



Landcorp

Broome Motorplex Environment Approvals
Bilby Management Plan

August 2017

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1. Introduction

1.1 Purpose and scope

GHD Pty Ltd (GHD) was commissioned by LandCorp to prepare this Greater Bilby (*Macrotis lagotis*) (Bilby) management plan for the Shire of Broome in relation to the proposed multi-staged Broome Motorplex Project (the Project).

This management plan takes the environmental context and project engineering constraints into consideration. The purpose of this management plan is to identify the potential direct and indirect impacts to the Bilby associated with the Project, and to outline the management measures to avoid and minimise these potential impacts.

The Bilby is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Vulnerable under the Western Australian *Wildlife Conservation Act 1950* (WC Act). This management plan has been prepared based on the Department of the Environment (now Department of the Environment and Energy (DotEE)) *Environmental Management Plan Guidelines* (Department of the Environment 2014).

It is expected this management plan will guide the development of a Project specific Construction Environmental Management Plan (CEMP) and operational procedures for the facility in the longer term.

This report is subject to, and must be read in conjunction with the limitations set out in Section 10 and the assumptions and qualifications contained throughout the report.

1.2 Objectives of the management plan

The overall objective of this management plan is to define management and monitoring measures to minimise potential impacts to the Bilby. The key objectives aim is to “Minimise impact to the Bilby and its habitat within and adjacent to the Project area, as much as reasonably practicable, during construction and operation”.

2. Project context

2.1 Project description and location

The existing Broome Speedway and Motorcross facilities are located at the corner of Wattle Drive and Broome Road, and are immediately east of the Broome North District Development Plan area. The motor vehicle activities undertaken at this location are no longer compatible with the proposed urban growth of Broome.

On 21 November 2013 the Shire Council resolved '*... to undertake a feasibility to investigate the location and construction of a new motorsports complex to supersede the current Broome Speedway and Broome Motocross*' in the interest of providing security for future affordable land supply in Broome; as well as the long term viability of motorsports in Broome.

Initiated by the above mentioned Council resolution, the Project is planned to be a multi-stage project. Stage 1 involves the site selection for the Project and the relocation of the Motocross facilities to the selected site as well as the delivery of an approved Noise Management Plan to allow the Speedway to continue its operation at the current location for the medium term, until additional funding is available for its relocation.

The preliminary studies identified four potential sites and narrowed them down to two via independent multicriteria analysis. In order to provide more certainty moving forward, on 30 April 2015 the Council resolved to endorse the progression of further site specific more detailed technical studies on two sites with LandCorp assuming the responsibility of being the lead agency.

These more detailed studies were based on a holistic land capability approach while focussing particularly on the key areas of land tenure and assembly, planning, environmental, aboriginal heritage, servicing, engineering and financial requirements. On 26 May 2016 the Shire Council endorsed the selection of approximately 37 hectares (ha) within Lot 591 Broome Road (corner of Broome Road and Cape Leveque Road) from which approximately 30 ha will be cleared and developed for the proposed Project. This location was selected due to its distinct advantages in engineering, servicing, environmental, key stakeholder preference, financial, transport and site access considerations.

The location and total extent of the proposed disturbance footprint for the project is presented in Figure 1.

2.2 Project phases and schedule

It is intended to get all environmental, aboriginal heritage, planning, engineering approvals for the proposed Motorplex site before the end of 2017.

The Project will ultimately house similar activities to the current facilities, including Speedway and Motorcross operations, but this will be constructed in stages. A Site Masterplan, which will guide the long term orderly development of the site with many shared facilities by multiple uses is currently being developed.

As part of the first stage of the development, approximately 10 ha of the site is expected to be developed to facilitate Motocross relocation. The Motocross facilities construction is expected to take place between November 2017 and March 2018, with the ultimate aim of the 2018 Motocross season to be held in its new location.

The Speedway is expected to operate at its current location for the entire term of its 5 year Noise Management Plan, which was prepared in accordance with the new Department of Environment and Regulation guidelines and approved in May 2017.

The Project may ultimately house other low impact uses like 4WD training, BMX etc considered within the site boundary in medium to long term subject to availability of funding and demand.

2.3 Stakeholder consultation

LandCorp has carried out targeted and public consultation, including the Local Traditional Owners, Nyamba Buru Yawuru. The formal consultation has included:

- 6th May 2014 - Cardno and AECOM delivered a visioning workshop to the community on behalf of the Shire of Broome
- 9th March 2017 - LandCorp presented the motocross relocation to the Nyamba Buru Yawuru Board via Power point presentation
- 29th May 2017 - Aboriginal Heritage Survey undertaken
- 24th May 2017 – LandCorp hosted community consultation for the Motorplex Master planning.

2.4 Previous environmental studies

The results from the following assessments have guided the development of this management plan.

2.4.1 Specific to the Project

In 2013, the Shire of Broome Council resolved to undertake a feasibility study to investigate the location and construction of a new Motorplex complex. Following the preliminary feasibility study, a preferred site was identified based on a multi-criteria analysis.

In 2015, the Shire of Broome Council resolved to endorse the progression of further site-specific technical studies. As part of these studies, LandCorp engaged GHD to undertake desktop and field environmental investigations for the Project. The purpose of the investigations was to determine key site physical, flora, vegetation and fauna constraints, and recent and present land use for two Sites, Site 1 – Lot 351 McGuigan Road and Site 2 – Lot 591 Broome Road.

One area within Site 2 was identified as “more suitable” for development to the rest of the Sites. The reason for this being the area is located adjacent to the Cape Leveque Road and includes part of the previously disturbed area in the central portion of Site 2. This location has historic evidence of fly tipping of house hold waste and is likely to be less biologically constrained. Although this location is still considered to contain Bilby habitat, it attempts to distance the Project from the known Bilby activity recorded within the region, while attempting to limit impacts to *Jacquemontia* sp. Broome (a Priority 1 species listed by Department of Parks and Wildlife (DPaW) (now Department of Biodiversity Conservation and Attractions (DBCA)) and termite mounds, which provide micro habitat for fauna species including reptiles and small mammals (GHD 2016).

The area identified as more suitable for development aligns with the proposed Project disturbance footprint.

2.4.2 Other studies completed nearby

LandCorp has completed the initial site works and released for sale the first stages of the Broome Road Industrial Estate, which is located at the southern end of Cape Leveque Road. To support this development, flora, vegetation, fauna and targeted species surveys were commissioned. GHD (2010) completed a Preliminary Environmental Impact Assessment and biological assessment for the entire masterplan area. In December 2014 a targeted conservation significant fauna assessment for the Subdivision area (stages 1 – 5) and

associated easements occurred (GHD 2015a). Department of the Environment (now DotEE) were informed by a third party and investigated the clearing and site works associated with this subdivision area in 2015 for potential impact on the Bilby. Following a site investigation by authorised officers on 17 June 2015, Department of the Environment and Energy (DotEE) concluded clearing outside of the Subdivision area is likely to require referral; and therefore the clearing within the approximately 155 ha Subdivision area did not.

Main Roads plans to commence construction works for Stage 3 (12.5 -102.6 km) of Cape Leveque Road during 2017. The potential impact on threatened fauna (primarily the Bilby) triggered referral of the project to the Commonwealth Government under the EPBC Act. Stage 3 of the project was assessed on the Preliminary Documentation supplied with approval granted (EPBC 2013/6984) in 2013. The road upgrade was also referred to the Western Australian Environmental Protection Authority, but was determined to be 'Not Assessed', with a Clearing Permit granted by Department of Environment Regulation in 2015. To support the project planning and approvals process, Main Roads commissioned a number of studies including a flora and vegetation survey (GHD 2013a), targeted Bilby survey (GHD 2013b) and Bilby management plan (GHD 2014).

3. Environmental context

3.1 Regional environment, landforms and soils

3.1.1 Landuse zoning

The Shire of Broome Local Planning Scheme No. 6 indicates the Project area is zoned as 'Public Purpose: Water Supply', with Site 2 also within the 'Future Broome international airport environs' boundary (Shire of Broome 2012). The current Local Planning Strategy for Broome indicates that the Sites are zoned as 'Public Purpose'.

3.1.2 Landforms and soils

The Department of Water (DoW) *Geographic Data Atlas* indicates the topography of both Sites is generally flat. The elevation across the majority of the Sites is approximately 22 m Australian Height Datum (AHD) (DoW 2016).

During the site walkover the topography of the Site was observed to be generally flat with no discernible changes in elevation (GHD 2016).

3.2 Vegetation

The vegetation of the Project area was largely uniform with one vegetation association identified and described. This vegetation association is described as Pindan grassland and generally comprised isolated trees of *Corymbia* over a mixed shrubland and *Sorghum* and *Triodia* dominated grassland on red loamy sands on flat plains (GHD 2016). This vegetation association is well represented in areas adjacent to the Project area and is consistent with Beard (1977) and descriptions of Pindan reported by Kenneally *et al.* (1996). It is also well represented in the broader area.

The vegetation association identified does not align with any known Commonwealth or State listed Threatened or Priority Ecological Communities. The Roebuck Bay mudflats Threatened Ecological Community (TEC) occurs to the immediate south of the Project area. This TEC is aligned with Roebuck Bay, which is a tropical marine embayment with extensive, biologically diverse, intertidal mudflats. The landform of and vegetation to the immediate south of the Project area is not representative of the Roebuck Bay TEC.

The majority of vegetation throughout the Sites was rated as '*Excellent*'; in these areas the vegetation structure was intact, with disturbances limited to occasional tracks. A small part of the Project area was rated '*Degraded*', with this area historically cleared, contained old spoil piles from road maintenance and was largely overrun with **Cenchrus biflorus* (Gallon's Curse).

3.3 Hydrology

Based on elevation contours provided in the *Geographic Data Atlas*, surface water is likely to flow in a south-westerly direction (DoW 2016). The nearest surface water bodies are the Indian Ocean, which is located approximately 6 km to the west of the Sites and Dampier Creek, located approximately 3 km south of the Sites. It is expected that surface water infiltrates through sand across both Sites.

3.4 Fauna habitats

One broad fauna habitat type, Pindan grasslands was identified within the Project area, which aligns with the vegetation association described above. This habitat is broadly represented in the local and regional areas.

Micro-habitats throughout the Project area include termite mounds, leaf litter, tree hollows and hollow logs (on the ground). These habitats provide micro-habitat features that conservation significant fauna may utilise for refuges, foraging and breeding. In particular, there are some areas with moderately deep leaf litter which provides particularly good habitat for reptiles.

The fauna habitat is largely in excellent condition with the overall habitat value considered to be moderate. Whilst fauna diversity was limited, particularly to birds and mammals, this is likely due to the drier than normal conditions experienced at the time of survey (GHD 2016) and lack of creeks or water bodies in or near the Project area.

No EPBC Act listed conservation significant fauna species were recorded within the Project area. The Rainbow Bee-eater (*Merops ornatus*) – listed as Migratory terrestrial under the EPBC Act was observed within the larger survey area during the field surveys (GHD 2016). The Rainbow Bee-eater is a common and wide spread species in most parts of Australia and has been recorded regularly within 20 km of the Project area (DPaW 2007–).

3.5 Ecological linkages and wildlife corridors

The fauna habitat within the Sites is part of a large continuous tract of habitat that extends along the Dampier Peninsula (extending north and east of the Sites). There is also high connectivity to habitats directly south and west of the Sites, however, beyond this lies the town site of Broome to the south and the Indian Ocean to the west.

Localised variation in habitat was evident throughout the Sites and this is likely attributable to fire. The fire age of the Sites is estimated to be greater than 5 years.

In the central-eastern part of the Project area there is an area that has been historically modified and disturbed. This area has been partially cleared and contained old spoil piles from road maintenance; rubbish and weeds were also present in this area.

3.6 Bilby records

The Bilby was not recorded in the Project area or the larger survey area (GHD 2016), however the species is known from the area and is considered likely to occur opportunistically in the Project area. The Pindan habitat is suitable habitat for the Bilby, although the grass cover across the Project area (on average approximately 50-60%) would restrict the current use by Bilby. Several areas of scratchings were recorded in the shrublands consistent with Bilby activity, however these could not be verified with additional information such as burrows, scats or prints.

A known active burrow system is approximately 4.8 km from the Cape Leveque Road and Broome Road intersection, which is approximately 2.7 km to the closest point of the Project area. A walk back from the burrows towards the Project area identifying Bilby evidence decreased this distance to approximately 2.2 km from the Project area (GHD 2016).

Bilby evidence in the form of active and old burrows and diggings has also been recorded in association with Crab Creek Road to the south of Broome Road. The active burrows and fresh diggings at the time of the survey (May 2015) were approximately 2.3 km and 2.1 km from the Project area, respectively (GHD 2015b).

GHD is aware there may be another record immediately north-west of the intersection of Broome Road and Cape Leveque Road; however, this has not been able to be verified. If this record is in this location, it would be approximately 1 km from the edge of the Project area.

4. Ecology of the Bilby

4.1 Description and conservation status

The Bilby is listed as Vulnerable under the EPBC Act. Like all small mammals in Australia, a key threat to the bilby's survival is predation by feral cats and foxes. Wild bilby populations persist in the Northern Territory and Western Australia, while the population in Queensland appears to be under increased pressure (DotEE 2017).

The Bilby is the sole remaining representative of the sub-family Thylacomyinae in the Bandicoot family and one of few medium sized (0.5 kg to 3.5 kg) terrestrial mammals remaining on mainland Australia. Many species in this 'critical weight range' have become extinct since European settlement of Australia (DotEE 2017).

4.2 Biology

The Bilby shows sexual dimorphism with adult males reaching between 0.8 kg and 2.5 kg as compared to the smaller females at 0.6 kg to 1.1 kg. The Bilby has a distinctive appearance with long slender hind legs, small front limbs, a long tail, rabbit-like ears and a long snout. The animal has silky grey fur with a black and white tail (Van Dyck and Strahan 2008).

4.3 Distribution and habit

The Bilby distribution in Western Australia is restricted to the north, including the Pilbara, Dampier Peninsular, southern Kimberley, Sandy and Gibson Deserts. The Bilby usually spends the daytime in burrows, which are in the open or sometimes built against termite mounds, spinifex hummock or shrubs (Van Dyck and Strahan 2008). Bilby populations occur in a variety of habitats, usually on landforms with level to low slope topography and light to medium soils. They occupy three major vegetation types; open tussock grassland on uplands and hills, mulga woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas. Laterite and rock feature substrates are an important part of Bilby habitat. These habitats support shrub species, such as *Acacia kempeana*, *A. hilliana* and *A. rhodophylla*, which have root-dwelling larvae that provide a constant food source for the Bilby. On the Dampier Peninsular the preferred substrate appears to be sandy or sandy loam in Pindan Woodland.

After dark they leave their burrows to feed and populations are known to move long distances when current habitat ranges become unsuitable. Bilbies are largely solitary, widely dispersed and found in low numbers. An individual Bilby may regularly utilize over a dozen burrows within its home range. The species is highly mobile and have been recorded using burrows over 2 km apart on consecutive days. Studies on the home-range size of the Bilby range from 1 km² to over 3 km² (Pavey 2006).

The current occurrence of the Greater Bilby is strongly associated with higher rainfall and temperatures, which promote areas of higher plant and food production. The Greater Bilby may also prefer these conditions as higher rainfall and temperatures are not well tolerated by foxes (Pavey 2006; Southgate et al. 2007).

4.4 Reproduction

The Bilby can breed throughout the year and like many Australian arid-zone mammals can produce young quickly to take advantage of variation in arid conditions. Bilby gestation is 12 days long with live-born young spending 10 weeks in the mother's pouch and becoming independent at three months of age. Bilbies are sexually mature by six months of age. Bilbies

can breed up to four times a year and one or two young are usually produced per litter, however they can produce up to three young per litter (Pavey 2006).

4.5 Diet

The Bilby is omnivorous and many food resources vary seasonally across the landscape. The Bilby is recognized as an ecosystem engineer as it often digs for food and this process creates variation in micro- habitat function.

5. Potential threats to the Bilby

The *National Recovery Plan for the Greater Bilby Macrotis lagotis* (Recovery Plan) (Pavey 2006) identifies known and potential threats to the species; these include:

- Predation
- Competition with introduced herbivores
- Habitat degradation by introduced herbivores
- Habitat degradation resulting from unsuitable fire regimes
- Habitat destruction and degradation resulting from mining and other development
- Road mortality

The development of the Project may increase the likelihood of some of these threats to the Bilby. The potential increase in threat to the Bilby as a result of the Project are discussed below giving consideration to the construction and operational phases.

5.1 Construction phase

5.1.1 Predation

Biological surveys completed for the Project and surrounding area have recorded the presence of introduced predators, including the feral cat and dingo/wild dog. The Recovery Plan outlines particular activities may facilitate the movement of predators (e.g. along corridors), provide access to water and scavenging opportunities (e.g. at rubbish dumps), and culling of one predator species through management control may inadvertently allow another to flourish (Pavey 2006).

This Project may introduce **temporary water sources** for the construction of the new facility and for dust suppression. The likely need for dust suppression is low due to the remote location of the Project and lack of nearby sensitive receptors. The presence of construction personnel on site will result in **waste and rubbish** that may attract predators if not managed and disposed of appropriately.

5.1.2 Habitat degradation resulting from unsuitable fire regimes

Unsuitable fire regimes are expected to restrict breeding and impede dispersal and colonisation of unoccupied areas by the Bilby. The Recovery Plan states high intensity wildfires that burn uncontrolled across large areas are of particular concern (Pavey 2006).

Fire is used in the Pastoral industry to stimulate grass growth for cattle. This practice is wide spread in Northern Australia and is documented to have adverse impacts on biodiversity. Although this Project is not proposing to use fire for construction activities, the use of **machinery and hot-works on site** will introduce a potential ignition source that may result in an uncontrolled fire. It is expected standard management measures will be sufficient to mitigate this likelihood to a low risk.

5.1.3 Habitat destruction and degradation

The Recovery Plan focus habitat destruction impacts around the siting of mining operations around particular important habitat such as paleodrainage systems and laterite substrates. The Recovery Plan also notes the loss of Bilby habitat and other indirect consequences such as

predation resulting from transport infrastructure developments such as railways, major roads and pipelines (Pavey 2006).

The Project will result in the **clearing of Bilby habitat** (approximately 30 ha). This clearing will occur over various project phases. The amount of clearing proposed within regional context is considered insignificant, and unlikely to have an adverse consequence on the regional population or survival of the species. However, there is a potential that clearing for the project may have isolated consequences for individuals at a local scale given the proximity of known active burrows, without the implementation of management actions. The spatial extent and location of the Project is unlikely to create habitat fragmentation or a significant barrier for Bilby movement.

Secondary impacts from **noise and vibration** are also likely to occur during clearing of vegetation and habitat, which may degrade the suitability of this habitat for Bilby occupancy in the immediate vicinity of the Project. This may scare Bilby individuals away from the Project area although the species continues to persist in low numbers adjacent to existing roads, where there are vehicle noise and vibration sources.

5.1.4 Road mortality

The construction works will require **vehicle movement** along the Broome Road and the lower section of Cape Leveque Road. There will also be vehicle activity onsite to construct the facilities. Unlike mining operations these movements will be limited to daylight hours and in number.

5.2 Operation phase

5.2.1 Predation

During operation of the Project, it is reasonable to expect **waste and rubbish** will be generated on site, which may continue to attract feral animals that are Bilby predators. Furthermore, the **structures and modified environment** for the facilities may unintentionally create habitat that is suitable for predators and the Bilby to occupy, while the facilities are not being used. Perimeter fencing constructed for security purposes will serve a second purpose, which is to prevent predator and Bilby access to the facility.

5.2.2 Habitat degradation resulting from unsuitable fire regimes

Hot vehicle exhausts and **human activity** on site may result in ignition of nearby vegetation. However, fire breaks around the perimeter of the facility and vegetation control (e.g. slashing of grass etc) within the facility are expected to occur for human and asset safety reasons. These management measures will also mitigate potential impacts to the Bilby.

5.2.3 Habitat degradation resulting from increased noise and lighting

Vehicle noise and **facility lighting** at night may create a buffer immediately around the Project area, where Bilby habituation is less likely. Mitigating measures may reduce this impact on the surrounding habitat.

5.2.4 Road mortality

The Project will be associated with **vehicle movement** intermittently accessing the facility; however the number and flow are not expected to significantly increase the existing baseline risk of Bilby mortality along these roads associated with vehicle strike. The perimeter fence will mitigate the likelihood of Bilby vehicle strike within the Project area.

6. General Environmental Management

6.1 Environmental management roles and responsibilities

The management measures outlined in the sections below will be implemented by the Shire of Broome (or their representative) and/or the construction contractor(s) during the construction and operation of the Project.

Roles and responsibilities will include the following organisations and/or personnel:

- Shire of Broome Project Manager – will be **accountable** for ensuring the requirements of the Plan are met for design and construction activities
- Construction Contractor Site Manager – will be **responsible** for ensuring the requirements of the Plan are met during construction
- Construction Contractor(s) and their staff – will be **responsible** for implementing the requirements of the Plan during construction
- Shire of Broome Project Environmental Officer – will be **responsible** for gathering and maintain records and providing these to relevant authorities where appropriate
- Nyamba Buru Yawuru Ranger(s) and/or Ecologist(s) – will be engaged to be **responsible** for pre-clearing fauna assessments and trapping, handling and relocation during construction. The Ranger(s) and/or Ecologist(s) will be suitably experienced to carry out this work
- Facilities Manager – will be **accountable and responsible** for ensuring the requirements of the Plan are met once the facility is in operation.

6.1.1 Department of Biodiversity Conservation and Attractions licencing requirements

Fauna handling and relocation will require licencing under the provisions of the WC Act. A Regulation 15 licence to take fauna for education or public purposes (fauna relocation and/or education) will be required for the relocation of any fauna (as discussed in Section 7.3).

6.2 Reporting

6.2.1 Incident and non-conformance reports

Environmental incidents and non-conformances will be documented in accordance with the requirements of the project EMP.

6.2.2 Opportunistic reporting

All Bilby sightings, injuries and mortalities will be reported to the Environmental Officer, and will be investigated appropriately with additional management measures implemented where required.

6.2.3 Auditing and/or legislative reporting

The Environment Officer or appropriate Shire of Broome representative will audit this management plan within 2 weeks of the start of the Project, and upon completion.

The Regulation 15 licence will have reporting requirements. This reporting involves submission to DBCA with the details of animals (location, number and species) that are relocated under the Regulation 15 licence. The schedule for delivering the report (or Fauna return) will be stipulated

on the licence and is usually due within 1 month of the completion date nominated on the licence application.

6.3 Environmental Training

Environmental training will be implemented to all personnel on the Project to ensure all personnel understand their responsibilities relevant to this management plan. Site inductions and tool box talks will be used as the methods of environmental training. All staff (personnel and subcontractors) will undertake a site induction prior to starting work on site, which will include the following:

- Detailed information about the Bilby
- Communicate the potential for interactions with the Bilby
- Report Bilby activity if observed
- Identification of the site environmental values – including biodiversity constraints and the potential presence of the Bilby (and what signs of Bilby presence looks like) in the Project area
- Employee and contractor management responsibilities relevant to this management plan
- Site environmental controls
- Environmental incident identification and response

Weekly tool box meetings will be held with all project personnel, and will include topics relevant to the Bilby.

7. Management Measures for the Bilby

7.1 Predation

Management and controls measures will be implemented to minimise the risks associated with predation for the Project, as described in Table 1.

Table 1 Measures for predation

No.	Measure	Timing	Performance target
MP1	Temporary water sources will be enclosed in vessels or fenced to prevent fauna access.	Construction	No open standing water within a fenced area.
MP2	All rubbish, food scraps and discarded materials to be appropriately stored and removed from site.	Construction Operation	Appropriate waste and rubbish storage available and emptied as required to allow proper use. No uncontained visible waste or rubbish on site.
MP3	The Project area will be fenced prior to significant construction works to prevent Bilby and predator access to developed facilities (including fence skirts to prevent access under the fence).	Construction Operation	Fencing is present (with skirts) and in good working order.
MP4	No feeding of fauna is permitted.	Construction Operation	Requirement to be included in site induction. No non-conformance logged in reporting system.

7.2 Habitat degradation resulting from unsuitable fire regimes

Management and controls measures will be implemented to minimise the risks associated with modified fire regimes for the Project, as described in Table 2.

Table 2 Measures for modified fire regimes

No.	Measure	Timing	Performance target
MF1	All site personnel will be made aware of obligations related to fire management during site inductions.	Construction	No human-induced fires onsite.
MF2	Smoking is not be permitted onsite.	Construction	No human-induced fires onsite.

MF3	Any fires will immediately be reported to the Construction Contractor Site Manager.	Construction	No human-induced fires onsite.
MF4	Site personnel are not permitted to bring firearms or unauthorised machinery on site.	Construction	No human-induced fires onsite.
MF5	All construction vehicles onsite are to have fire extinguishers fitted.	Construction	Fire extinguishers present.
MF6	Burning of vegetation can only be conducted under a Shire of Broome permit (where required).	Construction	Permit in place where required.
MF7	Fire breaks and vegetation management will occur along boundary fence (and internally within the Project area where appropriate) to reduce /remove combustion sources	Construction Operation	Evidence of annual vegetation maintenance works. Fire break present.

7.3 Habitat destruction and degradation

Management and controls measures will be implemented to minimise the risks associated with Bilby habitat loss for the Project, as described in Table 3.

Table 3 Measures for Bilby habitat clearing and degradation

No.	Measure	Timing	Performance target
MC1	Clearly delineate the extent of the approved disturbance footprint (clearing footprint). Prior to clearing a surveyor will mark out the approved clearing boundary and this will be checked by the Shire of Broome Project Environmental Officer to determine that it is clearly defined and compliant with any native vegetation clearing permits. The extent of the approved clearing will be clearly communicated in documentation.	Construction Prior to clearing	Restrict clearing footprint to Project area Clearing compliant with any Clearing Permit issued.
MC2	All project clearing personnel will be inducted prior to the commencement of works.	Construction Prior to clearing	All project personnel inducted
MC3	Prior to vegetation clearing activities a Ranger(s) and/or Ecologist(s) will be engaged as an Ecologist. The Ecologist will be suitably qualified and experienced and acquire a licence (under WC Act, Regulation 15 to remove and relocate any fauna). The Project Ecologist shall be present during all clearing works.	Construction	No loss of vertebrate fauna individuals

MC4	<p>The Ecologist(s) (as per MC3) will undertake a pre-clearance inspection for Bilby. This will involve ground truth the Project area 1 week prior to clearing. If clearing is not undertaken within one week of the preclearance survey then the pre-clearing ground truthing will be repeated.</p> <p>If any species are present on site they will be moved from the site through assisted migration (hand capture and relocation as per the DBCA, Standard Operating Procedures (DEC 2009a-g) prior to clearing. Species will be relocated to adjacent suitable habitat. The relocation location will be pre-selected and endorsed by DBCA and may include soft-release enclosures if required.</p> <p>The Ecologist will be on site to observe the clearing process and remove/ relocate any animals displaced during the clearing process.</p>	Construction Prior to clearing	No loss of Bilby individuals
MC5	<p>The Ecologist(s) (identified in MC3) will be suitably experienced to assess for Bilby activity.</p> <p>If no burrows are identified clearing will proceed.</p> <p>If Bilbies (or their burrows) are present within the clearing area a suitably licenced and experienced person will manage the burrows/ Individuals as per the protocol in Appendix B.</p>	Construction Prior to clearing	No loss of Bilby individuals
MC6	<p>The observation of a Bilby individual will trigger an immediate stop of work and investigation before recommencement of works.</p>	Construction	No loss of Bilby individuals
MC7	<p>Any Bilby (or other native fauna) individuals are encountered during the clearing process, they will be relocated out of the approved disturbance area.</p> <p>If fauna species are captured then a Ranger / Ecologist will relocate them to outside the clearing area to a pre-determined location in consultation with DBCA.</p>	Construction	No loss of Bilby individuals
MC8	<p>If a Bilby is injured during construction, contact will be made with a pre-arranged qualified veterinarian or qualified wildlife carer and appropriate action taken to ensure the animals welfare.</p>	Construction	No loss of Bilby individuals

MC9	Conditions of relevant fauna licences, clearing permits will be complied with throughout the Project.	Construction	Legislative compliance
MC10	Lighting to be directed within the facility boundary, so as to limit lighting pollution.	Operation	Evidence of consideration within design specifications
MC11	Noise management considerations will be incorporated into facility design to limit noise pollution during operation.	Construction	Evidence of consideration within design specifications

7.4 Road mortality

Management and controls measures will be implemented to minimise the risks associated with vehicle strike linked to the Project, as described in Table 4.

Table 4 Measures for road mortality

No.	Measure	Timing	Performance target
MR1	Vehicle movement and use of plant and vehicles at dusk and dawn and during night-time hours will be minimised and restricted.	Construction	No bilby vehicle strikes recorded
MR2	Bilby signage will be place at the exit of facilities to highlight potential presence of the Bilby in the area.	Construction Operation	Signage present

8. Risk assessment

A qualitative risk assessment was completed to determine the residual risk post management implementation. This assessment utilised the definitions provided in the Australian Government's *Environmental Management Plan Guidelines* (Department of the Environment 2014). The qualitative measure of likelihood and consequences is reproduced in Table 5, with the risk matrix reproduced in Table 6.

Table 5 Measure of likelihood and consequences

Qualitative measure of likelihood (from the Project)	
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances
Qualitative measure of consequences (to the Bilby)	
Minor	Minor incident of environmental damage that can be reversed
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts
High	Substantial instances of environmental damage that could be reversed with intensive efforts
Major	Major loss of environmental amenity and real danger of continuing
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage

Table 6 Risk matrix

Likelihood	Consequence				
	Minor	Moderate	High	Major	Critical
Highly likely	Medium	High	High	Severe	Severe
Likely	Low	Medium	High	High	Severe
Possible	Low	Medium	Medium	High	Severe
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Low	Medium	High

The risk associated with each threat pre and post management implementation are presented in Table 7. A more detailed risk assessment table is provided in Appendix C. This table includes:

- Threats
- Hazards
- Initial risk rating, including the qualitative measure of consequence and likelihood
- Management measures proposed in this plan to reduce the initial risk
- Residual risk rating, including the qualitative measure of consequence and likelihood

Table 7 Risk assessment outcome pre and post management implementation

Threat	Initial risk rating	Residual risk rating
Predation	High	Low
Habitat degradation resulting from unsuitable fire regimes	Medium	Low
Habitat destruction and degradation	High	Medium
Road mortality	Low	Low

All threats have a residual risk rating of low, with the exception of 'habitat destruction and degradation', which has a medium residual risk. This outcome is driven by the fact that clearing of Bilby habitat will occur, however the expected consequence of this will be minor (the lowest measure of consequence).

9. Monitoring

9.1 Monitoring

A CEMP will be developed and provide details of environmental monitoring planned during the construction phase. Each key performance indicator will have monitoring protocols set in place detailing the frequency and responsibility of the monitoring program. As a minimum, monitoring during construction activities will include:

- Daily assessment of animal observations (native and introduced) and interactions
- Daily assessment of any breaches in relation to clearing or unapproved activities
- Weekly assessment for visible waste on site and compliance of waste disposal offsite
- Bimonthly inspection of perimeter fence for integrity

Any incidents involving Bilby will be reported to the Broome DBCA office and DotEE as soon as possible.

Post construction monitoring will include:

- Monthly inspection of waste management on site (during periods of operation)
- Six monthly inspection of perimeter fence for integrity
- Annual inspection of fire breaks

9.2 Corrective actions

Where Project reporting or monitoring identifies a non-conformance with the management measures, the matter will be investigated and corrective action take to rectify the issue. An auditable system will be developed for recording the implementation of these procedures and their outcomes. The Construction Contractor will be responsible for any investigations during construction, with this responsibility transferred to the Facilities Manager during operation.

9.3 Reporting, review and updates

Reporting of incidents which are considered non-compliant or for monitoring purposes will be completed pursuant to the CEMP or equivalent environmental management plan developed by the Construction Contractor. Any relevant changes or updates to knowledge, standards, policies and procedures will be incorporated wherever possible prior to the commencement of phased construction works.

10. Limitations

This report has been prepared by GHD for Landcorp and may only be used and relied on by Landcorp for the purpose agreed between GHD and the Landcorp as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Landcorp arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Landcorp and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

11. References

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DEC 2009h, *Standard Operating Procedure (SOP) No. 13.4, Ground-based radio-tracking*, Perth, Department of Environment and Conservation.

DEC 2009i, *Standard Operating Procedure (SOP) No. 12.9 Temporary marking of mammals, reptiles and birds*, Perth, Department of Environment and Conservation.

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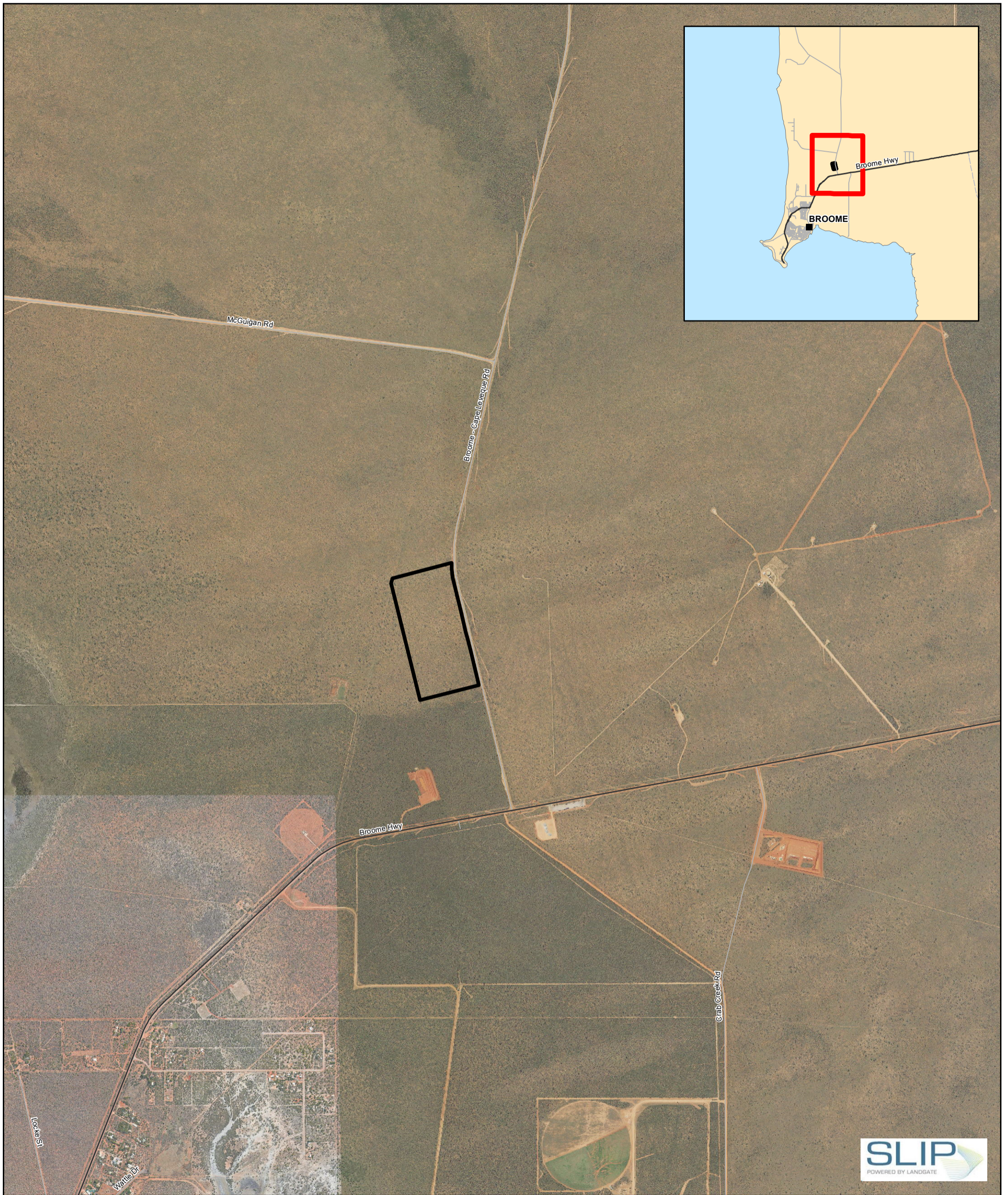
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Appendices

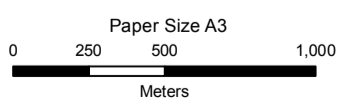
Appendix A - Figures

Figure 1 Project locality and disturbance footprint extent

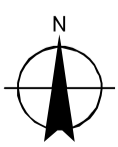


LEGEND

- Local Road
- State Road
- ▭ Site Boundary (approximate)



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 51



Landcorp
 Broome Motorplex
 Environment Approvals

Job Number	61-35797
Revision	A
Date	04 Jul 2017

Site Location

Figure 1

Appendix B - Protocol for Greater Bilby

Greater Bilby relocation protocol

In the unlikely event that the Greater Bilby (*Macrotis lagotis*) is detected during the pre-clearance fauna efforts the following protocol should be employed.

Reporting

In the event that Bilby burrow/s or other Bilby evidence is discovered on site the Ecologist will report the finding to the Site manager and Broome Department of Biodiversity Conservation and Attractions (DBCA) within 24 hours.

All relevant locations (ie burrow locations, release sites etc.) will be recorded via a GPS for use in reporting as part of the reporting / communications process identified in this plan and any developed CEMP.

Activity assessment

Where burrows are detected an assessment of activity will be conducted for five consecutive days. Where there is no activity (for five consecutive days) the burrow will be excavated and collapsed (see section below).

Where Bilby activity (diggings, prints etc) are recorded at the burrow a trapping program will be conducted (see below).

Trapping around Burrows

Where Bilby activity (diggings, prints etc) are recorded at the burrow a trapping program will be conducted for four consecutive nights within one week prior to the clearing.

Trapping will be conducted in accordance with DBCA Standard operating procedures (SOPs).

Bilbies captured will be relocated into adjacent habitat with possible use of soft release if the bilbies have young.

Trapping will continue (and the clearing will be postponed) until four consecutive nights of trapping occur where no Bilbies are captured.

Burrows excavation and collapse

Where no Bilby activity is recorded and / or there are four consecutive nights/ days where no Bilbies are captured at the site the burrows will be excavated (to ensure the burrow is not in use) and then collapsed (to reduce the chances of Greater Bilby moving back in to the burrow)

Relocation

In the event where Bilbies are captured, they will be relocated to adjacent habitat in accordance with DBCA SOPs, with possible use of soft release if the bilbies have young.

The relocation site should be within 15 kms of the Project site (so that the individual is not removed from any local population demographic) and further than 1 km away (to reduce the chances of the individual moving back into the Project area during the construction/ clearing phase).

Relevant DBCA Standard Operating procedures and guidelines

The potential to encounter Bilbies, albeit low, should be included in the application for a regulation 15 licence obtained for the broader fauna clearance activities. There are several SOPs and guidance statements that should be adhered to during any Bilby management actions including;

References

DEC 2009a, *Standard Operating Procedure (SOP) No. 9.2 Cage traps for live capture of terrestrial vertebrates*. Department of Environment and Conservation.

DEC 2009b, *Standard Operating Procedure (SOP) No. 9.6, Hand capture of wildlife*, Perth, Department of Environment and Conservation.

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DEC 2009f, *Standard Operating Procedure (SOP) No. 14.1 Care of evicted pouch young*, Department of Environment and Conservation.

DEC 2009g, *Standard Operating Procedure (SOP) No. 14.2, First Aid for animals*, Perth, Department of Environment and Conservation.

DEC 2009h, *Standard Operating Procedure (SOP) No. 13.4, Ground-based radio-tracking*, Perth, Department of Environment and Conservation.

DEC 2009i, *Standard Operating Procedure (SOP) No. 12.9 Temporary marking of mammals, reptiles and birds*, Perth, Department of Environment and Conservation.

Appendix C - Risk assessment outcome pre and post management implementation

Threat	Hazard	Initial risk rating			Management measures	Residual risk rating		
		Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
Predation	Increased presence and persistence of predator species due to increased resources (water and food waste)	High	Likely	High	<ul style="list-style-type: none"> Temporary water sources will be enclosed in vessels or fenced. All rubbish, food scraps and discarded materials securely stored and removed from site. The Project area will be fenced to prevent Bilby and predator access to developed facilities. No feeding of fauna permitted. 	Minor	Unlikely	Low
Habitat degradation resulting from unsuitable fire regimes	Increased fire risk from machinery and hot-works on site during construction and vehicle exhausts and human activity during operation	High	Unlikely	Medium	<ul style="list-style-type: none"> All site personnel will be made aware of obligations related to fire management during site inductions. Smoking is not be permitted onsite. Any fires will immediately be reported. 	Moderate	Rare	Low

Threat	Hazard	Initial risk rating			Management measures	Residual risk rating		
		Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
					<ul style="list-style-type: none"> Site personnel are not permitted to bring firearms or unauthorised machinery on site. All construction vehicles onsite are to have fire extinguishers fitted. Burning of vegetation can only be conducted under a Shire of Broome permit (where required). Fire breaks and vegetation management will be implemented. 			
Habitat destruction and degradation	Lose of Bilby habitat through clearing and degradation via vehicle noise and vibration; and facility lighting	Moderate	Highly likely	High	<ul style="list-style-type: none"> Clearly delineate the extent of the approved disturbance (clearing) footprint. All project clearing personnel will be inducted prior to the commencement of works. The suitably qualified Ecologist(s) will undertake a pre-clearance inspection and any species 	Minor	Highly likely	Medium

Threat	Hazard	Initial risk rating			Management measures	Residual risk rating		
		Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
					<p>present on site they will be relocated.</p> <ul style="list-style-type: none"> • The Ecologist will be on site to observe the clearing process and remove/ relocate any animals displaced during the clearing process. • If Bilbies (or their burrows) are present within the clearing area a suitably licenced and experienced person will manage the burrows/ Individuals. • The observation of a Bilby individual will trigger an immediate stop of work and investigation before recommencement of works. • If a Bilby is injured during construction, contact will be made with a pre-arranged qualified veterinarian or wildlife carer to ensure the animals welfare. 			

Threat	Hazard	Initial risk rating			Management measures	Residual risk rating		
		Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
					<ul style="list-style-type: none"> • Conditions of relevant fauna licences, clearing permits will be complied with throughout the Project. • Lighting to be directed within the facility boundary, so as to limit lighting pollution. • Noise management considerations will be incorporated into facility design to limit noise pollution. 			
Road mortality	Vehicle movement within and to Project area	Moderate	Rare	Low	<ul style="list-style-type: none"> • Vehicle movement limited to daylight hours. • Bilby signage at the exit of facility. 	Moderate	Rare	Low

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93484/[https://projects.ghd.com/oc/WesternAustralia/broomemotorplexappro/Delivery/Documents/6135797-REP-A_Bilby Management Plan.docx](https://projects.ghd.com/oc/WesternAustralia/broomemotorplexappro/Delivery/Documents/6135797-REP-A_Bilby%20Management%20Plan.docx)

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	D Farrar	G Gaikhorst		D Farrar		01/08/2017

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