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**WEST PERTH WA 6872**

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Dear Mr Groeneveld

**CHANGE TO PROPOSAL – THUNDERBIRD MINERAL SANDS PROJECT -  
ASSESSMENT NO. 2073**

Under section 43A of the *Environmental Protection Act 1986* (EP Act), I am able to approve a change to a proposal, without a revised proposal being submitted to the Environmental Protection Authority.

I consider that the changes described in your application dated 28 November 2016 is unlikely to significantly increase any impact that the proposal may have on the environment.

I also consider that the change described in your application can be assessed through the Public Environmental Review (PER) process currently underway for the Thunderbird Mineral Sands Project. I expect that the draft PER document will be updated to provide information for the public that the project has been changed through a section 43A process and that the PER document is updated to ensure that the changes are incorporated into the environmental impact for the proposal.

Approval is therefore granted under section 43A of the EP Act, for the change to the proposal. You are reminded that this approval does not replace any responsibilities that you may have for seeking approvals from other government agencies to implement the change.

Yours sincerely



**Dr Tom Hatton**  
CHAIRMAN

13 December 2016

28 November 2016

Environmental Protection Authority  
Locked Bag 10  
East Perth WA 6892

Attention: Chris Stanley

Dear Chris

**Re: Sheffield Resources Limited Thunderbird Mineral Sands Project (Assessment 2073)  
Section 43A Application**

Sheffield Resources Ltd (Sheffield) submitted a Section 38 referral to the Environmental Protection Authority (EPA) on 20 November 2015 regarding the Thunderbird Mineral Sands Project. Subsequent to this, an Environmental Scoping Document (ESD) was prepared by Sheffield and approved by the EPA on 4 July 2016.

During preparation of the Bankable Feasibility Study, a number of additional technical studies have provided greater clarity on project design. This has allowed refinement of project key characteristics since submission of the ESD. The most significant of the changes have been additions to product exporting plans to include export of packaged products through the Port of Broome, increase in project power generation requirements, and clarification of groundwater abstraction volumes over the 40+ year project life. Minor changes to the total amount of land clearing required for implementation of the project within the Mine Site Development Envelope have also been addressed.

Sheffield requests a change to the proposal under Section 43A of the *Environmental Protection Act 1986*. The Public Environmental Review (PER) assessment was based on the amended project key characteristics and reflects the current proposal. The proposed changes to key characteristics of the project compared to those contained in the approved ESD document and the reasons why Sheffield does not believe these significantly increase the potential residual environmental impacts of the project and can be managed adequately under existing legislation are described in more detail below.

## 1. EXPLANATION OF CHANGES TO PROJECT DESCRIPTION

### 1.1 PRODUCT EXPORT

**Table 1: Changes to Key Characteristics - Export**

Element	Change to Key Characteristics
Short Description	Minor changes to accommodate transport of packaged products to the Port of Broome for export using existing infrastructure.
Transport, Storage at Port and Shipping of Product	Change of storage amount of mineral products at Derby Port from storage of '50,000 to 60,000 t' to 'up to 50,000 t'. Additional potential sailings from the Port of Broome added (20 – 30 sailings/annum depending on customer orders).



Four final products (ilmenite, primary zircon, zircon concentrate and HiTi88 leucoxene) will be produced for export from the Mine Site. A titano-magnetite concentrate produced as by-product of the ilmenite roasting stage may form a fifth saleable concentrate. The products will be stored at the Mine Site in individual product storage bins from which they will be fed to either a bagging plant on a batch or campaign basis as required, or transported and exported as a bulk product. The total amount of products proposed to be produced over the project life have not changed.

Bulk mineral product from the Mine Site will be loaded on to road trains and transported to Derby Port for export. Bulk product is expected to be transported using a fleet of quad road trains, each completing two trips per 12 hour shift. Up to 10 return truck movements per day will occur between the Mine Site and Derby Port, operating 24 hours per day 7 days per week. The estimated average annual output of between 250,000 tpa to 400,000 tpa of bulk products from Derby (dependant on production year) will be loaded at an estimated average cargo size of 15,000 t per vessel leading to about 20-40 annual sailings, requiring an ocean-going vessel scheduled every 1 to 3 weeks. The transport route from the Mine Site to Derby Port is approximately 145 km long with approximately 6 km of the transport route located in residential/commercial areas within Derby (the remaining 139 km are in unpopulated areas). The Great Northern Highway forms the longest portion of the transport route to Derby Port.

In addition to the transport and export of product through Derby Port, packaged mineral sands products (zircon concentrates and HiTi88 Leucoxene) will be transported by road train to the Port of Broome. This addition to export options has been included as Derby Port facilities do not allow for efficient transfer of packaged materials to ocean-going vessels. Existing facilities, including storage sheds will be used for storage and export of packaged products via the Port of Broome.

Bulk products will be loaded into bulka bags and/or containers at the Mine Site prior to road transport. Up to 7 return truck movements per day will occur between the Mine Site and the Port of Broome, operating 24 hours per day 7 days per week. The estimated annual output of between 100,000 tpa to 150,000 tpa of packaged products from Broome (dependant on customer demands) will be loaded at an estimated average cargo size of 5,000 t per vessel leading to about 20-30 annual sailings. Packaged products will be transferred via existing wharf or vessel cranes directly to ocean-going vessels. The transport route from the Mine Site to the Port of Broome is approximately 150 km long with approximately 12.5 km of the transport route using the dedicated heavy vehicle bypass route (Gubinge Road and Port Drive) to access the Port. The Great Northern Highway forms the longest portion of the transport route to the Port of Broome.

The proposed transport routes for mineral sands products are shown in Figure 1.

## 1.2 GROUNDWATER ABSTRACTION REQUIREMENTS

Changes to mine planning and completion of additional hydrogeological studies have allowed greater understanding of project water requirements over the life of the project. The changes as they relate to Key Characteristics are described in Table 2.

**Table 2: Changes to Key Characteristics – Groundwater Abstraction**

Element	Change to Key Characteristics
Groundwater use	Changes of 'abstraction of groundwater of up to 13 GL per annum' to: <ul style="list-style-type: none"> <li>• Borefield abstraction up to 13 GL per annum for Mine Site use prior to mining below the water table.</li> <li>• Mine dewatering abstraction up to 33 GL per annum once mining below the water table commences.</li> <li>• Groundwater reinjection up to approximately 22 GL per annum once mining below the water table commences.</li> </ul>



The overall water demand for the project is met entirely from a project specific borefield in the early years of mine life when mining is above the water table. This is replaced by mine dewatering later in the mine life, after Year 15. Additional studies identified that groundwater abstraction volumes necessary to allow mining below the water table will by Year 32 exceed project water demands. As such, plans have been developed to reinject excess groundwater downgradient of the mining areas back into the Broome Sandstone Aquifer. Maximum annual reinjection volumes are estimated to be 22 GL.

The anticipated sources of project water supply required over the life of the project are shown in Table 3.

**Table 3: Project Water Requirements**

Input		Quantity (GL/yr)		
		Stage 1 (Year 1 – 3)	Stage 2 (Year 4 – 15)	Stage 3 (Year 15+)
Water Sources	Mine dewatering	0	0	10.7 – 32.7
	Bore field abstraction	5.2 – 12.2	10.7	
	<b>Total</b>	<b>5.2 – 12.2</b>	<b>10.7</b>	<b>10.7 – 32.7</b>
Excess Water Disposal	Aquifer reinjection	0	0	0 to -22
<b>Grand Total</b>		<b>5.2 – 12.2</b>	<b>10.7</b>	<b>10.7</b>

### 1.3 POWER GENERATION REQUIREMENTS

Refinement of project design as part of Bankable Feasibility Studies has identified a change (increase) to power requirements at the Mine Site, with the impact of this on Key Characteristics shown in Table 4.

**Table 4: Changes to Key Characteristics – Power Generation**

Element	Change to Key Characteristics
Power	Changes to increase power output from the multifuel generator from 16 MW to 35 MW

A power plant will be constructed at the Mine Site to provide power for all mining and ore processing activities, and to power associated facilities. The power station will be constructed in two stages with a total capacity of 35 MW and will utilise generators running on either LNG or diesel/LNG. The initial stage will be 16 MW increasing to 35 MW when Stage 2 of ore processing plant is commissioned. The power plant will be located southeast of the TSF and will include all necessary fuel facilities for its own supply. Gas and/or diesel will be delivered by truck to the Mine Site and no piping of gas to the project is required. The proposed power plant will require a slightly larger footprint and fuel supply and will be permitted and managed under Part V of the *Environmental Protection Act 1986*.

### 1.4 LAND CLEARING

A refined site layout has been produced as part of the Bankable Feasibility Study. This has allowed more detail on project land clearing requirements needed for the Mine Site Development Envelope. Total land clearing for the project has increased from 2,030 to 2,280 ha. The impact of this on Key Characteristics is shown in Table 5.



**Table 5: Changes to Key Characteristics - Clearing**

Element	Change to Key Characteristics
Mining Excavation	Changes to increase the clearing from 1,540 ha to 1,635 ha within a 5,875 ha Development Envelope over a 40+ year timeframe. Changes to increase the amount of mine pit open at any one time from approximately 100 ha to approximately 200 ha.
Processing Infrastructure	Changes to increase clearing from (no more than) 35 ha to (no more than) 40 ha within a 5,875 ha Development Envelope.
Other Supporting Infrastructure	Changes to increase clearing from no more than 100 ha to no more than 320 ha within a 5,875 ha Development Envelope.
Site Access Road	Changes to decrease clearing from no more than 230 ha to no more than 160 ha within a 5,875 ha Development Envelope.

## 2. PROPOSED KEY CHARACTERISTICS TABLE

The Key Characteristics Table as contained in the approved ESD has been updated and is provided as Table 6. This reflects changes to product export requirements, increased project generation needs, changes to land clearing areas in each development envelope and clarification of water abstraction and reinjection quantities. Please note that the figure number references below have been updated from those in the ESD in order to align with the PER.

**Table 6: Key Characteristics of the Project**

Summary of the Proposal		
Proposal Title	Thunderbird Mineral Sands Project	
Proponent Name	Sheffield Resources Limited	
Short Description	<p>The project is located approximately 95 km northeast of Broome and 75 km west of Derby in Western Australia. The project includes heavy mineral sands mining above and below the water table, dewatering within the Broome Sandstone Aquifer, onsite mineral processing, transport of bulk mineral sands products to Derby Port and transshipping bulk product via King Sound using new and existing infrastructure at Derby Port and transport of packaged products to the Port of Broome for export using existing infrastructure. The project includes:</p> <ul style="list-style-type: none"> <li>Mining up to a depth of approximately 100 m below ground level.</li> <li>Processing of heavy mineral sands including use of a tailings storage facility.</li> <li>Progressive backfilling of the mine pit and rehabilitation of backfilled areas.</li> <li>Upgrade and extension of an existing road, and construction of a new road, to provide an approximately 30 km long Site Access Road linking the project to the Great Northern Highway.</li> <li>Groundwater abstraction from and reinjection to the Broome Sandstone Aquifer.</li> <li>Supporting infrastructure including internal roadways, accommodation camp, power plant, workshops, offices and landfill.</li> <li>Storage and export of bulk mineral sands products from Derby Port and export of packaged products from the Port of Broome.</li> </ul>	
Physical Aspects		
Aspect	Location	Proposed Extent Authorised
<b>Mine Site Development Envelope</b>		



Mining Excavation	Figure 5	Progressive clearing and mining of no more than 1,635 ha within a 5,875 ha Development Envelope over a 40+ year timeframe. Approximately 200 ha of mine pit open at any one time, with progressive backfilling and rehabilitation.
Processing Infrastructure	Figure 5	Clearing of no more than 40 ha within a 5,875 ha Development Envelope.
Borefield	Figure 5	Clearing of no more than 15 ha within a 5,875 ha Development Envelope.
Tailing Storage Facility	Figure 5	Clearing of no more than 110 ha within a 5,875 ha Development Envelope.
Other Supporting Infrastructure	Figure 5	Clearing of no more than 320 ha within a 5,875 ha Development Envelope.
Site Access Road	Figure 5	Clearing of no more than 160 ha within a 5,875 ha Development Envelope.
<b>Derby Port Development Envelope</b>		
Storage/export Facility	Figure 5	Construction of port storage/export facility on existing disturbed port land.
<b>Operational Aspects</b>		
<b>Element</b>	<b>Location</b>	<b>Proposed Extent</b>
Mineral Sands Processing	Figure 5	0 – 5 years: initial tailings deposition in tailings storage facility at no more than 7.5 Mtpa. 1 year - 5 years: tailings deposition in mine pit at no more than 7.5 Mtpa. 5 years - life of mine: waste and tailings backfilled to mine pit at no more than 15 Mtpa.
Water Supply Requirements	Figure 5	Borefield abstraction up to 13 GL per annum for Mine Site use prior to mining below the water table. Mine dewatering abstraction up to 33 GL per annum once mining below the water table commences. Groundwater reinjection up to approximately 22 GL per annum once mining below the water table commences.
Power	Figure 5	35 MW multifuel (LNG and/or diesel) power plant.
Transport, Storage at Port and Shipping of Product	Figure 5 Figure 6	Bulk product transport by road train to Derby Port via Site Access Road and Great Northern Highway (approximately 145 km total). Storage of up to 50,000 t of mineral sands products in an enclosed facility at Derby Port. Transshipment of bulk mineral sands products via barges from Derby Port to ships anchored at existing sea transfer point at Point Torment. Possibility of using other commercial export options currently under consideration by third parties including use of a lock system. 20 – 40 sailings/annum from Derby Port depending on ship size. Storage of up to 10,000 t of packaged products at the Port of Broome. 20 – 30 sailings/annum from the Port of Broome depending on customer orders.

### 3. POTENTIAL CHANGES TO ENVIRONMENTAL IMPACTS

Potential impacts of the project changes on environmental factors for the Mine Site Development Envelope and Derby Port Development Envelope are provided in Table 7. A review of the ESD was undertaken to confirm that the requirements for the assessment of potential impacts of the project were appropriate to the updated key characteristics of the project.

**Table 7: Impact Assessment for Environmental Factors for Mine Site Development Envelope**

Environmental Factor	Assessment of Impact	Regulation
<p><b>Flora and Vegetation</b></p>	<p>This factor is currently considered a 'Key Environmental Factor'.</p> <p>Exporting mineral sands product through the Port of Broome will have no impact on flora and vegetation. No new infrastructure is required at the Mine Site to prepare packaged products. No new infrastructure is required at the Port for storage or export of products. Product will be transported via existing heavy haulage routes.</p> <p>Increase in capacity of the power station will result in a small increase in footprint for infrastructure and increase in hydrocarbon fuels stored. This is within the contingency allowed as part of initial project design and can be adequately considered within the PER using existing processes documented in the ESD. Increase in power generation capacity does not change the impacts on flora and vegetation.</p> <p>Changes in groundwater abstraction volumes will not change impacts on flora and vegetation. Reinjection of groundwater into the Broome Sandstone Aquifer at depth is considered unlikely to impact flora and vegetation. Existing requirements within Items 6 to 15 of the ESD have been applied to assess impacts associated with groundwater abstraction and use and changes are adequately addressed in the Draft PER (Section 8.3).</p> <p>The increase in total land clearing required for the project is approximately 12%. Existing requirements within Items 6 to 15 of the ESD have been applied to assess impacts associated with the increased land clearing. Vegetation communities within the proposed Mine Site Development Envelope are common and widespread and all potentially impacted communities are well represented outside of the clearing footprint. Priority species identified during baseline surveys are considered to be widespread within the wider environment and are not restricted to the Development Envelope.</p> <p>The changes as identified in Section 1 do not represent a new impact or an increase in residual impacts to flora and vegetation. All potential impacts as a result of the changes are adequately addressed in the PER by commitments made in the ESD.</p>	<p><i>Biodiversity Conservation Act 2016.</i></p> <p>Works Approval and Licence under Part V of the <i>Environmental Protection Act 1986</i> (EP Act).</p> <p>General Provisions of the EP Act.</p> <p>Dangerous Good licence issued under the <i>Dangerous Goods Safety Act 2004</i>.</p>

Environmental Factor	Assessment of Impact	Regulation
Terrestrial Fauna	<p>This factor is currently considered a 'Key Environmental Factor'.</p> <p>Exporting mineral sands product through the Port of Broome will have no impact on terrestrial fauna. No new infrastructure is required at the Mine Site to prepare or transport packaged products. No new infrastructure is required at the Port for storage or export of products. Product will be transported via existing heavy haulage routes.</p> <p>Increase in capacity of the power station will result in a small increase in footprint for infrastructure. This is within the contingency allowed as part of initial project design and can be adequately considered within the PER (Section 8.2) using existing processes documented in the ESD. Increase in power generation capacity does not increase the risk of impacts on terrestrial fauna.</p> <p>Changes in groundwater abstraction volumes will not change impacts on terrestrial fauna. ReInjection of groundwater into the Broome Sandstone Aquifer at depth is considered unlikely to impact terrestrial fauna.</p> <p>The increase in total land clearing required for the project is about 12%. Existing requirements within Items 16 to 22 of the ESD have been applied to assess impacts on fauna habitat including assessment of impacts on the Greater Bilby which is a Matter of National Environmental Significance. Fauna habitats within the Mine Site Development Envelope are common and widespread and all are represented outside of the clearing footprint. Increase in project footprint will not result in impacts on species or habitats not already considered during baseline surveys.</p> <p>The changes as identified in Section 1 do not represent a new impact or an increase in residual impacts to terrestrial fauna. All potential impacts as a result of the changes are adequately addressed in the PER by commitments made in the ESD.</p>	<p>Works Approval and Licence under Part V of the EP Act.</p> <p>General Provisions of the EP Act.</p> <p>Biodiversity Conservation Act 2016.</p> <p>Environment Protection and Biodiversity Conservation Act 1999 (Cth).</p>

Environmental Factor	Assessment of Impact	Regulation
<p>Hydrological Processes</p>	<p>This factor is currently considered a 'Key Environmental Factor'.</p> <p>Exporting mineral sands product through the Port of Broome will have no impact on hydrological processes. No additional infrastructure or abstraction/reinjection of groundwater is required at the Mine Site to prepare or transport packaged products. No additional infrastructure or abstraction/reinjection of groundwater is required at the Port for storage or export of products.</p> <p>Increase in capacity of the power station will result in a small increase in footprint for infrastructure. This is within the contingency allowed as part of initial project design and has been adequately considered within the PER. Increase in power generation capacity does not affect hydrological processes.</p> <p>Although groundwater abstraction volumes and reinjection have altered from those specified in the ESD, commitments made in items 23 to 28 of the ESD adequately address the proposed changes. The increased groundwater abstraction volumes and reinjection were modelled in baseline hydrological surveys and have been adequately assessed in the Draft PER (Section 8.3). Potential impacts from increased abstraction and reinjection on groundwater regimes were considered very low. Potential impacts on GDE from increased abstraction and reinjection were considered in the PER to have a medium residual impact and a low residual impact on surface hydrological regimes (Section 8.3).</p> <p>The increase in total land clearing required for the project is about 12%. Existing requirements within Item 26 of the ESD has been applied to assess impacts on hydrological processes. There are no additional impacts or increase in risk to groundwater regimes as a result of the increased land clearing. Management measures as specified in Table 62 of the PER adequately addresses the impacts resulting from increased land clearing on surface hydrological processes.</p> <p>The changes as identified in Section 1 do not represent a new impact or an increase in residual impacts to hydrological processes. All potential impacts as a result of the changes are adequately addressed in the PER by commitments made in the ESD.</p>	<p>Works Approval and Licence under Part V of the EP Act.</p> <p>General Provisions of the EP Act.</p> <p>Permit to construct or alter a well under the <i>Rights in Water and Irrigation Act 1911</i> (RIWI Act).</p> <p>Groundwater Abstraction Licence under Section 5C of the (RIWI Act).</p> <p><i>Environmental Protection (Noise) Regulations 1997.</i></p>

Environmental Factor	Assessment of Impact	Regulation
<p>Inland Waters Environmental Quality</p>	<p>This factor is currently considered a 'Key Environmental Factor'.</p> <p>Exporting mineral sands product through the Port of Broome will have no impact on inland waters environmental quality. No new infrastructure, chemical reagents or wastes types will be used or generated at the Mine Site as a result of preparing and exporting packaged product via Broome Port. No new infrastructure is required at the Port for storage or export of products. Transport of sealed packaged product is via a dedicated heavy haulage route to the Broome Port located in an existing industrial zone. Items 31 to 34 of the ESD and Section 8.4 of the PER adequately address the potential impacts on inland water quality from the export of packaged product via Broome.</p> <p>Increase in capacity of the power station will result in a small increase in footprint for infrastructure and increased storage of hydrocarbons on site. The changes are within the contingency allowed as part of initial project design and have been adequately considered within the PER (Section 8.4) using existing processes documented in the ESD.</p> <p>Changes in groundwater abstraction volumes will not change impacts on inland water quality. Groundwater quality is good and water will be reinjected to the aquifer at depth. Reinjection of groundwater into the Broome Sandstone Aquifer is considered unlikely to impact inland water quality.</p> <p>The increase in total land clearing required for the project is approximately 12%. Erosion and sedimentation may impact inland water quality as a result of increased clearing. Existing requirements within Items 32 and 34 of the ESD have been applied to assess impacts associated with land clearing and adequately address the changes to key characteristics.</p> <p>The changes as identified in Section 1 do not represent a new impact or an increase in residual impacts to inland waters environmental quality. All potential impacts as a result of the changes are adequately addressed in the PER by commitments made in the ESD.</p>	<p>Works Approval and Licence under Part V of the EP Act.</p> <p>General Provisions of the EP Act.</p> <p>Groundwater Abstraction Licence under Section 5C of the RIWI Act.</p> <p>Dangerous Goods Safety Act 2004 (storage of hazardous materials).</p> <p>Dangerous Goods Safety (Storage and handling for Non explosives) Regulations 2007.</p> <p>Environmental Protection (Unauthorised Discharges) Regulations 2004.</p> <p>Contaminated Sites Act 2003.</p> <p>Contaminated Sites Regulations 2006.</p> <p>Prescribed premises licence for bulk loading and unloading (category 58) under EP Act.</p>

Environmental Factor	Assessment of Impact	Regulation
Heritage	<p>This factor is currently considered a 'Key Environmental Factor'.</p> <p>Exporting mineral sands product through the Port of Broome does not increase the impact on heritage. No new infrastructure is required at the Mine Site to prepare packaged products. No new infrastructure is required at the Port for storage or export of products and transport of product is via existing heavy haulage transport routes.</p> <p>Increase in capacity of the power station will result in a small increase in footprint for infrastructure which is within the contingency allowed as part of initial project design. Existing requirements within Items 41 to 45 of the ESD have been applied to assess impacts associated with groundwater abstraction and use and adequately address the changes (Section 8.5).</p> <p>Changes in groundwater abstraction volumes will not change impacts on heritage. Sheffield has designed the project to avoid heritage sites and associated buffer areas. The location of these areas has been agreed with Traditional Owners as part of Stakeholder consultation. Impacts on potential GDE's, which may also be of cultural significance, have been considered. Items 41 to 45 of the ESD have been addressed in the Draft PER considering changes to groundwater abstraction.</p> <p>The increase in total land clearing required for the project is approximately 12%. Existing requirements within Items 41 to 45 of the ESD have been applied to assess impacts associated with the increased land clearing.</p> <p>The Mine Site Development Envelope has been adequately surveyed for matters of Aboriginal heritage. The changes as identified in Section 1 do not represent a new impact or an increase in residual impacts to heritage. All potential impacts as a result of the changes are adequately addressed in the PER by commitments made in the ESD.</p>	Aboriginal Heritage Act 1972.

Environmental Factor	Assessment of Impact	Regulation
Landforms	<p>This factor is currently considered an 'Other Environmental Factor'.</p> <p>Exporting packaged mineral sands product via the Port of Broome will have no impact on landforms. Transport of sealed packaged product is via an existing dedicated heavy haulage route. No additional clearing or new infrastructure is required and no new waste materials will be generated at the Mine Site at the Port as a result of preparing, storing and exporting packaged product via Broome Port.</p> <p>Increase in capacity of the power station will result in a small increase in footprint for infrastructure which is within the contingency allowed as part of initial project design. Existing requirements within Items 59 to 62 of the ESD have been applied and adequately assess impacts associated with the increased land clearing.</p> <p>Changes in groundwater abstraction volumes will not impact on landforms.</p> <p>The increase in total land clearing required for the project is approximately 12%. Erosion and sedimentation may impact inland water quality as a result of increased clearing. Existing requirements within Items 59 to 62 of the ESD have been applied and adequately assess impacts associated with the increased land clearing.</p> <p>The changes as identified in Section 1 do not represent a new impact or an increase in the residual impacts to landforms. Changes to key project characteristics are not considered to change the significance of this environmental factor for the Mine Site Development Envelope.</p>	<p><i>Environment Protection and Biodiversity Conservation Act 1999 (Cth).</i></p>

Environmental Factor	Assessment of Impact	Regulation
Subterranean Fauna	<p>This factor is currently considered an 'Other Environmental Factor'.</p> <p><b>Exporting packaged mineral sands product via the Port of Broome, increased power station capacity and increased land clearing will have no impact on subterranean fauna as there are no impacts on the subterranean environment.</b></p> <p>Increased groundwater abstraction and reinjection of excess groundwater will not increase the risk of impacts on subterranean fauna as the project area provides little to no habitat suitable for subterranean fauna. Existing requirements within Items 63 to 65 of the ESD have been applied and adequately assess Impacts associated with the increased water abstraction and reinjection.</p> <p>The changes as identified in Section 1 do not represent a new impact or an increase in the residual impacts to subterranean fauna. Changes to project characteristics are not considered to change the significance of this environmental factor for the Mine Site Development Envelope.</p>	<p><i>Biodiversity Conservation Act 2016.</i></p> <p>General provisions of the EP Act.</p>

Environmental Factor	Assessment of Impact	Regulation
<p>Terrestrial Environmental Quality</p>	<p>This factor is currently considered an Other Environmental Factor.</p> <p>Exporting packaged mineral sands product via the Port of Broome will have no impact on terrestrial environmental quality. Transport of sealed packaged product is via an existing dedicated heavy haulage route. No additional clearing or new infrastructure is required and no new waste materials will be generated at the Mine Site at the Port as a result of preparing, storing and exporting packaged product via Broome Port.</p> <p>Increase in capacity of the power station will result in a small increase in footprint for infrastructure and increased storage of hydrocarbons on site. The increase in risk of impact to terrestrial environmental quality is within the contingency allowed as part of initial project design. Existing requirements within Items 66 to 68 of the ESD have been applied to assess impacts associated with groundwater abstraction and use and adequately address the changes.</p> <p>Changes in groundwater abstraction volumes will not change impacts to terrestrial environmental quality.</p> <p>The increase in total land clearing required for the project is approximately 12%. Existing requirements within Items 66 to 68 of the ESD have been applied to assess impacts associated with the increased land clearing on terrestrial environmental quality.</p> <p>The changes as identified in Section 1 do not represent a new impact or an increase in the residual impacts to terrestrial environmental quality. Changes to project characteristics are not considered to change the significance of this environmental factor for the Mine Site Development Envelope.</p>	<p>Works Approval and Licence under Part V of the EP Act.</p> <p>General Provisions of the EP Act.</p> <p>Dangerous Goods licence issued under the Dangerous Goods Safety Act 2004 (storage of hazardous materials).</p> <p>Dangerous Goods Safety (Storage and handling for Non explosives) Regulations 2007.</p> <p>Environmental Protection (Unauthorised Discharges) Regulations 2004.</p> <p>Contaminated Sites Act 2003.</p> <p>Contaminated Sites Regulations 2006.</p>

Environmental Factor	Assessment of Impact	Regulation
<p>Air Quality and Atmospheric Gases</p>	<p>This factor is currently considered an Other Environmental Factor.</p> <p>Exporting packaged mineral sands product via the Port of Broome will have no impact on air quality. Transport of sealed packaged product is via an existing dedicated heavy haulage route. No new treatment/processing or new infrastructure is required and no new waste materials will be generated at the Mine Site at the Port as a result of preparing, storing and exporting packaged product via Broome Port.</p> <p>Increase in power station capacity will result in increased emissions to air. Given the remote location of the project, there are no sensitive receptors located within the Development Envelope apart from the Accommodation Village to be established for the project. Other receptors are more than 10 km from the point of potential emissions. Existing requirements within Items 69 to 74 of the ESD have been applied to assess impacts associated with the increased emissions.</p> <p>Changes in groundwater abstraction and land clearing will not change impacts to air quality and atmospheric gases.</p> <p>Changes proposed to the Key Characteristics will not result in a new impact or increased the residual impacts to air quality and atmospheric gases. Changes to project characteristics are not considered to change the significance of this environmental factor for the Mine Site Development Envelope.</p>	<p>Works Approval and Licence under Part V of the EP Act. General Provisions of the EP Act. <i>Environmental Protection (NEPM-NPI) Regulations 1998.</i></p>

Environmental Factor	Assessment of Impact	Regulation
Human Health	<p>This factor is currently considered an 'Other Environmental Factor' for the Mine Site Development Envelope and the Port Development Envelope.</p> <p>No new infrastructure or processes are required for product for export via Broome and this change does not represent an increase in the total volume of product already being assessed for the project. Although 'Other Environmental Factors' for the Port Development Envelope are not specifically referred to in this application, the impacts on human health as assessed for transport and export of product via Derby are applicable to this factor for export via Broome Port (Section 11.4 of Draft PER). Potential impacts on human health at the Port of Broome and associated transport route are considered low as:</p> <ul style="list-style-type: none"> <li>Products will be packaged during transport, storage and transfer to an ocean going vessel, meaning likelihood of dust emissions is Rare.</li> <li>Products will be transported using approved heavy haulage routes. This minimises noise impacts on the community.</li> </ul> <p>The increase in usage of the Port due to the project is well within its designed limits meaning these impacts have previously been assessed as part of Port developments or upgrades.</p> <p>Impacts to human health have been adequately considered within Sections 10.5 and 11.4 of the Draft PER using existing processes documented in Items 75 to 77 of the ESD.</p> <p>Changes to power station capacity, water abstraction and reinjection, and land clearing will not alter residual impacts to human health. Changes to project characteristics are not considered to change the significance of this environmental factor for the Mine Site Development Envelope or the Port Development Envelope.</p>	<p>Radiation Safety (Transport of Radioactive Substances) Regulations 2012 (WA).</p> <p>Mines Safety and Inspection Regulations 1995 (WA).</p> <p>National Environment Protection Measure for Ambient Air Quality 1994 as Amended 2003 (NEPC 2003).</p> <p>Compliance with Kimberley Ports Authority HSE and other requirements.</p> <p>Radiation Safety Management Plan as required by Radiation Safety Act 1975 and Mines Inspection and Safety Act 1994.</p>

Environmental Factor	Assessment of Impact	Regulation
<p>Rehabilitation and Decommissioning</p>	<p>This factor is currently considered a 'Key Environmental Factor'.</p> <p>No additional infrastructure or clearing is required for export of mineral sands product via Port of Broome and will have no impact on rehabilitation and decommissioning.</p> <p>Increase in capacity of the power station will result in a small increase in footprint for infrastructure which is within the contingency allowed as part of initial project design. Impacts to rehabilitation and decommissioning have been adequately considered in the PER using existing processes documented in Items 48 to 50 of the ESD.</p> <p>Changes in groundwater abstraction volumes and reinjection of groundwater will not alter rehabilitation and decommissioning impact.</p> <p>The increase in land clearing required for the project is approximately 12%. Existing requirements within Items 48 to 50 of the ESD have been applied to assess impacts for rehabilitation and decommissioning associated with the increased land clearing.</p> <p>The changes as identified in Section 1 do not represent a new impact or an increase in the residual impacts of rehabilitation and decommissioning.</p>	<p>Commitments made in the Mining Proposal (MP) and Mine Closure Plan (MCP) submitted under the <i>Mining Act 1978</i>.</p>

Environmental Factor	Assessment of Impact	Regulation
<p>Offsets</p>	<p>This factor is currently considered a 'Key Environmental Factor'.</p> <p>No additional clearing or new infrastructure is required at the Mine Site or the Broome Port to prepare and export packaged products via Port of Broome. Existing requirements within items 46 and 47 of the ESD have been applied to assess impacts for offsets associated with the increased land clearing.</p> <p>Increased capacity of the power station will result in a small increase in footprint for infrastructure which is within the contingency allowed as part of initial project design. Increase in power generation capacity does not increase the risk of impacts on offsets. Existing requirements within items 46 and 47 of the ESD have been applied to assess impacts for offsets associated with the increased land clearing.</p> <p>Changes in groundwater abstraction volumes will not change offsets as offsets are related to clearing and other impacts on the Greater Bilby.</p> <p>The increase in total land clearing required for the project is approximately 12%. Existing requirements within items 46 and 47 of the ESD have been applied to assess impacts associated with the increased land clearing.</p> <p>The changes as identified in Section 1 do not represent a new impact or an increase to the impacts for this factor.</p>	<p>NA</p>

#### 4. OTHER APPLICABLE LEGISLATION

The Port of Broome currently does not hold an Environmental Licence under Part V of the *EP Act*. Proposed bulk loading and unloading at the Port of Broome is between 100,000 and 120,000 tonnes/annum which exceeds the design capacity threshold trigger in Schedule 1 of the *Environmental Protection Regulations 1987*. Sheffield as a customer of Kimberley Ports Authority (KPA) will use existing licenced storage and ship loading facilities to transfer packaged products to ocean going vessels where possible and work with KPA to obtain necessary licencing if this is not currently in place at KPA.

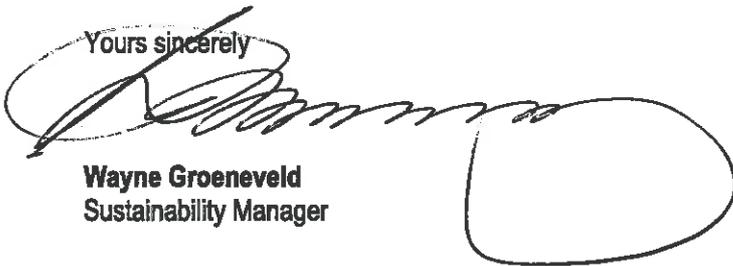
Emissions from power generation will be regulated under Part V of the *EP Act*. Specifically, the project will be required to obtain Works Approval to construct and an Environmental Licence from the Department of Environmental Regulation (DER) to operate the power station. The change in capacity will not impact on the need for these approvals which have previously been discussed with DER.

Water abstraction will require Sheffield to obtain a Groundwater Licence from the Department of Water under the *Rights in Water and Irrigation Act*. Reinjection will require approvals under Part V of the *EP Act*. Given reinjection will not be required until around Year 32 of project life, application for Works Approval and amendment to the by then existing Environmental Licence will not be applied for until closer to the required time.

Land clearing is already being assessed under Part IV of the *EP Act* thus no Clearing Permits under Part V of the *EP Act* will be required.

If you have any questions regarding this S43A application and the changes in Key Characteristics, please contact Kristy Sell on 08 9226 3166 or by email [ksell@mbsenvironmental.com.au](mailto:ksell@mbsenvironmental.com.au).

Yours sincerely



**Wayne Groeneveld**  
Sustainability Manager