

Thunderbird Mineral Sands Project

Offset Strategy

EPBC 2016/7648

September 2020

Prepared by:

Martinick Bosch Sell Pty Ltd

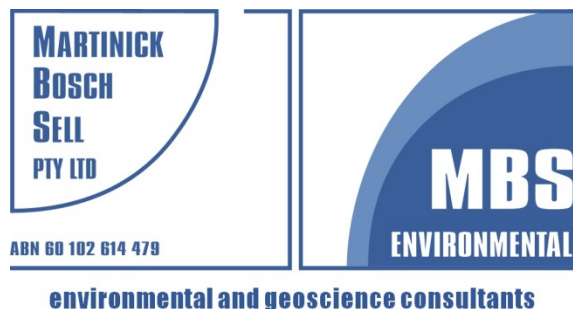
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THUNDERBIRD MINERAL SANDS PROJECT OFFSET STRATEGY

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1. INTRODUCTION

1.1 PROJECT DESCRIPTION

The Thunderbird Mineral Sands Project is a greenfields project and will comprise:

- Mining of heavy mineral sands over a 40 plus year period from the Thunderbird deposit. The initial rate of mining will allow excavation of a nominal 7.5 million tonnes per annum (Mtpa) of ore for the first four to five years, before increasing to a nominal 15 Mtpa of ore for the remainder of the Project life.
- Onsite primary and secondary processing of ore to produce a range of saleable mineral sands products (LTR Ilmenite, ilmenite, primary zircon, zircon concentrate, titano-magnetite and HiTi88 Leucoxene). Construction of processing facilities will be staged with production doubled to 15 Mtpa after approximately year five.
- Abstraction and reinjection of groundwater from the Broome Sandstone Aquifer to allow mining and supply ore processing needs.
- Development of infrastructure to support the Project including power generation facilities, accommodation village, administration and maintenance buildings, internal roads, communications infrastructure, and waste storage and disposal facilities.
- Upgrade and extension of the existing pastoral road (Mt Jowlaenga Road) from the Great Northern Highway to form a 30 km Site Access Road.
- Transport of mineral sands products from the Mine Site via the Site Access Road and Great Northern Highway to the Ports of Derby or Broome for storage prior to export.
- Export of bulk mineral sands products from the Port of Derby Port via King Sound and packaged mineral product from Port of Broome to international customers.

1.2 PROJECT LOCATION

The Project is located on the Dampier Peninsula within the west Kimberley region of Western Australia (Figure 1). The Project comprises two geographically separate locations, namely the Mine Site Development Envelope (including the Site Access Road) (Figure 2) and the Derby Port Development Envelope. Derby Port is an operational port and has been previously used for export of mineral products, but is currently not being used for this purpose. King Sound is currently home to several aquaculture and pearling industries.

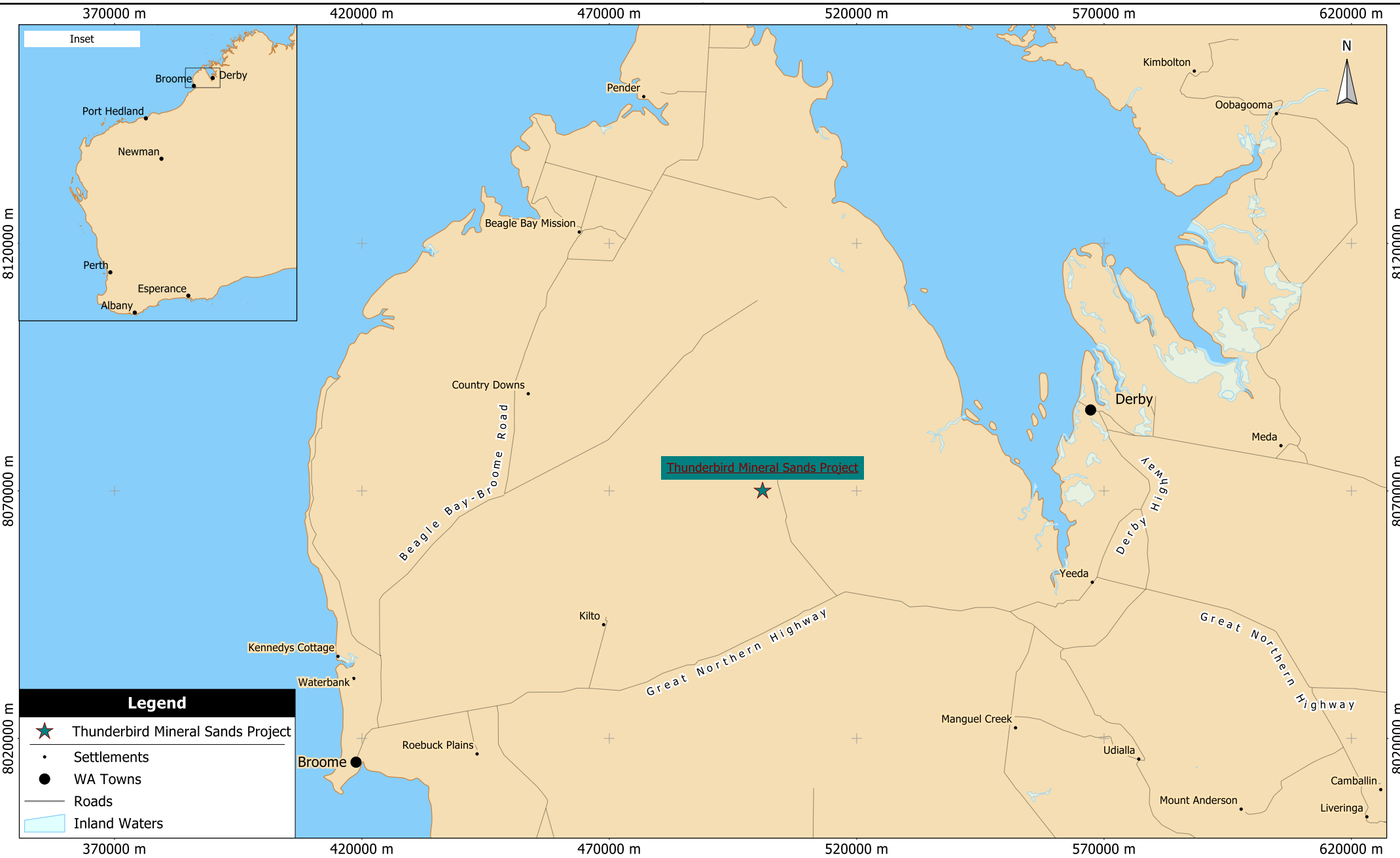
The Mine Site Development Envelope is located approximately 75 km west southwest of Derby and 95 km northeast of Broome (Figure 1). It is accessed from the Great Northern Highway via a proposed 30 km long Site Access Road.

The Mine Site Development Envelope is located within Mt Jowlaenga and Yeeda Pastoral Leases (H910623 and H649773), held by the Yeeda Pastoral Company Pty Ltd. An existing pastoral road that connects the Great Northern Highway to the abandoned Mt Jowlaenga Homestead will be upgraded to form part of the Site Access Road for the Project. The Site Access Road intersects the Great Northern Highway approximately half way between Broome and Derby; the intersection is approximately 110 km to Derby and 100 km to Broome by road.

Several tenements are held by Thunderbird Operations Pty Ltd for the Mine Site components of the Project. Thunderbird Project tenements are detailed in Table 1 and are shown in Figure 2. This Offset Strategy applies only to land disturbance conducted within the Mine Site Development Envelope.

Table 1: Thunderbird Mineral Sands Project Tenements

Tenement	Area (hectares)	Holder	Granted	Expiry
M04/459	4,525	Thunderbird Operations Pty Ltd	25/09/2018	24/09/2039
L04/82	633	Thunderbird Operations Pty Ltd	25/06/2018	26/06/2039
L04/83	219	Thunderbird Operations Pty Ltd	25/06/2018	26/06/2039
L04/84	120	Thunderbird Operations Pty Ltd	23/04/2015	22/04/2036
L04/85	237	Thunderbird Operations Pty Ltd	23/04/2015	22/04/2036
L04/86	191	Thunderbird Operations Pty Ltd	23/04/2015	22/04/2036



Legend

- ★ Thunderbird Mineral Sands Project
- Settlements
- WA Towns
- Roads
- ▭ Inland Waters

Scale: 1:1000000
 Original Size: A4
 Grid: MGA94(51)

0 40 km

Thunderbird Operations Pty Ltd
 Thunderbird Minerals Sands Project

Figure 1
Location Plan

4 Cook St
 West Perth WA 6005
 Ph: (08) 9226 3166
 Fax: (08) 9226 3177
 info@mbsenvironmental.com.au
 www.mbsenvironmental.com.au



500000 m

510000 m



8070000 m

8070000 m

8060000 m

8060000 m

8050000 m

8050000 m

500000 m

510000 m

M 04/459

L 04/85

L 04/84

L 04/86

L 04/82

L 04/83

Legend

-  Mine Site Development Envelope
- Thunderbird Tenements**
-  MINING LEASE
-  MISCELLANEOUS LICENCE
-  Great Northern Highway
-  Mt Jowlaenga Homestead (unoccupied)

Scale: 1:140000

Original Size: A4

Air Photo Date: 2015

Grid: Australia MGA94 (51)

0 4 km

Sheffield Resources Limited
Thunderbird Mineral
Sands Project

Figure 2

**Mine Site Development
Envelope and
Tenements**



SheffieldResources
LIMITED

2. POLICY AND LEGISLATIVE CONTEXT

The use of environmental offsets is guided by the following instruments:

- The Commonwealth EPBC Act Environmental Offsets Policy 2012, which provides guidance for offsetting significant residual impacts to Matters of National Environmental Significance (MNES).
- The West Australian Environmental Offsets Policy 2011 and Environmental Offsets Guidelines 2014.

As the Project was assessed under the terms of the Bilateral Agreement, approval under both the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Western Australian *Environmental Protection Act 1986* were required to allow Project implementation. Both approvals have been granted, specifically EPBC Act approval EPBC 2016/7648 and Ministerial Statement 1080.

2.1 EPBC ACT OFFSET CONDITION REQUIREMENTS

This Offset Strategy has been developed to ensure compliance with EPBC Act approval EPBC 2016/7648, specifically conditions 3 and 4.

Condition 3 of EPBC Act approval EPBC 2016/7648 requires Thunderbird Operations Pty Ltd to submit and obtain approval of an Offset Strategy before the action can be commenced.

The Offset Strategy (this document) is specifically required to:

- a) Provide offsets for 1,961.1 ha of Greater Bilby Habitat to be cleared as a result of the action.
- b) Prioritise land management activities with direct benefit for Greater Bilby habitat over research activities.
- c) Consistently with relevant approved conservation advice, recovery plans and threat abatement plans and/or regional conservation plans, identify threats to Greater Bilby, and nominate priorities for offset projects that are likely to realise a conservation benefit for Greater Bilby.
- d) Specify a financial commitment to offset projects based on a rate of at least \$2,500 (excluding GST) per hectare of Greater Bilby habitat cleared. The contributions rate must be amended quarterly to match inflation measured through CPI, taking the date of this approval as the starting point for adjustments.
- e) Specify milestones for Greater Bilby habitat clearing and for expenditure on offset projects, with a staged process for developing and submitting offset projects for approval by the Department.
- f) Specify the process for reporting on expenditure on offset projects, and conservation outcomes achieved.
- g) Outline the circumstances whereby the approval holder may request from the Minister an acquittal of a portion of the area of Greater Bilby habitat specified in Condition 3(a) as a result of implementing rehabilitation activities.

Condition 4 of EPBC Act approval EPBC 2016/7648 requires Thunderbird Operations Pty Ltd to obtain approval for specific offset projects prior to any such projects being allowed to be undertaken. Offset project proposals submitted to the Department of Agriculture, Water and the Environment (DAWE) for approval must:

- a) Specify the location and nature of offset project activities.
- b) Include project goals, budget, and a detailed offset project description, including timeframes for implementing the offset project, and reporting and publishing offset project results.
- c) Identify and manage all risks (including but not limited to environmental, administrative, financial, and governance risks) associated with implementing the offset project.
- d) Demonstrate how the offset project is consistent with the Offset Strategy.
- e) Outline consultations associated with developing the offset project, including the outcomes of those consultations.

- f) Outline how the offset project complies with the principles of the EPBC Act Environmental Offsets Policy and, if relevant, how the offset project meets the criteria for research and educational programs identified in Appendix A of the EPBC Act Environmental Offsets Policy.

Condition 11C of *EPBC Act* approval EPBC 2016/7648 states that if the approval holder wishes to carry out the action otherwise than in accordance with the Offset Strategy approved by the Minister under Condition 3, the approval holder may submit a revised Offset Strategy for the Minister's approval. If the Minister approves the revised Offset Strategy, the approval holder must implement that strategy instead of the Offset Strategy as originally approved.

Condition 12 of *EPBC Act* approval EPBC 2016/7648 requires the Offset Strategy to be published on the Company's website within 1 month of it being approved by the Minister.

2.2 STATE OFFSET REQUIREMENTS

Ministerial Statement 1080 requires an offset to be made to address significant residual impacts on the Greater Bilby.

Condition 10 relates to provision of offset for Processing and Support Infrastructure and requires Thunderbird Operations Pty Ltd to:

- Fund and undertake an offset to counterbalance the significant residual impact caused by the loss of habitat for the greater Bilby. The amount of funding required shall be based on an initial rate of \$2,500 (excluding GST) plus CPI per hectare (offset rate) of Greater Bilby habitat cleared for Processing and Support Infrastructure.
- Prepare and submit a Greater Bilby Research and Conservation Plan which identifies research projects and on-ground conservation projects to be undertaken which offsets the significant residual impact and contributes to lasting conservation outcomes for the Greater Bilby on the Dampier Peninsula no later than six months from commencement of the Thunderbird Mineral Sands Project.
- Within 6 months of receiving approval for the Greater Bilby Research and Conservation Plan, commence implementation of it.

Condition 11 relates to provision of offset for the mine pits and requires Thunderbird Operations Pty Ltd to:

- Provide additional offset to that required by Condition 10 if the Greater Bilby Habitat Rehabilitation Plan performance review required by Condition 9-8 determines that the proposal has resulted in additional significant residual impact to habitat of the Greater Bilby as a result of clearing for mine pits.
- Apply the methodology for identification of Greater Bilby Habitat required by Condition 10 to areas cleared for mine pits.
- Update the Greater Bilby Research and Conservation Plan to include additional discrete research and on-ground conservation projects in accordance with the requirements of Condition 10.

2.3 THE BILATERAL ASSESSMENT

During assessment of the Project, DAWE and the Western Australian EPA have worked in close consultation regarding offset requirements and have harmonised offset requirements to minimise duplication of provisions between the jurisdictions.

This has resulted in:

- Recognition that due to the location of the Project on the Dampier Peninsula, direct offset by land purchase was not practically achievable given land is predominantly held in long term pastoral leases held in the conservation estate or is Aboriginal land.

- Agreement on the financial offset rate to be provided to address loss of Greater Bilby habitat.
- Recognition that significant residual impacts are related to long term or permanent loss of habitat.
- Recognition that the mineral sand mining process and subsequent landform restoration and revegetation may not result in long term habitat loss. This is conditional on Thunderbird Operations Pty Ltd demonstrating rehabilitation has resulted in return of areas suitable for use by the Greater Bilby.
- Recognition that offset projects will achieve lasting conservation outcomes for the Greater Bilby on the Dampier Peninsula.

3. BIODIVERSITY VALUES REQUIRING OFFSET

3.1 PROFILE OF TARGET SPECIES

The target species for the Offset Strategy is the Greater Bilby (*Macrotis lagotis*) listed as Vulnerable under the (EPBC Act) and the West Australian *Wildlife Conservation Act 1950*. Baseline assessments of fauna in the vicinity of the Mine Site Development Envelope identified that the Greater Bilby utilises the Project area and surrounds.

Once common throughout the arid and semi-arid regions of Australia, European settlement brought about changes to the Greater Bilby's habitat and as a result during the 20th century its range reduced significantly with the species now being absent from its previous southern and central range. Populations are now restricted to within the Tanami Desert of the Northern Territory, the Great Sandy and Gibson Deserts, parts of the Pilbara and Kimberley (near Broome) regions of Western Australia and the clayey and stony soils of the Mitchell grasslands of south west Queensland. Changes to the Greater Bilby's distribution have been attributed primarily to the introduction of predators such as cats and foxes, introduction of herbivores such as cattle, camels and rabbits, modification and destruction of habitat and changes to fire regimes, associated with European settlement.

Greater Bilbies are largely solitary, widely dispersed and found in low numbers. The Greater Bilby is a nocturnal species. During daylight hours this species remains sheltered in burrows they construct to a depth of 2 – 3 m. At night they leave their burrows to forage and have been known to move up to 5 km in an individual night in search of food (ABAS 2002). Responding to changes in food availability, Greater Bilby home ranges are extensive and variable (van Dyck and Strahan 2008). To accommodate these large home ranges, Greater Bilbies can utilise over 12 burrows concurrently (Southgate 1987).

The Greater Bilby has historically been recorded within a variety of habitat types that have included open Eucalyptus forest and woodlands in south west Australia, tall shrublands and woodlands in semi-arid Australia, and hummock grasslands and sparse forblands in arid Australia (Pavey 2006). In Western Australia, bilbies have been recorded from a variety of substrate and vegetation types. These align broadly with the habitats identified by Southgate (1990). Three primary landscape types can be identified:

- Laterite, silcrete or stony rises and uplands (residual landforms).
- Drainage lines including upland creek systems, calcareous areas and broad palaeodrainage systems (fluvial landforms).
- Flat or gently undulating plains and dune fields.

The prevalence and persistence of bilbies has been found to vary among these habitats and in response to the rainfall gradient. The availability of key foods and the prevalence of key introduced species were also found to vary with landform types.

In the north, where rainfall is higher, bilbies occupy residual, fluvial and sand plain landforms. In the southern part of the range, where rainfall is lower, it is evident that bilbies have become more restricted primarily to occupy residual and fluvial landforms (Cramer et al. 2017).

In the broader region surrounding the Project area, the Greater Bilby has been reported within open woodland and open forest pindan vegetation types, with occurrence in pindan shrubland and other vegetation communities having a lower degree of preference (Southgate 2012 cited in Ecologia 2016). During the targeted Greater Bilby survey, evidence of Greater Bilby occurrence was primarily recorded within the pindan shrubland vegetation type (Ecologia 2016). More specifically, the Greater Bilby was recorded predominantly within dense, mature *Acacia tumida* var. *tumida* woodland micro-habitat. This micro-habitat appears to be influenced by fire age, with older fire age (>2 years) than surrounding areas. The dense, mature *Acacia tumida* var. *tumida* woodland micro-habitat forms a dense canopy layer, but relatively open ground cover, which is in contrast to surrounding areas which appear to have been burnt more frequently and are characterised by dense ground vegetation.

3.2 THREATS TO THE GREATER BILBY

3.2.1 National Threats

Consideration has been given to the National Recovery Plan for the Greater Bilby *Macrotis lagotis* (National Recovery Plan) (Pavey 2006). The two main aims of this National Recovery Plan are:

- 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.

Consideration has been given to the *EPBC Act* Conservation Advice for the Greater Bilby (DAWE 2016). The threats identified in the advice are:

- Invasive species – predation by foxes and cats is a potential threat for Greater Bilbies in the northern ranges of their distribution.
- Habitat loss and fragmentation - land clearing leading to loss and degradation of habitat, increased predation and fragmentation effects, increased risk of road kill where clearing is for infrastructure corridors and infrastructure resulting in potential barriers to dispersal and gene flow is a potential threat for Greater Bilbies in the northern ranges of their distribution.
- Impacts of domestic species –introduced herbivores and water points are known to be threats to Greater Bilbies in the northern ranges of their distribution. Introduced herbivores remove vegetative cover and cause soil compaction, particularly around water points.
- Fire – Extensive and intense fires are known threats to Greater Bilbies in the northern ranges of their distribution as they remove vegetation cover from large areas potentially increasing predation pressure and reducing availability of food resources.

3.2.2 Regional Threats

Consideration has been given to the threats listed in the Rangeland NRM Regional Plan for the Kimberley (Rangelands, NRM 2018), specifically threats to conservation significant species (flora and fauna). The Kimberley NRM Region Plan program aims to protect priority flora, fauna and aquatic ecosystems by implementing a co-ordinated approach to fire management, controlling feral animals and containing new and emerging weed species. Rangelands NRM Regional Plan aim to continue to work with the community to increase capacity to effectively plan, resource and implement on ground works to manage priority areas. Government agencies, pastoral managers and Indigenous Rangers are stated to be critical to the management of these priority areas. Threats identified in the Rangelands NRM Regional Plan and their associated significance are:

- Inappropriate fire (High).
- Inappropriate grazing management (Low).
- Weeds (Low).
- Feral animals – herbivores (Low).
- Feral animals – predators (High).
- Disconnection (Low).
- Land clearing (Low).
- Mining, industry and pollution (Low).

3.2.3 Project Specific Threats

As part of the impact assessment process, threats to the Greater Bilby were identified and assessed. These are not significantly different to the identified national or regional threats, however they are more specific given they have been assessed on a project basis for a small land area. The identified project related threats to the Greater Bilby are:

- Vehicle strike causing injury or death.
- Fragmentation and loss of habitat resulting in displacement.
- Clearing activities causing injury or death.
- Entrapment leading to injury or death.
- Increased predation causing injury or death.
- Altered fire regimes causing injury or death or loss of habitat.
- Light and noise emissions disrupting nocturnal activities.
- Radiation exposure causing injury or death.

Management and mitigation measures have been documented in the Fauna Environmental Management Plan to prevent or minimise impacts on the Greater Bilby. These actions are not considered as part of the offset requirements, rather part of other land management and regulatory expectations.

3.3 OFFSETTING RESIDUAL IMPACTS

Given the land tenure challenges in the Kimberley, the majority of land being long term pastoral leases, conservation estate or Aboriginal land, the DAWE Offset Assessment Guide (offset calculator) was not used by DAWE to derive an appropriate offset for the Project. Rather the offset was aligned with Western Australian Government offset requirements in the pastoral regions of WA, which relate area of species habitat cleared to financial contributions per hectare. The majority of the offset commitment will be designed to provide direct benefits to the conservation status of the Greater Bilby through on-ground land management actions.

The EPBC Act conditions of approval specify that Thunderbird Operations Pty Ltd must not clear more than 1,961.1 ha of Greater Bilby habitat and, to compensate for residual impacts to the Greater Bilby, this Strategy must '*provide offsets for 1961.1 ha of Greater Bilby habitat to be cleared as a result of the action*'. Current mine planning is for a maximum clearing of 1931.1 ha of Greater Bilby habitat, and so Thunderbird Operations Pty Ltd proposes at this stage to only provide offsets for this area of impact (see Tables 4 and 5).

If Thunderbird Operations Pty Ltd decides to clear greater than 1931.1 ha (and less than 1961.1 ha) of Greater Bilby habitat it will submit a revised Strategy under Condition 11C of the EPBC Act approval. Thunderbird Operations Pty Ltd will only proceed with additional clearing following approval of the revised Strategy.

Provision has been made within Condition 3g for Thunderbird Operations Pty Ltd to request from the Minister for the Environment acquittal of a portion of the Greater Bilby habitat disturbance as a result of implementing effective rehabilitation activities. The circumstances of that request include that Thunderbird Operations Pty Ltd will submit to the Department:

- The approved Greater Bilby Habitat Rehabilitation Plan confirmed in accordance with requirements of Condition 9- and 9-2 of MS 1080.
- The Greater Bilby Habitat Rehabilitation Performance Report specified in Conditions 9-8 and 9-9 of MS 1080.
- Evidence, confirmed in writing by an expert that has been approved by the Department, that rehabilitated areas are habitat suitable for the Greater Bilby, including for foraging and burrowing.
- Spatial data for the rehabilitation area as specified by the Department.

4. OFFSET STRATEGY

4.1 OVERVIEW OF OFFSETS

The Offset Strategy proposed for the Project will fund land management activities and research that specifically address threats to the Greater Bilby. Given the long project life (40+ years) and thus need for the Offset Strategy to be a long term document, offset projects will be conceived and designed to respond to changing circumstances, reflect outcomes of funded Projects and to respond to future priorities.

It is noted that while the Offset Strategy is necessitated by the land disturbance that occurs within the Mine Site Development Envelope, the projects that it funds will be for areas outside of the Development Envelope recognising that Thunderbird Operations already has legal obligations for environmental management of impacts on the Greater Bilby associated with implementation of the Project.

4.2 LAND MANAGEMENT

The Offset Strategy will give priority to funding on ground land management activities that will benefit the Greater Bilby on the Dampier Peninsula. A minimum of 90% of the offset funds will be spent on 'direct offset' activities. Of this no less than 75% of the "direct offset" component will be for on-ground land management activities for threat abatement, and no more than 25% will be attributed to offset project planning, monitoring, community engagement and reporting costs. The costs of administering the projects (see Section 4.4.1.4) will be borne by Thunderbird Operations.

The land management activities funded under this Strategy will comply with the following principles:

- The activities will improve the long term viability of the species and will be targeted towards threats identified in the National Recovery Plan and priorities identified in the DAWE Conservation Advice for the species.
- The land management activities will be undertaken in a transparent, scientifically robust and timely manner. Land Management Project proposals considered by Thunderbird Operations for funding will need to demonstrate:
 - The project is likely to achieve a conservation gain for the Greater Bilby on the Dampier Peninsula.
 - The capacity of the individual, team or organisation to implement the project to achieve the project outcomes, the anticipated cost of the project, the proposed use of local resources to undertake the project and compliance with relevant research, regulatory or other standards to allow the work to be undertaken.
 - The appropriateness of the proposed time frame required to complete the project, including key milestones.
- Priority will be given to funding projects that address threats at a landscape level rather than focusing on small, highly localised programs. Land management projects will not be conducted on Thunderbird Operations tenure unless it is part of a wider regional program and will not be associated with mining rehabilitation activities or designed to avoid or mitigate impacts from the mining operations.
- Involvement of local community members in land management activities will be encouraged.

Table 2 lists the priorities within the DAWE Conservation Advice for the Greater Bilby with regard to conservation and management.

Table 2: DAWE Conservation and Management Priorities for the Greater Bilby

Threat	Priority Actions	Relevance to Dampier Peninsula
Invasive Species	Develop regional predator management strategies.	High
	Manage feral cats and foxes to reduce predation on bilbies, by refining, trialling, and implementing introduced predator control techniques in and around areas where bilbies occur (primarily baiting, grooming trap, shooting, training rangers and neighbouring pastoralists to trap, traditional hunting, fox and feral cat -specific baiting, trapping, grooming trap, shooting).	Moderate
	Reduce the numbers of introduced herbivores, including rabbit populations, in and around areas where bilbies occur.	Low* [^]
Habitat Loss and Fragmentation	Enlarge and reconnect wild populations that are fragmented; work with landholders and neighbouring pastoralists to maintain and improve habitat quality and manage feral predators.	Moderate
	Manage and restore habitat with the aim of creating sufficiently large areas to support subpopulations of up to 10,000 individuals.	Low [#]
Impacts of Domestic Species	Manage levels of feral herbivores below thresholds at which they impact habitat quality for bilbies.	Low [^]
Fire	Define and promote appropriate region-specific fire management to minimise large scale fires and promote mosaics of vegetation with heterogeneous structure and age classes, e.g. through patch burning, traditional burning, linear fire breaks etc.	Moderate/High
Stakeholder Engagement	Have an effective recovery team to lead and coordinate the conservation and recovery of the greater bilby nationally.	Low
	Develop an engagement strategy which realises opportunity for participation and support, and which engenders community awareness and understanding for greater bilby conservation. All potential relevant parties will be included in this – public sector, resource sector, agricultural sector, Traditional Owners, NGOs and general community.	High
	Land managers (including pastoralists, indigenous communities, Indigenous Protected Areas, etc) should be given information about managing fire and invasive species for the benefit of the greater bilby.	High

* Rabbits are reported as absent or present in very low numbers on the Dampier Peninsula (Cox et Al. 2013).

[^] A large proportion of the Dampier Peninsula are pastoral leases used for rangeland grazing of cattle. Minimum and maximum stocking rates are subject to approval under the Lands Administration Act. Substantial or long term changes in stocking rates require approval under the Lands Administration Act.

[#] Fragmentation and or unavailability of habitat is not considered a significant threat on the Dampier Peninsula as large areas of Aboriginal Land, Conservation Estate and Pastoral stations provide suitable habitat.

Considering the priorities listed in the Conservation Advice for the species and results of stakeholder engagement undertaken during the environmental impact assessment process for the Project, land management activities focusing on the following themes are favoured at this stage:

- Fire management to reduce uncontrolled, high intensity events on the Dampier Peninsula.
- Sustainable grazing practices to minimise impacts on Greater Bilby and their habitat.
- Feral animal control on the Dampier Peninsula focusing on cats, foxes and wild dogs.

- Weed control on the Dampier Peninsula focusing on species that represent the highest risk to Greater Bilby habitat (from disturbance and increased fire risk).
- Education programs within the Dampier Peninsula focusing on transfer of knowledge for improved land management practices that are likely to be implemented and will improve the long term viability of Greater Bilby populations on the Dampier Peninsula.

Project funding for feral animal and weed control activities will only be for activities that are in addition to control activities required at the time under duty of care/biosecurity obligations on the Dampier Peninsula. Details as to the actual activities to be sponsored, the location, implementation schedule and costs will be documented in the project proposals to be submitted to DAWE for approval.

4.3 RESEARCH

The Offset Strategy will give lower priority to funding research activities that will benefit the Greater Bilby on the Dampier Peninsula compared to funding on-ground land management activities. A maximum of 10% of the offset funds will be spent on such research activities over the life of the Project. Preference will be given to applied research that will contribute to improved land management outcomes.

Research activities sponsored will comply with the following principles:

- The research will be structured to improve the long term viability of the species on the Dampier Peninsula and will be targeted towards research priorities identified in the DAWE Conservation advice noting that this considered information from the Greater Bilby Recovery Summit Report and Interim Conservation Plan (Bradley et al., 2015).
- Research activities will be undertaken in a transparent, scientifically robust and timely manner. Research project proposals considered by Thunderbird Operations for funding will need to be able to demonstrate:
 - The research project is likely to achieve a conservation gain for the Greater Bilby on the Dampier Peninsula.
 - The capacity of the individual, team or organisation to conduct the research to achieve the project outcomes, the anticipated cost of the project, and compliance with relevant research, regulatory or other standards to allow the work to be undertaken.
 - The appropriateness of the proposed time frame required to complete the research project, including key milestones.
- Results of research activities will be shared and made publically available to assist with improved understanding of the species and increasing effectiveness of land management activities to maintain their viability.

Table 3 lists the priorities within the DAWE Conservation Advice for the Greater Bilby with regard to information and research.

Table 3: DAWE Research Priorities for the Greater Bilby

Priority Actions	Relevance to Dampier Peninsula
Develop a prioritised, targeted research program incorporating social, cultural and ecological elements which informs effective greater bilby conservation. This plan is likely to address the following issues:	
• Determine size of habitat required to support high bilby numbers.	Low
• Determine intensity of grazing that negatively affects bilby populations.	High
• Experimentally determine whether a reduction or removal of stock can restore habitat suitability and enable reintroduced bilbies to persist.	High
• Undertake research on immigration corridors, source populations and feral cat movement during boom and bust events in South West QLD to enable implementation of effective predator control.	Nil
• Determine the impact of feral cats on bilbies in a system with few foxes and rabbits.	High
• Determine impact of broad scale predator baiting programs on abundance and composition of predator communities and how this affects total predation pressure on bilbies.	Low/Moderate
• Test efficacy of manipulative management measures aimed at reducing feral cat abundance and determine the effort required to reduce feral cats to levels that allow bilby persistence and recovery.	Moderate
• Test response of bilbies (plus habitat quality, food availability, predators) to experimental fire manipulation in five different bilby subpopulations.	High
• Determine the effect of turning on and off water points on predator composition and their relative abundance/occupancy.	Low
• Determine the required conditions for successful release of captive animals into the wild, including history of sites, results of previous translocations, traits which improved the survival of release animals in the past.	Low
Prioritise research into biological controls to manage predation.	Low/Moderate

Considering the priorities listed in the Conservation Advice for the species and results of stakeholder engagement undertaken during the environmental impact assessment process for the Project, research activities focusing on the following aspects are favoured at this stage:

- Understanding habitat preferences and use for the Greater Bilby on the Dampier Peninsula.
- Improved understanding of the threats posed by introduced predators for Greater Bilbies on the Dampier Peninsula.
- Improved understanding of pastoral (grazing) activities on the long term viability of the Greater Bilby on the Dampier Peninsula.
- Improved understanding of how fire regimes affect Greater Bilby conservation on the Dampier Peninsula.

Details as to the actual research activities to be sponsored, the location, implementation schedule and costs will be documented in approved Offset Projects.

4.4 STAGED OFFSET PLAN

Thunderbird Operations Pty Ltd approach to complying with the required offset obligations will be through staged offset payments over the life of the Project as this reflects the staged approach to land clearing that will be undertaken. This provides an incentive for the Project to undertake less clearing than projected. Expenditure of offset funds for approved offset projects will also be staged to reflect the funds available for Projects.

The scheduled land clearing and rehabilitation is shown in Table 4.

Table 4: Schedule of Land Disturbance and Rehabilitation (ha)

Project Year ¹	Process Plant & Infrastructure Land Disturbance Area	Mine Disturbance Area	Total Annual Land Disturbance	Cumulative New Land Disturbance	Annual Rehabilitation Area	Cumulative Rehabilitation Area
0	66.1	0	66.1	66.1	0	0
1	260	37	297	363.1	0	0
2	0	27	27	390.1	0	0
3	0	27	27	417.1	10	10
4	0	43	43	460.1	17	27
5	0	88	88	548.1	26	53
6	0	41	41	589.1	19	72
7	0	41	41	630.1	41	113
8	0	41	41	671.1	41	154
9	0	41	41	712.1	57	211
10	0	57	57	769.1	173 ⁺	384
11	0	81	81	850.0	7	391
12	0	71	71	921.1	32	423
12	0	65	65	986.1	29	452
14	0	66	66	1,052.1	228	680
15 - 20	0	270	270	1,322.0	196	876
21 - 25	0	150	150	1,472.1	176	1,052
26 - 30	0	130	130	1,602.1	176	1,228
31 - 35	0	130	130	1,732.1	260 [^]	1,488
36 - 40	0	148	148	1,880.1	163	1,651
41 - 45	0	59	59	1,939.1	116	1,767
45 - 50	0	0	0	1,939.1	172.1	1,939.1

⁺ Includes rehabilitation of 134 ha of the TSF disturbance

[^] Includes rehabilitation of 20 ha of the Borefield

¹ The calendar year in which the project commences, and which is notified to the regulators.

4.4.1 Offset Entity, Offset Payments and Offset Expenditure

4.4.1.1 Approval Requirements

Under both State and Federal requirements, an offset payment of \$2,500 per hectare is required (excluding GST) with contributions to be amended quarterly to match inflation measured through CPI.

Ministerial Statement 1080 requires:

- Payment for land disturbed for processing and support infrastructure with the payments to be reconciled with actual annual land clearing.
- Payment of funds for land disturbed for mine pits only if the Greater Bilby Habitat Rehabilitation Plan Performance Report finds that the rehabilitation works undertaken have been unsuccessful in returning Greater Bilby habitat back to the agreed completion criteria. Rehabilitation monitoring programs relevant to re-establishment of Greater Bilby habitat have been established as part of the Fauna Environmental Management Plan required by both Ministerial Statement 1080 and *EPBC Act* Approval EPBC 2016/7648. The Rehabilitation Performance Report is required to be submitted within 10 years of the Greater Bilby Rehabilitation Plan being approved by the CEO of the EPA. This in effect means that no offset payments are required for mine pit disturbance up to the time of submission of the Rehabilitation Performance Report (estimated to be about 2030). If the rehabilitation of mine pits disturbance is unsuccessful, payments for the land cleared for mine pits would be required including all land already cleared for this purpose and ongoing payments commensurate with the annual land clearing amount.

EPBC 2016/7648 does not specify any difference in payment based on land activity type, but does however allow the Proponent to request from the Minister acquittal of a portion of the offset as a result of implementing rehabilitation activities. No reference to the State requirement for the Greater Bilby Habitat Rehabilitation Plan Performance Report is contained within the approval.

Thunderbird Operations will undertake an annual reconciliation of land disturbance for each calendar year with results to be included in annual compliance reporting submitted to DAWE and the EPA. This will provide detail on the amount of land cleared and the purpose of the land clearing.

4.4.1.2 Offset Payment Plan

Offset funds will be paid quarterly by Thunderbird Operations into a dedicated Offset Entity managed by Thunderbird Operations. Provision of quarterly offset payments into the Offset Entity will align with the required quarterly CPI adjustments and will reflect the annual land disturbance reconciliation agreed with the EPA.

Recognising the differences in requirements between MS 1080 and EPBC 2016/7648 regarding payment of an offset for mine pit disturbance, Thunderbird Operations proposes to establish a Bank Guarantee Facility to hold the required money until no later than 1 January 2032, or if sooner, such time as:

- The outcomes of the mine pit Rehabilitation Performance Report have been assessed and determined by the EPA.
- The Federal Environment Minister has determined a request submitted in accordance with Condition 3(g) of the EPBC Act approval.

A reconciliation of the land disturbed will be undertaken annually (reconciliation period) for the purposes of the Bank Guarantee Facility. At the end of the reconciliation period, if an increase in the area of land disturbed has occurred, a payment based on the additional disturbed area will be made into the Bank Guarantee Facility. Based on current mine schedules, it is estimated that total mine pit disturbance for the period in question (i.e. first 12 years of operation) would be 595 ha, which equates to \$1,487,500 for the total Bank Guarantee facility. If the Federal Environment Minister:

- Does not accept mine pit rehabilitation as offset for a portion of the area of Greater Bilby habitat cleared as a result of the action, the Bank Guarantee and required interest and CPI amounts will be used to fund approved offset projects.
- Accepts mine pit rehabilitation as offset for a portion of the area of Greater Bilby habitat cleared as a result of the action, the respective portion of funds deposited in the Bank Guarantee will be used to fund approved offset projects.
- Accepts mine pit rehabilitation as offset for all of the area of Greater Bilby habitat cleared as a result of the action, the Bank Guarantee will be dissolved and no offset for mine pit related land disturbance will be required.

Commitments to offset project funding is set shown in Table 5.

Table 5: Schedule of Offset Payment in relation to Land Clearance

Project Year	Process Plant & Infrastructure Land Disturbance Area	Mine Disturbance Area	Cumulative Land Disturbance	Estimated Offset Funding (\$)#
0	66.1	0	66.1	165,250
1	260	37	363.1	650,000
2	0	27	390.1	1,487,500 Contribution into a Bank Guarantee until Minister determines request in accordance with Condition 3(g).
3	0	27	417.1	
4	0	43	460.1	
5	0	88	548.1	
6	0	41	589.1	
7	0	41	630.1	
8	0	41	671.1	
9	0	41	712.1	
10	0	57	769.1	
11	0	81	850.0	
12	0	71	921.1	
13	0	65	986.1	162,500*
14	0	66	1,052.1	165,000*
15 - 20	0	270	1,322.0	675,000*
21 - 25	0	150	1,472.1	375,000*
26 - 30	0	130	1,602.1	325,000*
31 - 35	0	130	1,732.1	325,000*
36 - 40	0	148	1,880.1	370,000*
41 - 45	0	59	1,939.1	147,500*
45 -50	0	0	1,939.1	0

Excludes GST and CPI components. * Requirement for payment will depend on outcome of Minister's decision in accordance with Condition 3(g)

4.4.1.3 Offset Expenditure Plan

Thunderbird Operations EPBC Act approval EPBC 2016/7648 (Condition 4) and Ministerial Statement 1080 (Condition 10-3) requires project proposals to be developed and submitted to both State and Federal departments for approval, in order to offset Greater Bilby habitat loss. Project proposals will be developed and submitted for approval in stages. Initial project proposals will be included in the Greater Bilby Research and Conservation Plan (the plan), which is to be submitted within six months of Thunderbird Operations project commencement (Condition 10-2 of Ministerial Statement 1080). The submission of subsequent offset project proposals will align with adequate funds and suitable timing as determined by staged offset payments which reflect staged land clearing. Commencement and expenditure of approved projects must occur within six months of their approval (Condition 10-4, Ministerial Statement 1080).

Expenditures will be made from the Offset Entity to DAWE approved projects in line with the agreed expenditure schedule for each project.

Offset expenditure will be allocated in financial years following the initial allocation and expenditure of funds.

It is likely that the Offset Entity will hold funds in excess of funding required to implement approved projects. This may occur when:

- Funds have accumulated within the Offset Entity to fund project proposals.
- Written agreement from the DAWE and the EPA that expenditure of money in the Offset Entity is not warranted in the short term due to a lack of approved projects that can demonstrate they will contribute to a long term conservation outcome for the Greater Bilby on the Dampier Peninsula.
- Delays in commencement of an approved project. This may occur where:
 - Thunderbird Operations is dependent on third party commitments to implement the approved project in the projected timeframe, and those parties fail to meet their commitments. In this circumstance Thunderbird Operations will submit for approval a revised project proposal to reflect revised project timeframes.
 - Thunderbird has evaluated the results of a separate approved project and this has raised concerns as to the appropriateness of the scope and methodology of a project that previously has been approved without the benefits of this new knowledge. In this circumstance Thunderbird Operations will submit for approval a revised project proposal to reflect this new knowledge and revised project timeframes.

If such an instance occurs where the Offset Entity has more funds than has been expended, the funds would be maintained in the Offset Entity and subject to interest payments. Such interest payments will add to the funds available for use in approved projects.

4.4.1.4 Offset Administration

Thunderbird Operations will administer approved projects and the Offset Entity and ensure auditable accounts are produced for the Offset Entity on an annual basis.

Money from the Offset Entity will not be used for:

- Financial administration of the Offset Entity.
- Selecting, designing, stakeholder/project partner consultations on and managing projects.
- Liaising with DAWE and the EPA regarding approval of offset project, progress reporting or compliance reporting.

4.5 CONSISTENCY WITH EPBC ACT ENVIRONMENTAL OFFSETS POLICY

Table 6 shows how this Offset Strategy is consistent with the *EPBC Act* Environmental Offsets Policy (October 2012) principles.

Table 6: Compliance with EPBC Act Offsets Policy Requirements

Offset Principles Requirement	Compliance Details
Deliver an overall conservation outcome that improves or maintains the viability of a protected matter.	The Offset Strategy targets the protected matter (Greater Bilby) that is being impacted. As stated in Section 4.1, 90% of the offset money will be spent on land management projects on the Dampier Peninsula, such that improved land management outcomes on a regional scale will improve or maintain the viability of Greater Bilby populations on the Dampier Peninsula.
Built around direct offsets, but may include other compensatory measures.	It proposes that a minimum of 90% of the Offset Entity expenditure will be through direct offsets and 10% through indirect (research offsets). Costs associated with administration of the Offset Strategy will not be drawn from the Offset Entity. This is detailed in Section 4.4. The Offset Strategy is consistent with key priority actions outlined in the National Recovery Plan and State conservation advice for the species.
Be in proportion to the level of statutory protection that applies to the protected matter.	The funding commitment for the Offsets Strategy (i.e. \$2,500 per hectare of habitat loss) is consistent with the approval requirements for EPBC 2016/7648 and MS 1080, both of which considered the level of statutory protection (i.e. vulnerable) applied to the Greater Bilby.
Be of a size and scale proportionate to the residual impacts on the protected matter.	The funding commitments for the Offsets Strategy (i.e. \$2,500 per hectare of habitat loss) are consistent with the approval requirements for EPBC 2016/7648, which considered the size and scale of the residual impacts on the Greater Bilby.
Effectively account for and manage the risks of the offset not succeeding.	The Offset Strategy requires 90% of the offset funds to be used for land management activities, a direct offset type as defined under the EPBC Act Offset Policy. This focus on on-ground actions and consultation and risk management arrangements anticipated at the offset project scale will manage the risk of the offset not succeeding.

Offset Principles Requirement	Compliance Details
<p>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>	<p>The Offset Strategy specifically states in Section 4.1 that it does not apply to land management within the Development Envelope recognising that Thunderbird Operations already has legal obligations for environmental management in this area. Also, offset projects will not fund project activities that are already required, determined by law or planning regulations or agreed to under other schemes or programs, for example to meet Western Australian weed, pest and/or biosecurity obligations.</p>
<p>Be efficient, effective, timely, transparent, scientifically robust and reasonable.</p>	<p>The Offset Strategy recognises requirements of both State and Federal approvals relevant to offset provisions and protection of the Greater Bilby. This improves the likelihood of the Offset Strategy when implemented being efficient and effective.</p> <p>The offset payment and expenditure provisions documented in Section 4.4.1 demonstrate the link between land clearing (relevant threatening process) and provision of the offset.</p> <p>Section 4.2 and 4.3 provide details of the principles to be applied for land management and research projects to be considered suitable funding. This includes provision for them to demonstrate they are scientifically robust.</p>
<p>Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.</p>	<p>The Offset Strategy documents reporting requirements in Section 5. Stated reporting requirements will allow assessment of compliance with offset payment and expenditure requirements and will provide details of the outcomes of the approved offset projects.</p> <p>The annual compliance reports required by DAWE and the EPA will be made publically available, fulfilling the transparency requirement of the EPBC Act Offset Policy.</p>

5. REPORTING

The Annual Compliance Report for *EPBC Act* Approval EPBC 2016/7648 will include the following information relevant to the Offset Strategy:

- Amount of Greater Bilby habitat cleared during the reporting period and cumulative Project clearing at the time of report submission.
- Offset fund payment amounts made during the reporting period and amount of funds within the Offset Entity at the time of report submission.
- Offset Entity expenditure made during the reporting period, cumulative expenditure at the time of report submission and funds committed to approved programs, but not yet paid.
- Programs relating to land management and research approved during the reporting period.
- Status of active approved programs and progress made toward agreed deliverables.
- Outcomes of approved projects completed during the reporting period.

6. CONCLUSION

Offsets are required to be provided for any significant residual impacts on matters protected under the *EPBC Act*. The Thunderbird Mineral Sands Project gives rise to significant residual impacts on the Greater Bilby. This Offset Strategy outlines a framework for the long term provision of offsets for impacts on this species, and for the consideration of mine pit rehabilitation to acquit those offset obligations.

Greater Bilby populations are currently restricted to within the Tanami Desert of the Northern Territory, the Great Sandy and Gibson Deserts, parts of the Pilbara and Kimberley (near Broome) regions of Western Australia and the clayey and stony soils of the Mitchell grasslands of south west Queensland. Changes to the Greater Bilby's distribution have been attributed primarily to the introduction of predators such as cats and foxes, introduction of herbivores such as cattle, camels and rabbits, modification and destruction of habitat and changes to fire regimes, associated with European settlement.

Direct (land management) offsets for the Project, in particular land management are prioritised over and above indirect (research) offsets and will comprise at least 90% of the offset package with the remaining up to 10% attributed to research. There are obvious opportunities to achieve conservation gain for the Greater Bilby on the Dampier Peninsula through land management activities and whilst the specific offsets projects are still to be finalised, proposed land management projects focusing on the following themes are favoured at this stage:

- Fire management to reduce uncontrolled, high intensity events on the Dampier Peninsula.
- Sustainable grazing practices to minimise impacts on Greater Bilby and their habitat
- Feral animal control on the Dampier Peninsula focusing on cats, foxes and wild dogs.
- Weed control on the Dampier Peninsula focusing on species that represent the highest risk to Greater Bilby habitat (from disturbance and increased fire risk).
- Education programs within the Dampier Peninsula focusing on transfer of knowledge for improved land management practices that are likely to be implemented and will improve the long term viability of Greater Bilby populations on the Dampier Peninsula.

Research projects to be undertaken on the Dampier Peninsula focusing on the following themes are favoured at this stage:

- Understanding habitat preferences and use for the Greater Bilby on the Dampier Peninsula.
- Improved understanding of the threats posed by introduced predators for Greater Bilby on the Dampier Peninsula.
- Improved understanding of pastoral (grazing) activities on the long term viability of the Greater Bilby on the Dampier Peninsula.
- Improved understanding of how fire regimes affect Greater Bilby conservation on the Dampier Peninsula.

It is recognised that these projects also have the potential to provide wider benefits to a number of other native fauna species that are subject to the same or similar threats.

7. REFERENCES

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