5. ENVIRONMENTAL MANAGEMENT FRAMEWORK

5.1 ENVIRONMENTAL POLICY

Sheffield's Environmental Policy outlines its intentions and commitment to environmental performance. A copy is provided in Appendix 3.

5.2 ENVIRONMENTAL MANAGEMENT SYSTEM

Sheffield is developing an environmental management system (EMS) to facilitate the management of environmental responsibilities for all phases of the project (construction, operation and closure) and to enable continuous improvement of the company's environmental performance. Over the life of the project, the EMS will enable Sheffield to systematically assess and review its environmental impacts, in addition to implementing programs for the management of environmental impacts and obligations.

The Sheffield EMS will be based on AS/NZ ISO 14001:2004 Environmental Management System Standards, which are internationally accepted and include a model for continuous improvement.

EMPs will form the cornerstone of the project's EMS as they will document actions and responsibilities for protection of the environmental values of the Thunderbird Mineral Sand Project.

5.3 ENVIRONMENTAL MANAGEMENT PLANS

Environmental Management Plans (EMPs) underpin the adaptive environmental management approach and will be used for the life of the project to implement the EMS at an operational level. EMPs will cover the design, construction, commissioning, operation phases and maintenance activities of the project. They will identify key environmental issues across the project and provide strategies and plans for managing them effectively. They will also define the legal requirements for the project, identify regulatory permits and licences required for various construction activities and will also govern roles and responsibilities of contractors.

EMPs will be developed and documented through a systematic and consultative process to address environmental factors and risks. Technical input will be sought from a variety of sources including the design and construction contractors, conditions of approvals and legislative requirements and industry standards.

Where there is potential for significant impacts to key environmental factors or there is likely to be significant stakeholder concern, draft Condition EMPs (CEMPs) have been developed in accordance with Environmental Assessment Guideline for Preparation of Management Plans under Part IV of the *Environmental Protection Act 1986* (EPA 2015d) and are provided as drafts to support this Public Environmental Review (PER).

Inclusion of the draft CEMPs for key factors in the PER aims to provide confidence to the EPA and other stakeholders that the project is likely to meet the environmental objective for those factors by providing as much detailed information as possible. The draft CEMPs also provide information which the EPA can use to inform outcome-based conditions where appropriate. CEMPs provided with this PER are listed in Table 42. Non-significant impacts will be managed via policies and procedures documented in the EMS.

It is recognised that aspect specific management plans may be required for the project to satisfy legislative requirements outside of the *EP Act* e.g. A Radiation Management Plan will be required to be submitted to and approved by DMP to satisfy requirements of the *Radiation Safety Management Act* 1975 and the *Mines Safety and Inspection Act 1994*. This focuses on protection of human health, particularly occupational exposure.

Prior to completion of radiation assessments of ore, mine wastes, process residues and products, provision was included in the ESD for inclusion of a Radiation Management Plan as part of the PER. Subsequent completion of

the radiation assessment has demonstrated that ore, mine waste, blended process residue to be returned to the mine void and most products will have radiation specific activity concentrations less than 1 Bq/g. In accordance with Australian Radiation Protection and Nuclear Safety Agency (ARPANSA 2005) and International Atomic Energy Agency Safety Guide RS-G-1.7 (IAEA 2004), materials containing naturally occurring radioactive materials (NORMs) are excluded from regulations and considered inherently safe if the specific activity concentrations are below 1 Bq/g (ARPANSA 2005).

Packaged products to be exported from the Port of Broome will be classified as radioactive substances. No products will have a specific activity concentration of NORM greater than 10 Bq/g and as such will not be required to have their transport regulated under the *Radiation Safety Management Act 1975*. Given the low radiation specific activity concentrations and associated low risk to the environment posed by the project, the need for a Radiation Management Plan administered under the *EP Act* that is additional to that required under the *Radiation Safety Management Act 1975* and the *Mines Safety and Inspection Act 1994* is not considered to be warranted and as such has not been included as part of the PER. Management measures relevant to mitigation of potential impacts associated with radiation are documented in Sections 8 to 13 of this PER.

Table 42: Condition Environmental Management Plans Included in PER

Draft CEMP	Key Environmental Factor	Factors/Aspects Addressed
Mine Site Development Envelope		
Mine Closure Plan Appendix 4	Rehabilitation and Decommissioning	Planned, unplanned and temporary closure Post Mining land use Stakeholder engagement Decommissioning Landform re-establishment Revegetation Completion criteria Monitoring
Vegetation Management Plan Appendix 22	Flora and Vegetation	Clearing Management Conservation Significant Flora Weed Management Fire Management
Bilby Management Plan Appendix 23	Terrestrial Fauna	Direct impacts on animals and habitat Indirect impacts on animals and habitat Monitoring
Groundwater Management Plan Appendix 24	Hydrological Processes	Groundwater abstraction Groundwater reinjection Groundwater quality Monitoring
Port Development Envelope		
Port Management Plan Appendix 25	Marine Environmental Quality Amenity	Transport of product Product unloading Product storage Product loading Transhipment Spillage management Radiation management Emissions management (noise and dust) Monitoring

5.4 PRINCIPLES OF ENVIRONMENTAL PROTECTION

The EPA has identified a set of principles for environmental management, which the proponent considered in the Preliminary Feasibility Study. EPA principles are being further considered during the Bankable Feasibility Study (anticipated to be completed in Quarter 4 2016) when the project environmental design standards will be incorporated and implemented in the engineering specifications of the project. Details of how these have been considered in project design are provided in Table 43.

Table 43: Principles of Environmental Protection

Principle	Details	Consideration in Proposal
Precautionary Principle	Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decisions should be guided by: • careful evaluation to avoid, where practicable, serious or irreversible damage to the environment • an assessment of the risk-weighted consequences of various options.	A large number of technical investigations were carried out to provide accurate and comprehensive baseline data to allow detailed impact assessment and/or modelling to be carried out with scientific certainty. Studies undertaken for the project are documented in full in Table 14. A risk based approach was undertaken for the development of the project. Project design was amended to avoid, where practicable, serious or irreversible impacts and appropriate management measures have been implemented to minimise residual impacts. This is demonstrated by adjustment of the mining footprint to avoid impact on heritage site buffers determined via consultation with Traditional Owners, removal of a separate borefield originally proposed outside of the current footprint, and reduction of annual throughput. Relevant environmental factors were scoped through the Environmental Scoping Document process for the proposal and involved consultation with EPA and other Decision Making Authorities regarding proposal details and risks.
The principle of intergenerational equity	The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.	The project has been designed and will be implemented to ensure that cleared land will be rehabilitated to a condition similar to or better than that of the pre-disturbed land. Closure strategies to achieve this have been developed and are detailed in Sections 3.9 and 12. A Preliminary Mine Closure Plan has been prepared for the Thunderbird Mineral Sands Project. This will be regularly updated in consultation with regulatory authorities, Traditional Owners, the pastoral leaseholder and other stakeholders to ensure that post mining land use is consistent with agreed stakeholder objectives and so that rehabilitation can be progressively implemented. During the life of the project management measures will be implemented to ensure that the environment is protected against potential impacts. Management measures are documented for each Key Environmental Factor in Sections 8.1 to 8.5 and 9.1 to 9.2.

Principle	Details	Consideration in Proposal
The principle of the conservation of biological diversity and ecological integrity	Conservation of biological diversity and ecological integrity should be a fundamental consideration.	Biological diversity has been investigated in detail for this project. Numerous flora and fauna surveys have been carried out for the Mine Site Development Envelope and surrounds and a detailed assessment of the extent and significance of impacts has been completed. The scope of the studies was determined through project scoping, risk assessment and stakeholder consultation. The conservation significant Greater Bilby is present in the area and additional targeted survey work has been carried out to determine the likely impacts on this species and is detailed in Section 13.
Principles relating to improved valuation, pricing and incentive mechanisms	• Environmental factors should be included in the valuation of assets and services. • The polluter pays principle — those who generate pollution and waste should bear the cost of containment, avoidance or abatement. • The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes. • Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.	Sheffield understands that environmental factors should be included in the valuation of assets and services and commits to doing this where appropriate. Sheffield recognises the polluter pays principle and management and mitigation measures as specified in this PER aim to reduce the risk of pollution. Sheffield commits to ongoing mitigation and management measures for the life of the project. Sheffield recognises the need to provide sufficient capital and operating funds to ensure environmental management measures are implemented throughout the project life. Provision has also been made for costs associated with closure and decommissioning and these costs form part of the cost of production. Environmental goals will be pursued in the most cost effective way. As an example, costs and environmental impact associated with power generation and energy use options were considered as part of the Scoping Study and then refined as part of the Preliminary Feasibility Study.
The principle of waste minimisation	All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	All reasonable and practicable measures to minimise the generation of waste and its discharge to the environment will be taken. Sheffield will implement an 'avoid, reduce, re-use, reprocess, recycle, recovery and dispose' hierarchy of waste management approach across all components and phases of the project, in accordance with the objectives of the *Waste Avoidance and Resource Recovery Act 2007.*