder Consultation". It refers to the "Mt Jowlaenga No.2 Claim Group" first in the list of stakeholders at Table 47 and refers to its consultation requirements as being:</p> <p>"Regular consultation during project feasibility, construction, operation and closure phases."</p> <p>I note that 'project feasibility' for the Thunderbird Project is currently underway, yet there is no consultation underway with the Mount Jowlaenga People, let alone regular consultation.</p> <p>As Sheffield intends to seek its mining Tenement through the Future Acts Determination Application WF2016/0014, i.e.- without native title consent through an agreement with Mount Jowlaenga, Mount Jowlaenga does not have any reason to believe that Sheffield will commence any consultation with them in respect of its PER.</p>	<p>The Feasibility Study has been completed (March 2017).</p> <p>Sheffield was specifically instructed by the Traditional Owners representatives on numerous occasions in 2016 that they could not communicate directly with the Traditional Owners. The matter of dealing in good faith is currently the subject of the NNTT determination process being managed by the NNTT.</p>

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		<p>Summary: It is submitted that the Mount Jowlaenga People are correctly identified as a Primary Stakeholder in the PER, and their Aboriginal Heritage is rightly assessed as being a Key Preliminary Environmental Factor in the PER.</p> <p>However, Sheffield's failure to consult with the Mt Jowlaenga People in identifying the potential impacts on their Aboriginal Heritage means the basis on which this key aspect of the PER has been undertaken is flawed.</p> <p>In addition, the measures Sheffield has proposed for management of those impacts on Aboriginal Heritage are deficient due to the foundation on which they are proposed, and the manner in which they have been developed.</p> <p>Until such time as the necessary consultation has taken place, the Mount Jowlaenga People do not consider the PER meets the relevant statutory requirements.</p>	<p>Sheffield is and always has been prepared to consult with the Mount Jowlaenga People if they wish to, however have been repeatedly refused the ability to do so by their legal representatives.</p> <p>Since the commencement of Native Title negotiations in relation to the grant of the Mining Lease for the Thunderbird Mineral Sands Project Sheffield was repeatedly advised by KRED Legal, the appointed legal representatives for the Mount Jowlaenga #2 People, that all communications by Sheffield had to be directed to KRED Legal, and that no direct contact was to be made with the Mount Jowlaenga #2 People.</p> <p>The Mount Jowlaenga #2 People are represented by six named applicants for the purposes of their Native Title claim. These named applicants participated (together with KRED Legal) in a number of the negotiation meetings held between Sheffield and the Mount Jowlaenga #2 People at which meetings Sheffield provided power point presentations about the Project. As negotiations continued, however, the named applicants did not participate in many of the meetings and the Mount Jowlaenga #2 People were represented only by KRED Legal.</p> <p>As Aboriginal heritage formed an integral part of the negotiations (and is also a relevant environmental factor for the purposes of the EP Act) Sheffield requested and the Mount Jowlaenga #2 People agreed, that a comprehensive heritage clearance survey of the proposed mine development works and mining operation activities would be undertaken. This survey took place over a period of a week in 2016, with the participation of authorised representatives of the Mount Jowlaenga #2 People. As a consequence of that survey, Sheffield agreed to a number of exclusion zones so that the proposed mining operations could proceed.</p> <p>Sheffield has also implemented an Aboriginal Heritage Management Operations Framework (Appendix 26 of the PER) which will address Aboriginal heritage issues which may arise as the Project progresses.</p> <p>Measures were discussed during heritage surveys and negotiations. Management of potential impacts on heritage will be consistent with the Aboriginal Heritage Management Operations Framework described in Section 8.5.3 of the PER. A key component of this framework is preparation of a Cultural Heritage Management Plan in conjunction with the Traditional Owners. This will detail the long term management requirement for specific places and sites identified through further consultation with Traditional Owners. This Plan has not been able to be developed due to specific instructions by the Traditional Owners representatives on numerous occasions in 2016 that they could not communicate directly with the Traditional Owners.</p>
84	Public Submission ANON-WQPC-QV1B-N	Summary of Stakeholder Engagement Conducted on Page 166 demonstrates a critical lack of engagement with Traditional Owners. Failure to engage and work constructively with Traditional Owners has resulted in Native Title Owners going to the Native Title Tribunal because Sheffield have not acted in good faith.	The State of WA referred the matter on 23 May 2016 to the NNTT for mediation. Subsequent to an outcome not being able to be met, Sheffield referred the process to the NNTT on 24 October 2016 for determination. The determination, including a decision on good faith is ongoing.

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85	KRED Enterprises Pty Ltd ANON-WQPC-QV1A-M	<p>Section 8.5 of the PER</p> <p>I note that the Bilateral Agreement between the Commonwealth and the State of Western Australia under which the Thunderbird Project is to be assessed identifies (at clause 7.1(a)) that:</p> <p><i>“Assessments will recognise the role and interest of Indigenous peoples, as applicable, in promoting conservation and ecologically sustainable use of natural resources and promote the cooperative use of Indigenous peoples’ knowledge of biodiversity and Indigenous heritage.”</i></p> <p>And, at clause 7.1(b), that the views of relevant Indigenous people are <i>“likely to be a primary source of information on cultural heritage”</i>.</p> <p>The Bilateral Agreement also provides that due regard is to be given to the <i>“relevant guidelines that address consultation with Indigenous peoples including, but not limited to, WA’s ‘Aboriginal Heritage Due Diligence Guidelines’ and ... [the] EPA’s guidance regarding the assessment of Aboriginal heritage”</i>.</p> <p>At page 222, section 8.5.1 of its PER, Sheffield notes that “Both Commonwealth and State legislation apply to the protection of Aboriginal heritage [and lists relevant legislation as being] the:</p> <ul style="list-style-type: none"> - <i>Aboriginal Heritage Act (1972) (WA)</i> - <i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)</i> - <i>Native Title Act 1993 (Cth)</i>. <p>Sheffield also states that “In addition to Commonwealth and State legislation, the following policy and guidance statements were considered in the impact assessment for Aboriginal heritage:</p> <ul style="list-style-type: none"> - Department of Aboriginal Affairs and Department of Premier and Cabinet (DAA & DPC) 2013. Aboriginal Heritage – Due Diligence Guidelines, Version 3.0. - EPA, 2004e. Assessment of Aboriginal Heritage. Guidance for the Assessment of Environmental Factors No 41. - Department of Aboriginal Affairs guidelines regarding Section 18 and risk assessment (DAA 2013)’. <p>The Department of Aboriginal Affairs and Department of Premier and Cabinet (DAA & DPC) 2013 Aboriginal Heritage – Due Diligence Guidelines, Version 3.0 provide that Aboriginal heritage information is “best obtained through consultation with the relevant Aboriginal people” and that “Registered native title claimants” should be consulted at a minimum. Without this consultation, Sheffield has failed to meet the minimum standard set by the relevant guidelines.</p> <p>The EPA’s Guidance for Assessment similarly provides a list of actions that also includes the requirement to “consult with the relevant Aboriginal people” and provides that Sheffield should be in a position to demonstrate to the EPA that “any concerns raised by Aboriginal people have been adequately considered by the proponent in its management of environmental impacts, and any changes as a result of this process are made known to the relevant Aboriginal people.”</p> <p>There has been no consultation with ‘the relevant Aboriginal people’ to identify the concerns of those Aboriginal people, nor to then consider measures for adequately considering those concerns.</p>	<p>Sheffield consulted consistently with the Mount Jowlaenga People and their representatives throughout the negotiation phase and provided details of mining and processing procedures, environmental management, rehabilitation techniques, benefits and opportunities that would occur during the life of the operation. Sheffield is and always has been prepared to consult with the Mount Jowlaenga People if they wish to, however have been refused the ability to do so by their legal representatives.</p> <p>Since the commencement of Native Title negotiations in relation to the grant of the Mining Lease for the Thunderbird Mineral Sands Project Sheffield was repeatedly advised by KRED Legal, the appointed legal representatives for the Mount Jowlaenga #2 People, that all communications by Sheffield had to be directed to KRED Legal, and that no direct contact was to be made with the Mount Jowlaenga #2 People.</p> <p>The Mount Jowlaenga #2 People are represented by six named applicants for the purposes of their Native Title claim. These named applicants participated (together with KRED Legal) in a number of the negotiation meetings held between Sheffield and the Mount Jowlaenga #2 People at which meetings Sheffield provided power point presentations about the Project. As negotiations continued, however, the named applicants did not participate in many of the meetings and the Mount Jowlaenga #2 People were represented only by KRED Legal.</p> <p>As Aboriginal heritage formed an integral part of the negotiations (and is also a relevant environmental factor for the purposes of the EP Act) Sheffield requested and the Mount Jowlaenga #2 People agreed, that a comprehensive heritage clearance survey of the proposed mine development works and mining operation activities would be undertaken. This survey took place over a period of a week in 2016, with the participation of authorised representatives of the Mount Jowlaenga #2 People. As a consequence of that survey, Sheffield agreed to a number of exclusion zones so that the proposed mining operations could proceed.</p> <p>Sheffield has also implemented an Aboriginal Heritage Management Operations Framework (Appendix 26 of the PER) which will address Aboriginal heritage issues which may arise as the Project progresses</p>

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85	KRED Enterprises Pty Ltd	<p>Sheffield has itself summarised its stakeholder engagement at Table 45, page 166 of the PER. It doesn't make any mention of engagement with the 'relevant Aboriginal people' being the Traditional Owners or the Mount Jowlaenga People (or any Aboriginal group for that matter).</p> <p>At Table 46 Sheffield lists stakeholder comments, and against the comment taken from non-Traditional Owners regarding concerns regarding "impacts of the project on Aboriginal cultural heritage", it states it has "addressed [these impacts] in Section 8.5".</p> <p>At section 8.5- specifically page 222 of the PER, part 8.5.2, Sheffield lists the: "Potential impacts to Aboriginal Heritage from the Project".</p> <p>The potential impacts listed have been decided upon by Sheffield without any consultation with the key group of 'Aboriginal' people whose 'Aboriginal Heritage' is to be impacted by the Project, i.e.- the Traditional Owners.</p> <p>Sheffield then claims to have "worked closely" with the Traditional Owners and "consulted" with the Traditional Owners regarding the management of the Potential impacts to Aboriginal Heritage from the Project that it identifies without consultation with the Traditional Owners.</p> <p>I reiterate there has been no close working (or any working) with, nor consultation with the Traditional Owners regarding the impacts Sheffield has decided to list at section 8.5.</p> <p>I note that any heritage survey conducted for heritage clearance of Sheffield activities over its various exploration tenure since 2012 in the areas mapped in the PER do not relate to the Thunderbird Project activities the subject of the PER.</p> <p>Aside from the fact that the application for the Tenement wasn't lodged by Sheffield until 2014 (and thus any activities the subject of the PER could not have been known about, let alone identified for heritage survey before that time), the surveys referred to relate instead to heritage assessments of Sheffield's notified exploration activities in specific locations.</p> <p>In the absence of consultation with the Mount Jowlaenga People regarding the PER, it is not apparent to Mount Jowlaenga People how Sheffield could be deemed to have adequately:</p> <ol style="list-style-type: none"> Identified the potential impacts to Mount Jowlaenga's Heritage; and then Developed plans to management impacts to Mount Jowlaenga's Heritage. 	<p>It was not intentional to exclude the indigenous stakeholders from this Table. They were categorically consulted and are acknowledged as primary stakeholders in Table 44. In addition, stakeholder comments regarding Aboriginal cultural heritage are acknowledged in Table 46, and ongoing consultation will be undertaken.</p> <p>Refer to previous comments regarding consultation with Traditional Owners.</p> <p>Sheffield consulted consistently with the Mount Jowlaenga People and their representatives throughout the negotiation phase and provided details of mining and processing procedures, environmental management, rehabilitation techniques, benefits and opportunities that would occur during the life of the operation. Sheffield has conducted heritage surveys each year since 2012 in relation to the Project and adjacent tenements. The most recent survey, conducted in 2016, was a very comprehensive survey over a period of one week, and covered all proposed mining operations including development of the mine. No adverse impacts on Aboriginal Heritage were identified during the course of that survey. All the heritage surveys conducted have included representative members of the group. Sheffield is and always has been prepared to consult with the Mount Jowlaenga People if they wish to, but have been refused the ability to do so by their legal representatives.</p> <p>Heritage surveys were originally undertaken for exploration purposes, however the survey conducted in mid-2016 was expressly for the purposes of mining operations.</p> <p>It is agreed that heritage surveys were originally undertaken for exploration purposes, however the survey conducted in mid-2016 was expressly for the purposes of mining operations.</p> <p>See above.</p>
86	Public Submission ANON-WQPC-QV1B-N	<p>The Derby Port area has a long history of contaminated sites due to the former storage and export of lead and zinc concentrates from the Lenard Shelf Lead and Zinc Operations. The Contaminated Sites Branch of DER carried out inspections at the port in June and August 2007. A Notice of Classification of a Known or Suspected Contaminated Site was subsequently issued by DER on 12 September 2008 to the former sublessees, Lennard Shelf Pty Ltd. The category of site classification was 'Possibly Contaminated - Investigation Required' on the basis of the identification of lead and zinc in concentrations above the Ecological Investigation Levels (EILs) for soil. The site was investigated and a closure plan prepared in March 2009 (MBS 2009). This included a site management plan for remediation of contaminated areas. The closure plan was assessed as satisfactory by DER in a letter dated 7 April 2009 and the site was subsequently closed and remediated during 2010 to 2011 by Rey Resources Limited. Validation sampling and reporting was undertaken at the site in 2012.</p> <p>While some residual lead and zinc concentrations exceeded the respective EILs but remained within discrete locations across the site, the risk to the surrounding environment was assessed as low. The site was deemed to be remediated to a level appropriate for its intended land use (industrial/commercial), with minimal risk to the surrounding environment as a result of residual soil contamination (MBS 2012). Due to the absence of any groundwater data beneath the site, the site remains classified as 'Possibly Contaminated – Investigation Required'.</p>	<p>Background history of Derby Port provided is noted.</p>

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		<p>Prior to any further development there should be open independent assessment of the current state of the level of contamination of the loading site at the Derby Port jetty and the transfer station as well as testing random sites within the King Sound. Given “the absence of any groundwater data beneath the site, the site remains classified as ‘Possibly Contaminated – Investigation Required’” and given previous community concerns regarding mineral loading at the Derby Jetty site were substantiated by testing it seems reasonable to establish a new baseline pollution level from open independent research to prevent the terrible risks that could occur through the cumulative impacts on human and environmental health and wellbeing. Many local people gather seafood (fish, crab and muscles) from near the loading terminal site. There is a public health responsibility for governments to act in the best interests of the people through the fundamental principle of ‘do no harm’.</p>	<p>Ownership and control of the site for the construction of the product storage facility at Derby rests with the SWKD/DoT not Sheffield, although Sheffield will enter into a sub-lease agreement with SWDK. Although a baseline study of this facility was conducted prior to Sheffield taking on a lease of this site from the Shire, the primary purpose was to validate the immediate area of the lease was not contaminated above industrial land use criteria and that acid sulfate soils would not be disturbed during construction of the shed and handling facility. Only two very limited locations (DS2 and DS4) immediately adjacent to the culverts on the mudflats east of the lease area exceeded the ISQG low guidelines for lead or zinc (Table 8, Figure 3). Nickel was regionally elevated and copper (likely due to use of copper anti-fouling paints) was noted to exceed the ISQG lows at both boat ramp locations (DMS1 and DMS2). No sediment exceedances of ISQG highs were found which is normally the trigger for further investigation and/or cleanup based on risk to the environment. Although residual lead and zinc on the lease area is not considered a risk by MBS or DER or a Sheffield responsibility, construction of the facility will seal a large portion of the lease area soil and reduce potential for any mobilisation. Environmental monitoring for the project at the Port will also provide if anything an opportunity to further define if lead and zinc concentrations in sediment pose a risk and for remedial works to be planned if this is determined – at this stage no risk has been indicated. The DER as the independent regulator has approved the validation report for clean-up of the lease area for industrial land use.</p>
86	Public Submission ANON-WQPC-QV1B-N	<p>The “National Environmental Protection Measure (NEPM) 2013 added contaminant level for this sandy soil type and would be at or below the EIL for the site depending on background concentrations. This is consistent with the previous site history and validation report (MBS 2012).</p> <p>The above phrase “depending on background concentrations” is critical because the existing background concentrations have not been independently researched or peer reviewed. Independent peer reviewed research is the accepted standard of ethics and quality assurance in Australian and international research. Furthermore the relevant information gathered by Sheffield is not made available to the community in the PER as Appendix 14: Derby Export Facility Baseline Contamination and Acid Sulphate Soil Assessment information has been omitted from both the printed and electronic versions of the PER.</p> <p>Further independent peer reviewed research is required to assess:</p> <ol style="list-style-type: none"> 1. the existing level and distribution of pollution from previous mineral loading operations at the Derby Jetty and Point Torment transfer station, 2. the real potential impact of the mineral loading operation given previous users of the loading facility predicted there would be no pollution created whereas the real outcome was high levels of pollution that was confirmed in a government report. Furthermore the results of a claim from another mineral resource company that they cleaned up the sight has not been validated by reliable independent sources particularly as no groundwater study of the location has been conducted, 3. impact on the environment particularly seafood from polluted water entering the King Sound from mine waste entering the Frazer River and draining into the King Sound, and 4. pollution resulting from activity at the transfer station near Point Torment. 	<p>The question of ‘depending on background concentrations’ is mis-interpreted. The NEPM 2013 the industrial Environmental Investigation Levels (EILs) are the sum of Ambient Background Concentrations (ABC) plus Added Contaminant Limit (ACL). The highest observed level of zinc (360 mg/kg) was exactly equal to the ACL for the sandy soil type which was imported and used in the lease area. ABC’s were not determined because there were not enough of clean samples of soil of this type in the area given previous activity to be statistically valid, but by NEPM definition of EIL as above, even at 1 mg/kg ABC (the lowest zinc result for any sample) the maximum zinc concentration seen is less than the EIL. Surrounding mudflat type sediments had a minimum concentration of 34 mg/kg zinc, but are of a different nature.</p> <p>Appendix 14 of the PER was provided as part of the PER and is as such publically available. This was available via electronic and hard copy versions of the PER.</p> <p>As stated above, the presence of any residual contamination due to zinc and lead is not the responsibility of the proponent, but baseline sediment monitoring in areas to be used by the proponent will be conducted prior to operations, can include analysis of lead and zinc and can be used to inform management by the Shire of West Kimberley Derby/DoT for historical contamination.</p> <p>Sheffield do not believe a peer review of the contaminant status of the Derby Port area due to historical activity is warranted. Reports submitted to the Department of Environment and Regulation (DER) as part of requirements of the <i>Contaminated Sites Act 2003</i> have been assessed by DER and found adequate. The current classification of the site under this Act reflects the outcomes of this work and deems the site suitable for re-use as industrial land. Subsequent investigation work commissioned by Sheffield as part of baseline environmental studies for the Thunderbird Mineral Sands Project have found results to be consistent with previous work and minimal potential of the re-developed site posing any risk to the surrounding environment due to historical lead and zinc contamination.</p> <p>Potential impacts from the current proponents operations were assessed in the PER and considered extremely low given the highly insoluble nature of the material and low radiation levels. There may be an opportunity assist SWKD by sampling ‘groundwater’ (intruded seawater which can be seen visually flowing out with each tide) under the site during construction or operations by the proponent. Given the high rate of water exchange and very low rate of any metals release from residual lead and zinc, findings equal to water in King Sound are expected. This clearance of the DER contaminated sites listing is not however the responsibility of the proponent.</p> <p>There is no discharge of any mine waste to the Frazer River. Mine process water is contained and re-circulated. Exported Ilmenite is natural, highly insoluble and very low environmental risk including for radiation.</p> <p>The practicality of being able to monitor sediment at Point Torment (as opposed to Derby jetty) given depth to bottom and tidal movement is questionable. Environmental risk from Ilmenite products is extremely low and monitoring of dust emissions would be a more practical approach for which standards can be more readily applied.</p>

No.	Submitter	Submission and/or issue	Sheffield Response to Comment
87	Department of Mines and Petroleum BHLF-WQPC-QV1K-X	<p>Comments on Draft Condition Environmental Management Plan – Mine Closure Plan (MCP) – Appendix 4</p> <p>The MCP has been prepared in accordance with the “Guidelines for preparing Mine Closure Plans” dated May 2015, and follows the structure required by the guidelines.</p> <p>Overall a good level of information for a preliminary MCP has been provided, however, given the long mine life it is expected that further information will be required in all sections as the project develops (after mining commences). This is especially relevant for the TSF, as this structure will be decommissioned earlier in the mine life than other mine areas and therefore the next MCP will need to include more specific detail around the rehabilitation and closure of this facility.</p> <p>It is DMP’s understanding (and experience) that detailed stakeholder consultation has been undertaken by Sheffield, however, the MCP does not include the level of detail in relation to this consultation that is required by the guidelines (a detailed stakeholder consultation register is not provided).</p>	<p>Noted.</p> <p>Noted.</p> <p>Agreed. It is anticipated that the Mine Closure Plan will be reviewed and resubmitted at a frequency that meets the requirements under the Mining Act. Future iterations of the Mine Closure Plan will include further detail on stakeholder consultation.</p>
88	Department of the Environment and Energy	<p>While the proponent has provided an indication of the employment that will arise from the proposal it has not provided information regarding:</p> <ul style="list-style-type: none"> - Capital investment and ongoing value - The basis for any estimations of costs and/or benefits - Progress and results of consultations with the local community, including traditional owners. <p>It is noted that the elements comprising the project proposal fall within areas covered by licenses issued under the Mining Act 1978. Consequently, the provisions of the Planning and Development 2005 do not apply in relation to determining proposals. Should the proponent propose to develop components of the project outside these areas covered by mining leases it may be necessary to consider the State’s land use planning framework, including local government planning schemes.</p>	<p>The Bankable Feasibility Study has been completed and was published in late March 2017 on the Sheffield website. This includes capital costs for the project and estimated employment requirements during different stages of the project. This information can be downloaded by the DoEE if required.</p> <p>Sheffield maintains a Consultation Register. Details of this can be provided to DoEE on request.</p> <p>Noted.</p>