13. ENVIRONMENTAL IMPACT ASSESSMENT - MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

13.1 INTRODUCTION

The project was referred to the (then) Commonwealth Department of the Environment on 8 February 2016 under the *EPBC Act* and was deemed to be a 'Controlled Action' on 7 April 2016 in respect to impacts on listed threatened species, specifically the Greater Bilby (*Macrotis lagotis*).

During development of the Environmental Scoping Document, the (then) Department of the Environment specifically required Sheffield to consider impacts of the project within the Mine Site Development Envelope on a number of other listed threatened species, specifically:

- Dwarf Sawfish (*Pristis clavata*) – listed as Vulnerable under the *EPBC Act.*
- Green Sawfish (*Pristis zijsron*) – listed as Vulnerable under the *EPBC Act*.
- Largetooth Sawfish (*Pristis pristis*) – listed as Vulnerable under the *EPBC Act*.
- Northern River Shark (*Glyphis garricki*) – listed as Endangered under the *EPBC Act*.

This request also included one species for the Derby Port Development Envelope:

- Humpback Whale (*Megaptera novaeangliae*) – listed as Vulnerable under the *EPBC Act*.

The Environmental Scoping Document requires consideration of the impacts on these species within the Marine Fauna Factor, which is not considered to be a Key Factor for the project.

Potential impacts on Dwarf, Green, and Largetooth Sawfish, and the Northern River Shark within the Mine Site Development Envelope relate to potential changes to hydrological regimes in watercourses as a result of groundwater abstraction required for the project. This is discussed in Section 11.2.2.3. Fraser River South has been identified as the only inland habitat associated with the project where juvenile Largetooth Sawfish may occur during the wet season. This watercourse is not considered potential habitat for other Sawfish species or the Northern River Shark (DoE 2015b). The project is expected to result in no discernible loss of habitat for these species, loss of individuals, or interruption to breeding patterns or behaviour. Management measures proposed in Section 11.2.3 are sufficient to manage potential impacts, and no additional management measures are proposed.

Potential impacts on the Humpback Whale are primarily in relation to additional shipping movements from Derby Port, which is assessed in Section 11.2.2.4. As Derby Port is already an existing port, the increase in transhipment vessel and tug movements is expected to present a limited additional impact. Management measures proposed in Section 11.2.3 are sufficient to manage potential impacts to Humpback Whales, and no additional management measures are proposed.

13.2 ASSESSMENT OF POTENTIAL IMPACTS – GREATER BILBY

The Greater Bilby (*Macrotis lagotis*) is listed as Vulnerable under the *EPBC Act* and Schedule 3 under the *WC Act 1950*. More information about the species and its presence within the Mine Site Development Envelope is provided in Section 4.2.9.3.

The potential impacts of the project on the Greater Bilby are presented below. These have been ranked in order of the highest to lowest potential impact:

- **Fragmentation of habitat resulting in displacement**.
- **Clearing activities causing injury or death**.

- **Vehicle strike causing injury or death**.
- **Increased predation causing injury or death**.
- **Altered fire regime causing injury or death or loss of habitat**.
- **Light and noise pollution disrupting nocturnal activities**.
- **Entrapment leading to injury or death**

Other potential impacts were screened out from further assessment (Section 7.4) as they were either assessed as not likely to occur or were unlikely to have any discernible consequence on any factor different to background levels:

Stressor	Justification for Exclusion
Radiation exposure to native fauna	The vast majority (98%) of all waste streams is from ilmenite processing or initially rejected sand/slimes material with low activity (0.39 Bq/g, see Appendix 21). Material with activity less than 1 Bq/g based on composition of Sheffield waste materials did not trigger the Tier 1 Environmental screening criteria of 10 µGy/h using the ERICA software assessment (ARPANSA 2015) for terrestrial flora. Sheffield commit to mixing and co-disposal of wastes to <1 Bq/g (combined activity c.a. 0.74 Bq/g). Backfill areas will be monitored to ensure radiation levels are within environmental screening criteria (10 µGy/h) or established pre-mining background levels. The inherent use of wet slurries for transport of mine waste back to the void minimises potential for dust emissions of higher activity material.

The assessed likelihood, consequence and residual impact (as per Section 7.3), is provided below for each potential impact.

Over and above this impact assessment, Sheffield has developed an Environmental Management Plan for the Greater Bilby which is attached as Appendix 23. This plan details the potential impacts upon the Greater Bilby and management measures that will be implemented during the duration of the project. The data that is collected will be freely available to the community and scientific institutions undertaking research on the Greater Bilby.

13.2.1 Fragmentation of Habitat Resulting in Displacement

Fragmentation of fauna habitat from land clearing may lead to loss of individuals through competition as affected individuals are required to relocate and compete. Approximately 1,632.9 ha of potential Greater Bilby habitat will be temporarily lost over the timeframe of the project; however due to the progressive nature of mineral sands mining the loss of this habitat will occur over a 40+ year time frame thus greatly reducing the impacts to the species in the area.

In addition the mining void created will be backfilled and rehabilitated as the project proceeds forward. This will provide new prospective habitat for the species to colonise.

Rehabilitation will aim at re-creating the Greater Bilby's preferred habitat and as a minimum, will be consistent with the condition of the vegetation in the greater area surrounding the project. This form of rehabilitation will mean that as habitat is removed, new habitats will be created for the Bilby to recolonise.

Minor, localised loss and fragmentation of Greater Bilby fauna habitat is 'Almost Certain', however the overall habitat in the area will remain intact. The potential impact from the fragmentation of habitat on the Greater Bilby is assessed as 'Medium'.

Impact	Consequence	Likelihood	Residual Impact
Fragmentation of habitat resulting in displacement	Minor	Almost Certain	Medium

13.2.2 Clearing Activities Causing Injury or Death

Clearing activities can result in the injury and/or death of Greater Bilbies who may be crushed and or injured by heavy machinery whilst they are resting in their underground burrows during the daylight hours. While pre-clearance surveys will be undertaken, the Greater Bilby's nocturnal and burrowing behaviours make them difficult to locate and remove to safety prior to clearing.

Although the death of animals is 'Almost Certain' to occur over the life of mine, this will not impact on the survival of the local population. The potential residual impact from clearing activities on Greater Bilbies is assessed as 'Medium'.

Impact	Consequence	Likelihood	Residual Impact
Clearing activities resulting in injury or death	Incidental	Almost Certain	Medium

13.2.3 Vehicle Strike Causing Injury or Death

Greater Bilby individuals within the Mine Site Development Envelope will be at risk of injury and/or death due to vehicle strike. This would be more likely along the Site Access Road and the road connecting the accommodation village and operational areas, particularly during the night when the Greater Bilby is most active. Vehicle strike from construction machinery is less likely than from vehicles on roads, as the Greater Bilby would be able to move away and avoid direct impact.

Although the death of several animals is considered to be 'Almost Certain' over the life of mine, this will not impact on the survival of the local population. The potential residual impact from vehicle strike on Greater Bilbies is assessed as 'Medium'.

Impact	Consequence	Likelihood	Residual Impact
Vehicle strike causing injury or death	Incidental	Almost Certain	Medium

13.2.4 Increased Predation Causing Injury or Death

Potential increase in pest species (populations and number of species) through establishment of domestic waste disposal and permanent water storage facilities may result in increased predation on the Greater Bilby by cats and/or dogs.

Although the death of several animals is 'Likely' to occur over the life of mine, this will not impact on the viability or abundance of the local population. The potential residual impact from increased predation on the Greater Bilby is assessed as 'Medium'.

Impact	Consequence	Likelihood	Residual Impact
Increased predation causing injury or death	Minor	Likely	Medium

13.2.5 Altered Fire Regimes Causing Injury or Death or Loss of Habitat

The Kimberley region is subject to frequent burning, which has increased in intensity in recent years; either as a result of natural or deliberate events (Section 4.2.11). Controlled burning conducted as part of pastoral activities will not be conducted on the same frequency or extent within the Mine Site Development Envelope as a result of implementation of the project. Due to the increased presence of people and machinery in the area there is however an increased risk of accidental fires, which could affect fauna and habitat on a local and regional scale. The project site induction will include information on the prevention and management of accidental fires. Should a fire occur, Greater Bilbies are likely to move away from the fire.

Vehicles will not be permitted to leave access tracks or cleared areas. Firefighting equipment will be maintained within light vehicles, earth moving equipment and buildings. Larger scale firefighting response will be provided as part of the projects Emergency Response Plan. Fire breaks will be installed at key locations to minimise risk to people and infrastructure. Lightning protection will be installed within the processing plant to minimise risk of damage to key infrastructure. Implementation of a Hot Work permit system will minimise the risk of accidental fire due to project activities. The result of these changes is likely to be a reduction in widespread cool, controlled burns across the Mine Site Development Envelope and an increase risk of uncontrolled, hot burns for small areas within the Mine Site Development Envelope.

It is 'Unlikely' that an accidental fire will occur, and any loss of habitat from fire is likely to be localised and short-term. The potential residual impact of altered fire risk on Greater Bilbies, after implementation of management measures, is assessed as 'Low'.

Impact	Consequence	Likelihood	Residual Impact
Increased fire risk causing injury or death	Incidental	Unlikely	Low

13.2.6 Light and Noise Pollution Disrupting Nocturnal Activities

Development of the project may result in an increase in light and noise pollution which could potentially result in changes to the Greater Bilbies nocturnal activities. However, the amount of natural habitat surrounding the project means that impacts are likely to be minimal, and affected individuals are likely to move away from noise or light sources. Management measures to limit the impact of noise and light on fauna will be implemented (Section 8.2.3).

Light and noise are considered a 'Likely' impact on the Greater Bilby, however no mortality of individuals is expected as the Bilbies will move to alternate habitats and/or burrows to avoid this impact. The potential residual impact of light and noise on the Greater Bilby is assessed as 'Low'.

Impact	Consequence	Likelihood	Residual Impact
Light and noise pollution disrupting nocturnal activities	Incidental	Likely	Low

13.2.7 Entrapment Causing Injury or Death

Trenches, excavations, and water storage structures often have steep, slippery sides which prevent fauna, which may fall into them, from escaping. Fauna may also be attracted to waste storage bins or domestic waste facilities, and become trapped. Entrapment may lead to fauna injury or death from starvation, dehydration, drowning, or injury. Fauna egress mats, fencing and visual inspections will be implemented to reduce the potential impact to fauna.

Mortality of Greater Bilby individuals is considered 'Unlikely' to occur, and will not result in effects on population viability or species diversity. The potential residual impact of entrapment on the Greater Bilby is assessed as 'Low'.

Impact	Consequence	Likelihood	Residual Impact
Light and noise pollution disrupting nocturnal activities	Incidental	Unlikely	Low

13.3 FEASIBLE ALTERNATIVES

Direct loss of habitat as a result of land clearing for the mine development and injury or mortality due to vehicle strikes represents the greatest potential impacts upon the Greater Bilby.

Considerations of any alternatives to the direct impact clearing of the pit area habitats are constrained by the fact that the deposit area cannot be avoided or substantially reduced in size due to the fact that it contains the mineral resources central to the economic viability of the project.

Alternatives to the location of the Site Access Road were considered, however based on the fact that a current road already exists where the Site Access Road will be located, it was determined that this option would have the least impact upon the Greater Bilby, since it requires the least additional or cumulative disturbance to potential habitat and those individuals established in the area are accustomed to vehicle traffic.

Sheffield has considered the management of direct and indirect impacts on the Greater Bilby and its habitat in order to avoid, minimise, reduce or eliminate potential adverse effects on the Greater Bilby population through the careful development and design of the project infrastructure to avoid areas where significant evidence of Greater Bilby presence was observed where possible.

13.4 MANAGEMENT AND MITIGATION MEASURES

A summary of key measures to address potential impacts on the Greater Bilby are shown in Table 85.

Table 85: Specific Management Measures for the Greater Bilby

Potential Impact Requiring Management	Measure
Fragmentation of habitat resulting in displacement	• Clearing activities will be managed to ensure clearing is strictly limited to that necessary for operations. • Land clearing will be undertaking progressively with the amount of active disturbance minimised. • Disturbed areas will be rehabilitated as they become available. • Topsoil and vegetation will be respread over rehabilitated areas to act as a seed source and mulch to protect the soil from erosion and provide habitat for fauna.

Potential Impact Requiring Management	Measure
Clearing activities causing injury or death	• Pre-clearance surveys will be undertaken no more than one month ahead of planned land clearing. As Bilbies are highly mobile, utilisation of burrows can vary nightly. To ensure pre-clearance surveys are accurate and information is current, the following protocols will be implemented: – The time between pre-clearance surveys and clearing will be minimised a far as practicable. – Locations of burrows previously identified in the clearing area (both active and non-active burrows) will be inspected. The areas surrounding these locations will also be searched to identify any new burrows in the vicinity. – All burrows present will be assessed to determine if they were recently active (evidenced by 'fresh' spoil, tracks, diggings and scats). – Motion sensor cameras will be used to monitor active Bilby burrows and confirm if Bilbies are present immediately prior to clearing. • In the week preceding entry of large scale mechanised equipment used for land clearing, active Bilby burrows will be identified during ore-clearance surveys. Those not containing young will be collapsed after either capture or removal of the animal to minimise potential for ongoing use prior to land clearing. • A Greater Bilby capture and relocation (translocation) program will be developed. If pre-clearance surveys indicate active burrows occur within the area to be cleared, then the Greater Bilby translocation program will be implemented by a suitably qualified environmental professional. • • A suitably qualified person (fauna spotter) will be on site during land clearing. The fauna spotter will meet the following requirements: – Have appropriate training in fauna handling techniques. – Will hold a permit to handle and move significant fauna under Regulation 15 of the Wildlife Conservation Act 1950. – Have suitable equipment to administer emergency care to injured and or displaced fauna. – Have access to a care facility that can used to rehabilitate injured fauna. Sheffield has established relationships with wildlife rehabilitation care organisations in Broome, who can provide care if required.
Vehicle strike causing injury or death	• Speed limits will be implemented for operational areas and the Site Access Road. • Personnel will be required to adhere to speed limits and drive to road/weather conditions to minimise risks of fauna injuries or death due to vehicle traffic • 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. • 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. • The site induction program will provide information on the Greater Bilby and the importance of minimising impacts on the species.

Potential Impact Requiring Management	Measure
Increased predation causing injury or death	• Sheffield will undertake pest animal control within the Mine Site Development Envelope in co-operation with regional control programs. • Domestic waste facilities will be fenced and putrescible wastes will be regularly covered. • Borrow pits will be designed and constructed to minimise permanent water ponding after rehabilitation.
Altered fire regime causing injury or death or loss of habitat	• Firefighting equipment will be located on site and emergency personnel will be trained in fire response • Lightning protection equipment will be installed as part of project design where necessary. • Vehicles will not be permitted to leave access tracks or cleared areas. • A Hot Work Permit system will be developed and implemented. • All machinery and vehicles undertaking clearing activities will be fitted with firefighting equipment. • 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. • The project site induction will include information on the prevention and management of fires.
Light and noise pollution disrupting nocturnal activities	• Travel between dusk and dawn on the Site Access Road and village assess road will be limited to essential travel. • Lights will be strategically placed and designed to shine towards plant operations and minimise light spill to the environment. • Equipment design will specify compliance with Australian Standard noise limits.
Entrapment leading to injury or death	• Artificial water sources will have egress points installed. • Open holes, trenches, landfill, and any water holding facilities will be inspected regularly for fauna. • Domestic waste facilities will be fenced and putrescible wastes will be regularly covered.
Radiation exposure resulting in loss or reduced health and condition of Greater Bilbies	• Rehabilitated areas will be monitored to ensure radiation levels are consistent with measured pre-mining background levels.

13.5 DOEE SIGNIFICANCE ASSESSMENT

The *EPBC Act* provides guidelines for self-assessment of whether an action is likely to have a significant impact on a matter of national environmental significance (DoE, 2013). While these guidelines are aimed at determining whether a project should be referred to DoEE to determine if it is a Controlled Action, the criteria are also useful for consideration as part of the impact assessment process. Four factors are routinely considered as part of this assessment. These factors were considered as part of the EPBC referral with the assessment documented in Table 86.

When addressing potential impacts on listed threatened species that are classified as Vulnerable, such as the Greater Bilby, DoEE provide more specific impact criteria to be addressed. An assessment against these criteria is provided in Table 87.

Table 86: Consideration of Significant Impact on Matters of National Environmental Significance

Significance Test Item	Assessment for Thunderbird Mineral Sands Project
Are there matters of National Environmental Significance located in the area of proposed action?	The Greater Bilby is known to be present within the Mine Site Development Envelope and surrounding areas. Presence was identified by observation of scats, diggings, inactive and active borrows during project specific baseline fauna studies. DNA examination of scats identified at least 9 individuals present within the survey area. No other matters of national environmental significance are known to be within or adjacent to the proposed project area that could be directly or indirectly impacted by implementing the action.
Is there potential for impacts (direct and indirect) on matters of National Environmental Significance?	The potential impacts (direct and indirect) on matters of national environmental significance are discussed in greater detail in Section 13.2. Impacts include: • Loss and or fragmentation of habitat resulting in displacement. • Clearing activities causing injury or death of individual animals. • Vehicle strike causing injury or death of individual animals. • Increased predation causing injury or death of individual animals. • Altered fire regimes causing injury or death or loss of habitat. • Light and noise pollution disrupting nocturnal activities. • Entrapment causing injury or death of individual animals.
Are there any proposed measures to avoid, reduce impacts?	Project design has considered environmental factors including matters of National Environmental Significance. This has included site layout, building placement, infrastructure design and operational rules. The hierarchy of avoid, minimise, mitigate has been considered and implemented. Avoidance of habitat of the Greater Bilby is not possible as the species is considered non-selective and may use multiple areas within the Mine Site Development Envelope. As such avoidance of Greater Bilby habitat within the deposit area cannot be achieved or substantially reduced in size due to the fact that it contains the mineral resource which is central to the economic viability of the project. The amount of land clearing has been minimised to reduce the direct impact. Progressive clearing for mining and rehabilitation of completed mined areas in compliance with an agreed Mine Closure Plan will also assist with mitigating adverse impacts resulting from land clearing. Where possible, existing disturbance such as the current road that accesses the project area have been utilised in order to minimise additional clearing of potential Greater Bilby habitat. Sheffield is working in close consultation with Traditional Owners to reach a Mining Agreement for the project. This agreement is anticipated to include support for land management activities by the Traditional Owners within the project area. Management measures specific to the Greater Bilby are documented in Section 13.4. A Preliminary Bilby Management Plan has also been prepared (Appendix 23).
Are any impacts of the proposed action on matters of National Environmental Significance likely to be significant impacts (important, notable or of consequence having regard to their context or intensity)?	The project area is located within land used for pastoral activities. It has been moderately impacted by pastoral activities (grazing, burning, introduced plant species, feral animals). Pastoral activities are ongoing and are outside the control of Sheffield. Based on consideration of the factors documented above, knowledge of the project area including results of site specific baseline ecological studies, significant impacts as defined under the *EPBC Act* are considered unlikely to result from implementation of the proposed action on the Greater Bilby. No other matters of national environmental significance are known to be within or adjacent to the proposed project area that could be directly or indirectly impacted by implementing the action.

Table 87: Significance Impact Criteria Assessment for Vulnerable Species

Significance Impact Criteria	Assessment
Lead to a long term decrease in the size of an important population of the species.	Baseline studies have identified the Greater Bilby is present within the Mine Site Development Envelope based on presence of scats, diggings, inactive and active borrows. DNA examination of scats identified at least 9 individuals present within the survey area. This is consistent with knowledge that the Greater Bilby is widely distributed across the Dampier Peninsula. Due to the highly mobile characteristics of the species, the number of individuals in any one area will likely experience significant change over time depending on regional as well as local conditions. The Bilby Population within the Mine Site Development Envelope is not considered to be an "Important Population" as defined by DoEE in that it is necessary for the long term survival and recovery of the species. It is acknowledged that animals present within the project area are however part of the Dampier Peninsula population which is important in terms of the animals survival in Western Australia. The project may impact individual animals and habitat as described in Section 13.2. Given the progressive nature of the project, the small total footprint in relation to the available habitat for the species, the current pastoral land use and the proposed management measures to minimise impacts, it is considered unlikely that a long term decrease in population will occur as a direct or indirect result of the implementation of the project.
Significantly reduce the area of occupancy of an important population.	The Mine Site Development Envelope is 5,875 ha in area. The direct area of impact over 40 + years is about 38.7% of this (2,272.8 ha) with an average of 200 ha cleared annually. Of the total area to be disturbed, 1,632.9 ha (71.8%) will be progressively rehabilitated and is expected to provide suitable habitat for use by the Greater Bilby as vegetation establishes over time. The remaining disturbance area (639.6 ha) will either be permanent disturbance associated with development of the Site Access Road or long term disturbance that will be rehabilitated after completion of the project. From this it can be seen that the project will not significantly reduce the area of occupancy on a local or regional scale of an important Greater Bilby population.
Fragment an existing population into two or more populations.	The Greater Bilby is known to be a highly mobile species. The Site Access Road upgrades an existing road on the pastoral station and will not add to any existing habitat fragmentation. The progressive nature of the proposed land clearing and associated rehabilitation within two years of clearing will minimise risks of habitat fragmentation. Additionally, sufficient Greater Bilby habitat remains around the periphery of the project to allow for movement and interactions within the current population base.
Adversely affect habitat critical to the survival of a species.	Baseline studies identified three habitat types within the Mine Site Development Envelope (5,875 ha). Of these Pindan Shrubland is the dominant habitat present (89.6%) and is considered preferable habitat for the Greater Bilby. Research currently being undertaken in the Western Kimberley has identified the Bilby is non-selective and uses a range of different habitat types. Sheffield in this impact assessment has taken a conservative approach and thus treated the whole Mine Site Development Envelope as potential habitat for the species. The Mine Site Development Envelope is 5,875 ha in area. This forms 14.5% of the total area surveyed during baseline studies (15,693.9 ha). The direct area of impact (i.e. area of land to be cleared) over 40 + years is about 38.7% of the Development Envelope (2,272.8 ha) with an average of 200 ha cleared annually. Of the total area to be disturbed, 1,632.9 ha (71.8%) will be progressively rehabilitated and is expected to provide suitable habitat for use by the Greater Bilby as vegetation establishes over time. The remaining disturbance area (639.6 ha) will either be permanent disturbance associated with development of the Site Access Road or long term disturbance that will be rehabilitated after completion of the project. From this it can be seen that while the project will cause removal of habitat in the short, medium and long term, this habitat is not significant on a local or regional scale and does not represent a habitat that is critical to the survival of the species.

Significance Impact Criteria	Assessment
Disrupt the breeding cycle of an important population.	The Bilby Population using the Mine Site Development Envelope area is part of a regionally important population as defined by DoEE, but it is not considered important on a local scale. The project will operate on a continuous basis i.e. 24 hrs per day, seven days per week. It is anticipated that individual animals will choose to preferentially use areas away from active operations due to the presence of people and noise and vibration emissions from operating equipment. Sheffield have committed to undertaking pre clearance surveys and implementing a Bilby relocation program if evidence of active Bilby use of an area planned to be cleared is detected. Project activities may disrupt breeding cycles on a local scale, but are unlikely to disrupt breeding activates on a regional scale that would adversely affect an important population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitats to the extent that the species is likely to decline.	Whilst the project will remove habitat in the short term until vegetation has established sufficiently to support use of rehabilitated areas by the species, the small scale annual removal of habitat in a regional context is considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitats to the extent that the species is likely to decline.
Result in invasive species that are harmful to the Greater Bilby becoming established.	The project will result in the area not being used for cattle grazing during the life of the project (40 + years). This will have an impact on native vegetation and habitat quality for the Bilby. As described in Section 13.2.4, Sheffield have committed to a number of measures to minimise the risk of introduction of or increase in populations of pest animals.
Introduce disease that may cause the species to decline.	Introduction of disease that may affect Greater Bilbies is not a risk associated with implementation of the project. No animals will be introduced to the Mine Site Development Envelope that may act as vectors for disease spread.
Interfere substantially with the recovery of the species.	The area in which the project would be implemented is an active grazing lease. No actions are currently being taken to address recovery of the species within the pastoral lease area. Greater Bilbies currently co-exist with cattle within this landuse. Sheffield has committed to implementation of an Offsets package in recognition that land clearing will have impacts on habitat of the Greater Bilby and this species is of national conservation significance and has importance socially to a number of stakeholders including Traditional Owners. The aim of the key component of the proposed offsets package is to increase knowledge about the species within the Kimberley to allow for improved conservation efforts. If implemented effectively, this will assist with recovery of the species.

13.6 PREDICTED OUTCOME

The Mine Site Development Envelope is known to support Greater Bilbies. Consistent with other areas of the Dampier Peninsula, the Development Envelope will support Greater Bilbies in low densities with significant difference in population numbers at any point in time given the highly mobile nature of the species.

It is almost certain that clearing associated with the project will result in loss of some Greater Bilby habitat, as well as habitat fragmentation and displacement of individuals. Habitat loss given the nature of the mining process will be progressive and is not expected to be permanent apart from expansion of the existing Mt Jowlaenga Road to form the Site Access Road. Progressive rehabilitation of mined areas to the current land use (grazing of native pasture) will minimise long term habitat loss. Extensive habitat is available in the areas surrounding the Mine Site Development Envelope and thus it is considered feasible for individual Greater Bilbies to move away from the impact area and colonise this habitat during the duration of the project.

Clearing activities are also almost certain to result in the injury or death of some individual Greater Bilbies. Likewise, vehicle strike is almost certain to cause injury or mortality of some individuals. However, these injuries and mortalities are not expected to impact the ability of the Greater Bilby population to survive at the local or regional level.

Light and noise pollution are likely to disrupt the nocturnal activities of the Greater Bilby, but affected individuals are expected to move away from noise and light sources. Fauna injury or mortality due to increased predation, changes to the fire regime, or entrapment may occur, however are not considered likely to impact population viability or diversity.

Based on an assessment of the potential impacts on the Greater Bilby in accordance with the *EPBC Act* significant impacts guidelines (Table 87) it can be summarised that the project is not expected to:

- Lead to a long term decrease in the size of an important population of the species.
- Significantly reduce the area of occupancy of an important population.
- Fragment an existing population into two or more populations.
- Adversely affect habitat critical to the survival of a species.
- Disrupt the breeding cycle of an important population.
- Modify, destroy, remove, isolate or decrease the availability or quality of habitats to the extent that the species is likely to decline.
- Result in invasive species that are harmful to the Greater Bilby becoming established.
- Introduce disease that may cause the species to decline.
- Interfere substantially with the recovery of the species.

Sheffield is committed to managing the project such that the species would not be significantly affected. In recognition of the conservation status of the species and potential impacts on it, an offset package to mitigate impact is proposed. This is detailed in Section 14.