
Evidence of the Greater Bilby, *Macrotis lagotis*, at the site of the proposed James Price Point Browse LNG Precinct



Report prepared for the Goolarabooloo and Broome No Gas Community

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Point Summary

Introduction

- A community survey was conducted in collaboration with the traditional custodians, the Goolarabooloo, and the Broome No Gas Community to investigate the Greater Bilby, *Macrotis lagotis*, on the site of the proposed Browse Liquefied Natural Gas (LNG) precinct. This survey was un-funded and all participants contributed their time voluntarily.
- The Greater Bilby is listed under the EPBC Act (1999) as Vulnerable due to its retraction from a historical range of >70% of Australia, to <20% of its former range.

Results

- This survey found old and recent evidence to the southwest of the proposed Browse LNG precinct, and active burrows, tracks and diggings to the north of the precinct belonging to a resident active colony
- Measurements of tracks to indicated one large male and one small male/large female Greater Bilby. Whilst, the use of motion activated cameras revealed a further mother and litter of three young, making an estimated colony size of at least 7 individuals. A litter size of three is unusually large and indicates productive conditions and highly suitable habitat.

Discussion

- The ecological surveys informing the Browse LNG precinct's environmental impact assessment had located scant evidence of bilby activity and were not thoroughly replicated temporally or spatially. Their conclusion that the only Greater Bilbies present in the area are vagrant individuals is not supported.
- The precinct area contains suitable and productive habitat for the Greater Bilby due to the climate, a presence of dingoes to keep feral cat populations in check, a mosaic of fire patches supporting a variety of available food, and productive drainage line/basin substrates with seasonal water availability.
- The bilby population has disappeared from parts of Australia where foxes and rabbits are widespread. Therefore the rabbit and fox free Dampier Peninsula, northern Great Sandy Desert and northern Tanami Desert are significant for bilby conservation due to their refugia status.
- The Greater Bilby population at James Price Point is the only breeding population currently known from the Dampier Peninsula refugia. It is assumed that more bilbies exist on the peninsula, yet as this assumption is not based on recent or thorough scientific surveys, the local population must be considered significant to the region.
- The precipitous loss of many endemic species from savannah habitats in northern Queensland and the top end of the Northern Territory has placed even greater significance on the areas of the Kimberley and Dampier Peninsula regions that still retain threatened mammal fauna.
- The National Recovery Plan for the Greater Bilby lists seven major threats to the remaining populations. The proposed Browse LNG Precinct will increase the likelihood and severity of four of these seven by opening up this largely undisturbed country to: Increased predation, changed fire regimes, increased road mortality and habitat destruction and degradation.

- It is more than likely that the proposed Browse LNG Precinct will have damaging and lasting consequences for the local Greater Bilby population and habitat.
- If the James Price Point area constitutes important productive habitat and populations, the impact of the Browse LNG Precinct may have long term consequences on the regional Dampier Peninsula population. As this region is one of three refugias remaining for wild Greater Bilbies, such an impact could be highly detrimental to the longevity of this species in the wild.
- As the potential impact on the species is high and little is known about the critical Greater Bilby habitats and populations of the Dampier peninsula, the application of the precautionary principle is appropriate. Until additional and substantive research occurs for Greater Bilbies of region, it is unfeasible and inappropriate to determine the impact of the proposed Browse LNG Precinct upon local or regional populations.

Key Recommendations

- Immediate restriction of vehicular use along the access road that passes through the active bilby colony to reduce the chances of road mortality
- Immediate cat trapping in the active colony to reduce the chance of predation of young bilbies
- A properly replicated survey (both temporally and spatially) in the James Price Point region to establish the extent and number of bilby populations and their important habitat. This survey should map the extent of current and recent colonies, measure habitat characteristics relevant to bilbies, revisit old survey sites for temporal replication, and extend to the vast areas of the precinct not yet surveyed.
- No further land clearing throughout the precinct area and the revoking of the current land clearing permit issued by the West Australian Department of Environment and Conservation in light of the evidence presented in this report (See Appendix B)
- A large regional research project into the bilby populations and critical habitat of the Dampier Peninsula region to establish the importance of the James Price Point area to the larger regional bilby population.
- Translocation of Greater Bilbies from the area should not occur. This would be disrespectful to the wishes of the traditional custodians, the Goolarabooloo, and would be heavily opposed by the No Gas Community. Secondly, as the habitat requirements of the Greater Bilby are unknown for the region it would be difficult to select a release site that would guarantee the survival of the individuals.

Introduction

Project Background

The West Australian Department of State Development is currently seeking approval for the Browse Liquefied Natural Gas (LNG) Precinct to be constructed at James Price Point, traditionally known as Walmadan, 50 km north of Broome on the Dampier Peninsula, in the Kimberley. The Browse LNG Development is the first project proposed for the precinct and is a joint venture between Woodside, Shell, Chevron, BP and BHP Billiton. The Browse LNG Precinct is a multi-user hub for processing oil and gas piped from the Browse Basin. Additionally, the West Australian Premier, Colin Barnett, has expressed interest in placing two other projects on the 35,000 km² LNG Precinct (Taylor & Perpich 2011). These additional projects are not covered by the current environmental impact assessment. Consequently, the accumulative impact of the proposed Browse LNG Precinct and additional projects will be much larger in the long term than is currently identified.

Walmadan and the broader Dampier Peninsula has important natural, cultural and social values, including indigenous heritage, paleontological significance, ecological diversity and importance to the local Broome community. Fauna surveys were conducted on behalf of Woodside and the WA State Government as part of an environmental impact assessment (ENV Australia 2008; Biota Environmental Services 2009b; AECOM 2010a; AECOM 2011). As these surveys were both brief and spatially limited, the traditional custodians, the Goolarabooloo, and the Broome No Gas Community were concerned that these surveys were not thorough enough to capture the area's ecological diversity. Consequently, a community-supported ecological survey was initiated. This ecological survey was originally broad in scope, but narrowed its focus on the Greater Bilby culminating in this intensive survey. This work was a collaborative effort utilising the tracking and bush skills of senior members of the the Goolarabooloo and the Broome community. This project was unfunded and all participants contributed their time voluntarily.

The Greater Bilby

Of the numerous federally listed species potentially in the area, this study focussed on the Greater Bilby, *Macrotis lagotis*, hereafter referred to as the bilby. This is the last extant species from the sub-family Thylacomyinae (Family Peramelidae). At the time of European settlement the bilby ranged over 70% of the Australian mainland but is now restricted to < 20% of its former range, mainly in the Dampier Peninsula, Great Sandy, Gibson and Tanami deserts, with an outlying population occurring within southwest Queensland (Southgate 2007). Due to this range decrease it is listed as vulnerable under schedule 1 of the *Environment Protection and Biodiversity Conservation Act 1999*, and vulnerable within West Australia. Within the Dampier Peninsula, since 1963, the Bilby has been recorded at Waterbanks, Couloumb Point and Roebuck, with the most recent record from Roebuck in 2001 (Biota Environmental Services 2009).

Methods

Transects

Tracks, burrows, scats and diggings were recorded during searches in and around the precinct area. These searches took three different forms. Firstly, incidental evidence was recorded by community members while walking through the precinct area for other purposes. Secondly, set transects of 1km length were conducted, generally by 2 people during daylight hours. Lastly and most commonly, targeted searches were conducted where search paths and lengths were determined by the tracks and traces of the animal.

Camera Traps

To confirm the identity of the species creating fresh tracks and burrows, camera traps were used. These motion and infrared activated cameras were set up adjacent to active pathways or burrows. To guide placement of the camera traps, each day the sand around all fresh burrows was swept flat and checked the following day for bilby activity. Bilbies are known to often visit multiple burrows in a night, so tracks at a burrow did not provide certainty of occupation. Bilbies are notorious for being difficult to trap or photograph and consequently numerous trapping nights were conducted with no results. The locations and dates of these failed camera traps were recorded but are not shown in this report.

Results

A large number of suspected bilby diggings, tracks and burrows, both old and new were found throughout the Browse LNG precinct (Figure 1). Old burrows and diggings were observed mainly in the woodland and pindan scrubland to the southwest of the precinct area. Whereas, fresh burrows, diggings and tracks were found in open forest to the north.

The active colony to the north of the precinct area exhibited fresh tracks, diggings and over 40 recently used burrows divided into two home range groups, home range 1 and 2 (Figure 2). It is presumed that these two groups are distinct, as no bilby traces were found in the areas between them. More burrows were concentrated in home range 2 suggesting more individuals. The full size and extent of the colony remains unclear as searches were mainly focused around the access road and not deeper into the forest. Interestingly, no scats were found near active diggings or burrows despite this being commonly observed in other populations. Additionally, the bilby diggings that were observed varied greatly in shape and depth, with few matching the presumed conical shape often attributed to bilbies. Indeed, many could be mistaken as goanna diggings.

In the home range 1, bilbies routinely used an access road to disperse and forage for food, leaving fresh tracks daily. Measurements of the gait length of the tracks indicated the presence of two significantly different sized individuals ($p \leq 0.001$, $df = 78$, $t = 11.8552$), one with an average gait length of 212.75mm, the other 272.25 mm. Using the model established by Southgate (2005) to explain the relationship between bilby weight and gait length, the smaller individual is either a large female or small male weighing 1395g, while the larger individual is a large male weighing 2285g (Southgate 2005). The importance of this road to these individuals is indicated by the location of six active burrows along its verges. In contrast, individuals active in the home range 2 used the access road only once, presumably as the understory is less dense compared to home range 1, allowing easier movement through the habitat.

Camera traps successfully recorded footage and photographs of a mother and three young at foot (Figure 3) occupying burrow #39 in home range 2 (Figure 2) between 04/08/2011 and 12/08/2011. These bilby young were nearing independence, having spent 14 days in gestation, 75 days in the pouch, and were now being cached in a maternal burrow for 14 days where they would be suckled until independence (Southgate et al. 2000; Pavey 2006). Bilby litters are of one to three babies (Southgate et al. 2000). Consequently, the large litter and breeding activity in this colony indicates that conditions are highly productive and the habitat is highly suitable. The night that the mother and young were photographed, the two individuals were active along the access road in home range 1 confirming a population of 6 individuals. However, it is estimated that at least one more adult resides in home range 2 due to the large number of burrows. This is the only breeding population of Greater Bilbies currently known from the Dampier Peninsula.

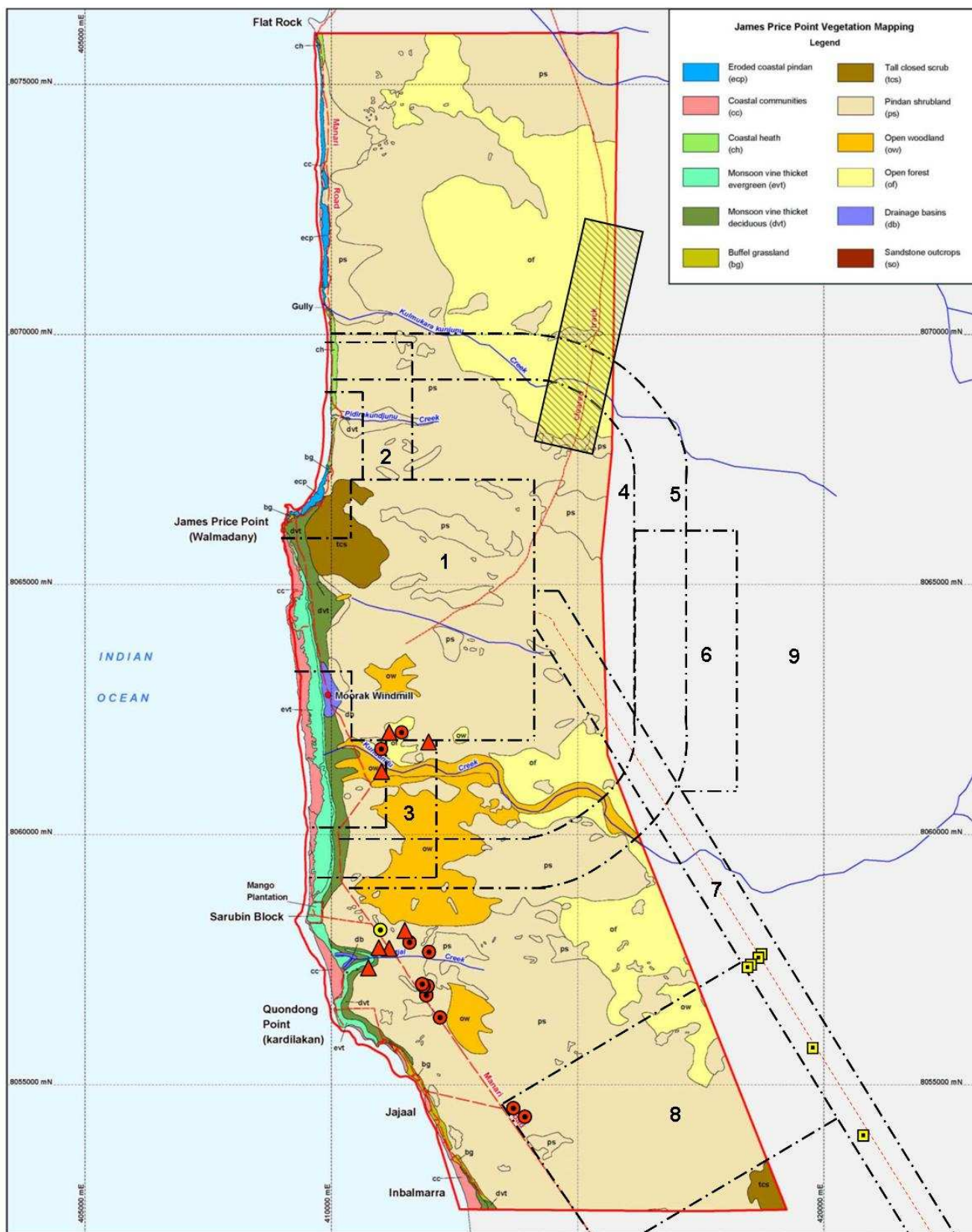


Figure 1: The major habitat classes of the region (see legend), as well as the Browse LNG Precinct 'activity zones' (black dot-dash lines): Industrial Precinct (1), Northern Pipeline Corridor (2), Southern Pipeline Corridor (3), Industrial Land Use Buffer (4), Sensitive Land Use Buffer (5), Light Industrial Area (6), Precinct Access Road (7), Worker Accommodation (8), and Supporting Infrastructure and Fire Management (9) (DSD 2010). Symbols represent bilby evidence from this study, old (red circles) and new (yellow circles); the active bilby colony from this study (hatched box); old suspected evidence from AECOM (2010a) (red triangles), and recent bilby burrows from AECOM (2011) (yellow squares). Figure is a composite from Biota Environmental Services (2009b) and DSD (2010).

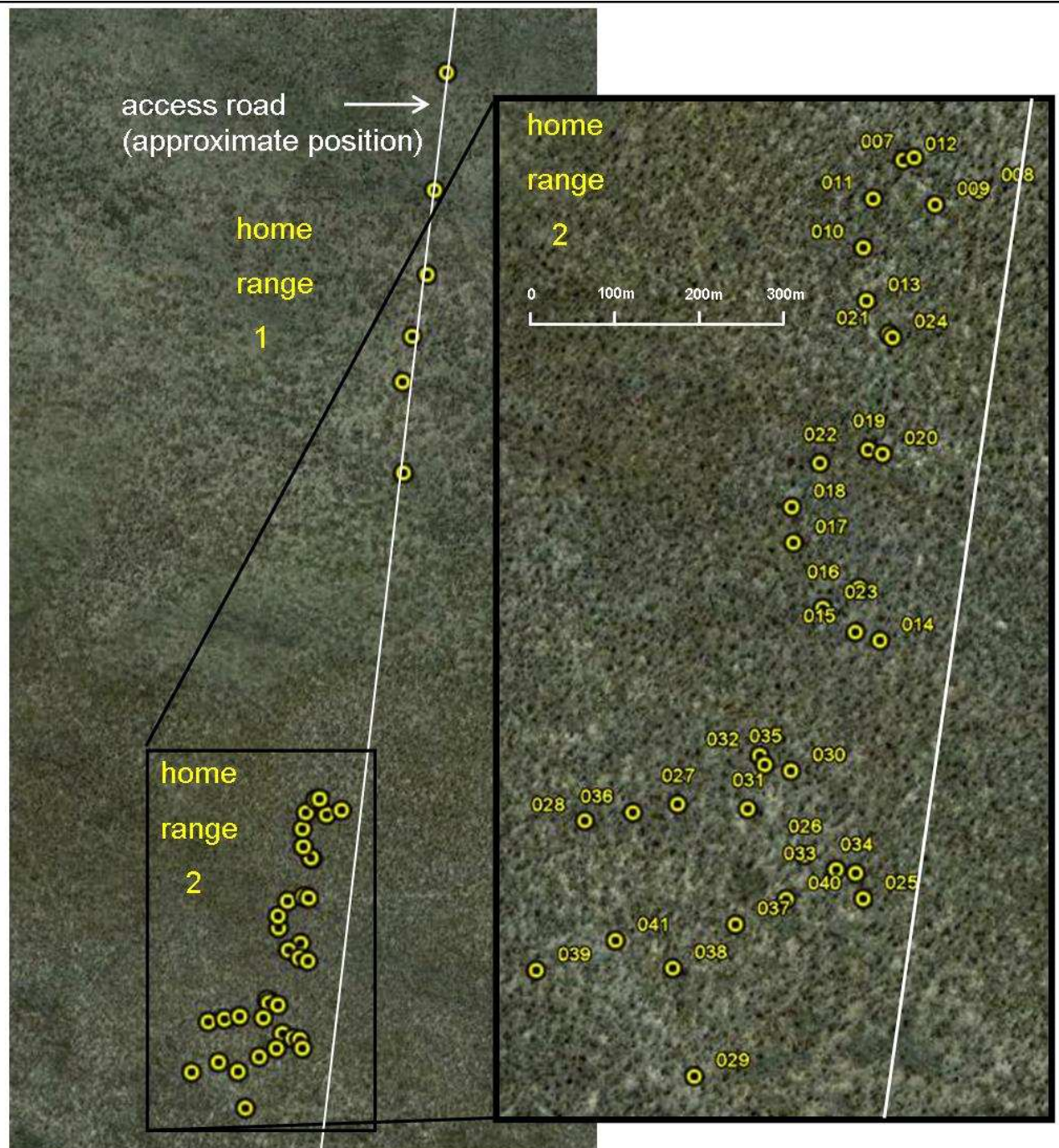


Figure 2: Locations of active burrows to the north of the precinct area. Two home range areas are indicated, inset is home range 2 in detail. Image source: Google Earth.



Figure 3: The photographed mother (upper) and three young bilbies (lower) at the entrance to the maternal burrow between 04/08/2011 and 12/08/2011.

Discussion

Comparison with past surveys in the area

This survey found evidence of an active breeding colony of bilbies in open forest to the north of the precinct area, as well as old and fresh evidence to the southwest. Ecological surveys conducted for the Browse LNG Precinct impact assessment either found no bilby evidence (ENV Australia 2008; Biota Environmental Services 2009b), some old and fresh evidence to the south (AECOM 2010a) or recent burrows to the south east (AECOM 2011). The southwest locations of evidence from this study closely matches those of a past survey (AECOM 2010a), suggesting this area may maintain long term populations, although the colony size remains unclear. When recent evidence was found in past surveys, it was concluded that if bilbies were present they were most likely vagrant individuals and not a resident colony (AECOM 2010a; AECOM 2011). This conclusion was based on the absence of burrow systems and tracks (AECOM 2010a) as well as the presumed inactivity of burrows due to a lack of scats and tracks (AECOM 2011). However, as both these studies did not search outside the set transects containing the evidence, it is difficult to conclude whether these burrows were the only ones in the area or part of an extensive colony. If the present study relied on similarly spaced and sized transects and did not utilise targeted searches as well, fresh and numerous evidence from the active colony could have easily been missed. Additionally, no scats were found at the active colony site contesting the assumed inactivity of burrows to the southeast. These recent burrows to the southeast require urgent investigation as they lie on the border of the proposed workers accommodation (Figure 1). Consequently, the presumption of vagrant bilby individuals remains unconvincing without further research. Finally, the sites surveyed in both this and past studies have generally been close to access roads due to convenience, resulting in the majority of the precinct area remaining unsearched. The extension of the vagrant individual presumption to the whole precinct area is also unconvincing.

Two of the previous studies had sites in the open forest inhabited by the active colony, yet found no evidence of bilbies there (Biota Environmental Services 2009b; AECOM 2010a). Although these study sites were not in the area of the active burrows (> 300 m away), the conspicuous roadside burrows of home range 1 should have been easily detected. Either, the bilby colony was missed, or more likely, the bilbies have recently colonised the area since the previous surveys (early and late 2009), although a few old burrows suggest it has been occupied in the past. Bilbies are capable of moving home-ranges depending on local food resources, rain and fire history (Pavey 2006). In mid 2009, a large fire swept through the region, heavily impacting the central/southern precinct area and moderately impacting the open forest of the active population. Bilbies have been shown to recolonise areas shortly after fire to take advantage of the growth of fireweeds (*i.e. Yakirra australiense*), a key food plant species for other bilby colonies (Southgate & Carthew 2006). However, the inhabited forest contains few of these plant species (Biota Environmental Services 2009a) suggesting that the bilbies may instead be feeding on the invertebrates that are thriving on the regrowth after the fire and subsequent good rainfalls.

As bilby populations and habitats change dynamically with fire, single year surveys within one area (e.g. Biota Environmental Services 2009b; AECOM 2010a) are inadequate in accurately documenting the temporal changes in populations and

habitat. A recently burnt area may currently be uninhabited, yet be utilised by a colony in the future when food resources mature. Temporal replication is therefore important to the understanding of how local bilby populations utilise a matrix of seral communities and which of these are critical in the long term. As the past surveys made largely unsupported presumptions of vagrant individuals, did not capture the bilby population to the north and were not thoroughly replicated temporally or spatially, they seem inadequate in representing bilby populations and habitat at the precinct site. Further research is therefore needed to adequately describe the extent of Bilby populations and habitats in the James Price Point area.

Habitat suitability

Most of the habitat currently occupied by bilbies in Australia presumably represents the least favourable portions of its former range, mainly open tussock grassland, mulga woodland/shrubland and hummock grassland (Pavey 2006). In this study, the existing bilby population was found in open forest dominated by *Eucalyptus miniata* and occasional *Corymbia dampieri* trees up to 10m tall, with an understory of *Acacia tumida*, *A. monticola*, *A. eriopoda* and *Grevillea refracta* shrubs, over *Triodia schinzii* hummock grassland with numerous *Chrysopogon pallidus* (Biota Environmental Services 2009a). This is similar to the hummock grasslands occupied by other bilby populations (Southgate 1990), except with the greater structural complexity and biomass of the mid and upper story. Recently used burrows to the southeast of the precinct area were observed in similar open forest habitat suggesting it is an important habitat class for the bilbies (AECOM 2011). Bilbies are opportunistic omnivores, with the proportions of invertebrate, plant and fungi in their diet varying depending on location, season, rainfall and fire history (Gibson 2001; Southgate & Carthew 2006). As discussed, the open forest contained few key food plant species, yet must be rich in invertebrate and fungal food resources to produce a litter of three bilbies. Part of this food resource may come from the presence of numerous *Acacia* plants that often contain root dwelling larvae (*R.Hunter* pers comms.), which are thought to be a persistent food resource for bilbies in the Tanami (Southgate *et al.* 2007). In comparison, the pindan scrubland and woodland habitat to the south contains many of the known bilby food plant species (Biota Environmental Services 2009a).

In addition to the food resources, the larger James Price Point region contains very suitable bilby habitat based on the model generated from bilby colonies in the Tanami desert (Southgate *et al.* 2007). These desert populations are most strongly associated with areas of high rainfall (mean annual: 600 mm) and high temperatures (mean daily min: 11.3°C, max: 39.3°C) (Southgate *et al.* 2007). Dampier peninsula receives similar annual rainfall (533mm), mean daily minimum (12°C) and maximum temperatures (36°C) (Bureau of Meteorology), suggesting ideal bilby climate. In the Tanami desert, bilbies are thought to positively associate with dingoes as they can control populations of the more efficient predators, feral cats and foxes (Southgate *et al.* 2007). Dingoes and feral cats are both common in the James Price Point area (Biota Environmental Services 2009b; AECOM 2010a), although the meso-predator interactions between them are unknown. The Tanami desert populations are locally associated with recently burnt areas (< 2 yrs) to take advantage of the regrowth of fireweeds (Southgate *et al.* 2007). Fires are common within the James Price Point region, with fires in 2007, 2009 and 2011, suggesting a mix of different seral communities and food resources. Lastly, Tanami bilby populations are more associated with productive substrates such as drainage lines and laterite/rocky features

(Southgate *et al.* 2007). The main substrate of the James Price Point area is pindan sands, with smaller patches of calcareous sand, sandy loam, clay sands and occasional drainage lines/basins (Biota Environmental Services 2009a). Most of these substrates are classified as having low productivity, with the exception being the drainage lines and basins, which are much more productive due to greater water supply and often greater nutrients (James *et al.* 1995). The drainage lines and basins in the precinct area seem to vary in their fertility, with some containing fertile black soils and *Melaleuca* trees, whilst others retain the lower nutrient pindan sands. As the majority of the bilby evidence occurs close to drainage lines (Figure 1), this appears to be the most important substrate to the local bilby population.

The greatest indicator of habitat suitability within the precinct area is the lack of foxes and rabbits, the two largest causes of bilby decline in the wild (R. Southgate, *pers. comms.*). Rabbits are thought to out-compete bilbies and cause significant habitat degradation (Morton 1990). Whereas, foxes are efficient predators of medium-sized mammals causing the decline of numerous native species as they spread across Australia (Abbott 2002). The spread of both rabbits and foxes across southern Australia closely correspond to the bilby's historic decline and distribution in 1990 (Southgate 1990) and 2004 (Pavey 2006) (Figure 4). The bilby's distribution in the fox and cat free northern Tanami Desert, northern Sandy Desert and Dampier Peninsula has changed little, indicating that these areas are critical refugia for wild bilby populations. Indeed, the precipitous loss of many endemic species from savannah habitats in northern Queensland and the Northern Territory has placed even greater significance on the refugia status of the Kimberley and Dampier Peninsula (Carwardine *et al.* 2011). Consequently, the precinct area appears to be important bilby habitat containing bilby food resources, ideal climate, a presence of dingoes, recent fire patches, some fertile substrates and no foxes or rabbits.

Threats to the James Price Point bilbies

Out of the seven major threats to bilbies listed in the National Recovery Plan (Pavey 2006), the Browse LNG Precinct has the potential to impact the local bilby population through four. Firstly, predation due to dingo/wild dog and feral cat will most likely increase through the facilitation of predator movement (e.g. access roads), access to water (e.g. turkey nest dams) and scavenging opportunities (e.g. rubbish dumps) (Pavey 2006). Secondly, habitat degradation resulting from unsuitable fire regimes may occur through the suppression of fires due to the threat to infrastructure. Thirdly, there will most likely be an increased risk of road mortality due to the increased number of roads and nocturnal traffic occurring through bilby habitat. This threat already occurs, with Browse LNG Precinct security staff currently driving along the access road used by the active bilby population, at speed, during the day and night.

The final listed threat is the habitat destruction and degradation resulting from mining and other development. Due to the Browse LNG Precinct's size and location in and near confirmed bilby habitat, it will most likely destroy and degrade bilby habitat through the potential impacts of extensive land clearing, noise pollution, light pollution, chemical pollution, altered hydrology and increased spread of weeds. This threat already occurs as the geological and hydrological survey currently underway for the Browse LNG Precinct has begun substantial land clearing permitted by the Department of Environment and Conservation (Appendix). This includes the intention to clear part of the habitat containing the breeding bilby colony, putting them directly

at risk (Figure 5). Even though the majority of the clearing has and will occur at the Browse LNG Precinct site, the largely unsurveyed precinct area and large dispersal capabilities of the bilby (e.g. 4 km) mean that bilby populations may have already been impacted. Due to these four threats, it is more than likely that the proposed Browse LNG Precinct will have damaging and lasting consequences for the local Greater Bilby population and habitat.

The question then is whether this local impact will affect regional bilby populations? The James Price Point population is the only breeding population currently known from the Dampier Peninsula. It is likely that other populations exist on the peninsula, yet as no thorough or recent surveys have been conducted in the region, the James Price Point Bilby colony can be identified as a significant population. Although the Browse LNG Precinct will only impact a small area relative to the bilby habitat regionally, if it occurs on or near important productive habitat it may have an impact on regional populations in the long term (Pavey 2006). It is therefore critical to determine whether the precinct area contains important productive habitat and populations, relative to the Dampier Peninsula and other bilby populations. This is difficult as little is known of the Western Australian populations and their critical habitats (Pavey 2006). Consequently, further research is needed into the local population and habitat of the precinct area and Dampier Peninsula relative to other refugia populations.

Conclusion

The current ecological surveys conducted for the Browse LNG Precinct are inadequate in documenting the extent of local bilby populations and habitats, and their spatial and temporal fluctuations. The precinct area appears to contain suitable and productive habitat that has sustained past populations and currently sustains a breeding population of bilbies. As little is known about the bilby populations and habitat of the Dampier Peninsula, the James Price Point population represents the only breeding population currently known from the region. As the Browse LNG Precinct will most likely impact the local bilby population and habitat, there is the potential for this to affect the regional population in the long term. An impact to the regional population could be detrimental to the longevity of the species in the wild as it is one of three fox and rabbit-free refugia left in Australia. Currently, there is not enough information to assess how local impacts resulting from the LNG facility will impact the regional population. Consequently, as the potential impact to the species is large, extensive research is needed before an accurate assessment of the Browse LNG Precinct's impact can be made.

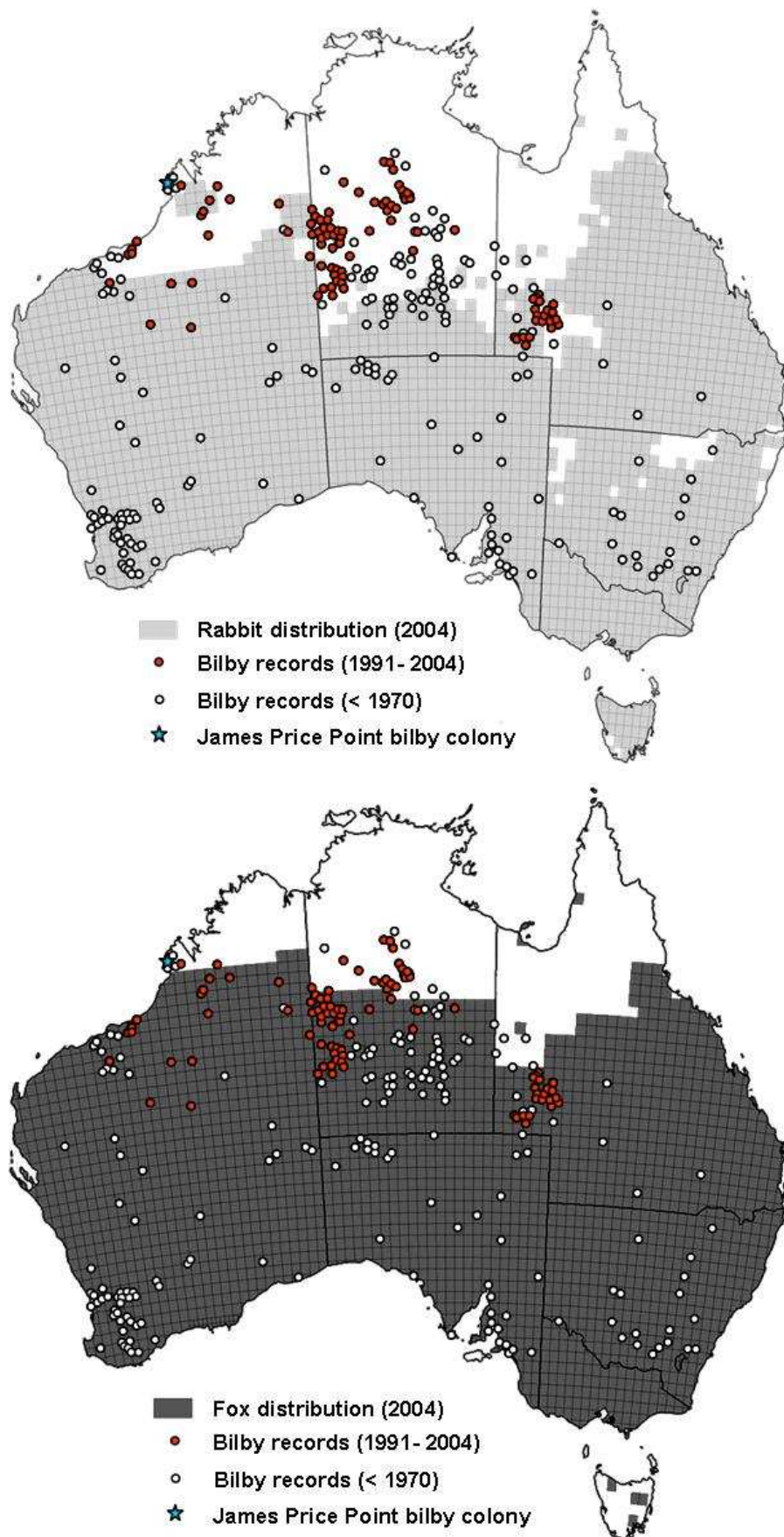
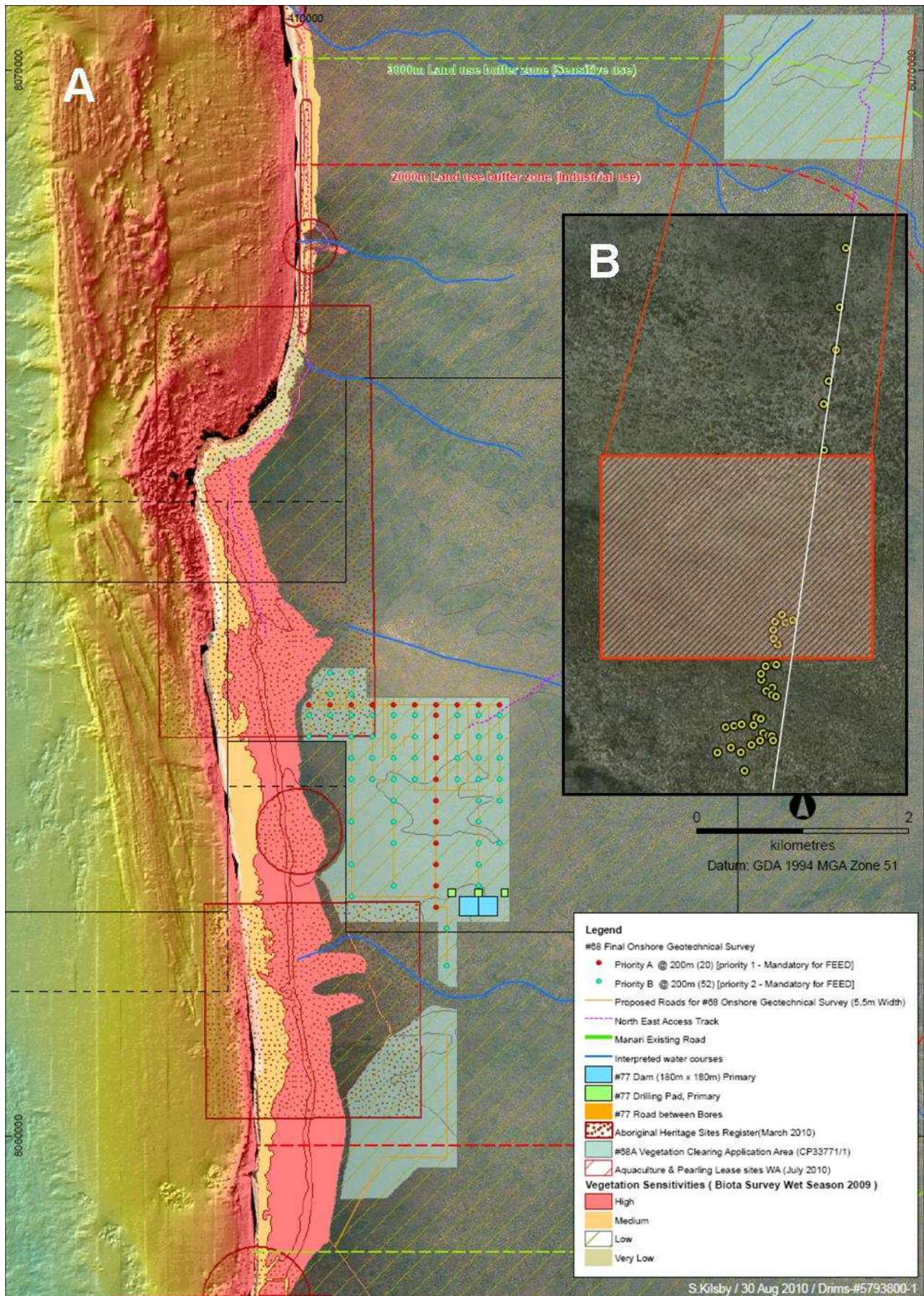


Figure 4: Rabbit distribution (upper) and Fox (lower) distributions (West 2004) relative to recent and old bilby records (Pavey 2006), and the James Price Point bilby colony.



Key Recommendations

- Immediate restriction of vehicular use along the access road that passes through the active bilby colony to reduce the chances of road mortality
- Immediate cat trapping in the active colony to reduce the chance of predation of young bilbies
- A properly replicated survey (both temporally and spatially) in the James Price Point region to establish the extent and number of bilby populations and their important habitat. This survey should map the extent of current and recent colonies, measure habitat characteristics relevant to bilbies, revisit old survey sites for temporal replication, and extend to the vast areas of the precinct not yet surveyed.
- No further land clearing throughout the precinct area and the revoking of the current land clearing permit issued by the West Australian Department of Environment and Conservation in light of the evidence presented in this report (See Appendix B)
- A large regional research project into the bilby populations and critical habitat of the Dampier Peninsula region to establish the importance of the James Price Point area to the larger regional bilby population.
- Translocation of Greater Bilbies from the area should not occur. This would be disrespectful to the wishes of the traditional custodians, the Goolarabooloo, and would be heavily opposed by the No Gas Community. Secondly, as the habitat requirements of the Greater Bilby are unknown for the region it would be difficult to select a release site of suitable habitat that would guarantee the survival of the individuals.

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Appendix A

Selected images of tracks, burrows and diggings from the survey



Figure A1: Selected images of fresh bilby tracks



Figure A2: Selected images of bilby burrows, clockwise from top right: burrow #9 (Figure 2), burrow #3, burrow #7, burrow #5, and an old burrow from south of the precinct area.



Figure A3: Selected images of bilby diggings and scats

Appendix B

Review of the Land Clearing Permit issued by the West Australian Department of Environment and Conservation to Woodside Energy Limited

On the 30th of July 2010, the Western Australian Department of Environment and Conservation (DEC) issued a land clearing permit to Woodside Energy Limited (WEL) (permit no: 3771/1) to undertake Geotechnical and Hydrogeological studies as part of their Onshore Site Investigation – Phase 1. As part of the permit application process, a Clearing Permit Decision Report (CPDR) was prepared by DEC staff to assess the impact of the land clearing against key conservation criteria. One of these criteria relates to the potential impact on conservation significant fauna species, such as the Greater Bilby (*Macrotis lagotis*). In light of the new evidence presented in this study, the sections of the Clearing Permit Decision Report relevant to the Greater Bilby are reviewed below. The full Clearing Permit Decision Report and Clearing Permit are available publically.

The sections of the Clearing Permit Decision Report prepared by DEC that are relevant to Greater Bilbies:

“(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments *Proposal is not likely to be at variance to this Principle*

There are no known records of conservation significant species mapped as occurring within the area under application.

...

There are records of the Greater Bilby (Macrotis lagotis) in the Broome hinterland during the last 10 to 15 years (AECOM 2010). There are three records of this vulnerable species in the local area (40km radius), with the closest mapped as 9.9km northwest of the applied area. No evidence of tracks or distinctive burrows were observed for M. lagotis during a fauna survey of the proposed footprint of the Browse LNG Precinct at JPP, in 2009 (AECOM 2010). However, foraging holes that may suggest the presence of a few vagrant M. lagotis individuals were observed during this survey (AECOM 2010). M. lagotis formerly occurred across the arid and semiarid zones of 70 per cent of continental Australia, however, is now restricted to 20 per cent of its former range, surviving in parts of the Tanami Desert (Northern Territory), Pilbara and southern Kimberley (Western Australia), and an isolated population in southwest Queensland (DEWHA 2005). M. lagotis is a wide ranging species that occurs in a broad range of habitats and is considered likely to occupy much of the Dampier Peninsula in very low densities (AECOM 2010).

...

The proposed clearing is of a moderate size and scattered nature and as the vegetation surrounding the area under application comprises vegetation in very good to excellent (Keighery 1994) condition with a high remaining extent, the applied area is not considered significant habitat for indigenous fauna. Therefore, the proposed clearing is considered not likely to be at variance to this Principle.”

DEC (2010) Clearing Permit Decision Report CPPS 3771/1

Authors Response to the Clearing Permit Decision Report and Land Clearing Permit

The Clearing Permit Decision Report presumes non-occupancy or vagrant occupancy of Greater Bilbies in the James Price Point area based on the results of the ecological surveys conducted as part of the Strategic Assessment Report (Aecom 2010).

Contrary to these presumptions, this study has found:

- A breeding colony of at least 7 Greater Bilbies occurring 3-4 km north of the Browse LNG Precinct at James Price Point. Part of this colony is scheduled to be cleared under the DEC clearing permit, therefore directly impacting this important breeding population.
- A number of old bilby burrows and diggings were observed throughout the precinct area adding to those found in past studies (Aecom 2010). This suggests that the area has consistently supported Greater Bilby populations.
- An unusually high litter of 3 young bilbies observed in the active colony suggests that the surrounding habitat is both productive and of good quality.
- When compared to habitat models based on Greater Bilby populations from the Tanami Desert, the area appears to contain sections of productive bilby habitat due to the suitable climate, presence of recently burnt patches, presence of dingoes and the presence of productive substrates (creek lines and drainage basins).
- Due to the colony, old evidence, large litter size and productive habitat, parts of the habitat within the area to be cleared are considered significant habitat.
- The conclusions made by past (Aecom 2010) and recent surveys (Aecom 2011) of only vagrant bilbies present in the area, is not supported due to their inability to find the breeding colony, restricted methodology, inadequate temporal and spatial replication, and presumptions of frequent scat occurrence near active burrows.
- The majority of the area permitted to be cleared remains unsurveyed by this or past surveys.

Due to the active breeding colony found on site; the sustained occupancy of the area through the past; the presumed significant and productive bilby habitat throughout the precinct area; the inadequacies of the past ecological surveys and the largely unsurveyed nature of the clearing area, it is presumed that bilby populations and significant bilby habitat do occur throughout the area permitted to be cleared.

The wide ranging and broad habitat use of the Greater Bilby, as described in the Clearing Permit Decision Report, does not mean that successful populations can be sustained in all these habitats. As most of the area now occupied by the bilby probably represents the least favourable of its former range, great importance is placed on the more productive habitats acting as population sources (Pavey 2006). Impacts from mining and land clearing may only affect a small area relative to the species' regional distribution, however, if that area is important and productive Greater Bilby habitat it may affect regional Bilby populations in the long term (Pavey 2006).

It is therefore critical to establish whether the area to be cleared at James Price Point contains important and productive Bilby habitat relative to the Dampier Peninsula region. The Clearing Permit Decision Report does detail that the vegetation within and surrounding the application area is of very good to excellent condition. However, the criteria used for this assessment are not directly related to the habitat preferences of the Greater Bilby (Keighery 1994). Critical habitat for the Greater Bilby has not been evaluated or defined for Western Australia (Pavey 2006). Therefore, to assess whether the land clearing will impact productive and important habitat on the Dampier Peninsula, a habitat model needs to be established similar to that generated for Bilby populations of the Tanami Desert (Southgate *et al.* 2007).

It is presumed that Greater Bilbies occupy much of the Dampier Peninsula in low densities (Aecom 2010b). As this presumption is based only on incidental occurrence and not thorough scientific surveys, it is unknown how extensive, dense, persistent or productive these populations are. Until a thorough Greater Bilby survey occurs throughout the Dampier Peninsula, the colony at the Browse LNG Precinct represents the only recorded breeding colony and should therefore be viewed as a significant population for the region.

As a significant Bilby population within the Dampier Peninsula, the James Price Point colony also may have significance to the species as a whole. The historical decline of Greater Bilbies across Australia is closely linked to the spread of foxes (predation) and rabbits (competition) (Southgate 1990). If this pattern of decline continues unabated, then the main wild population will retreat to refugia populations that are fox and rabbit free. These refugia are the Dampier Peninsula, Northern Tanami Desert and Northern Sandy Desert. Consequently, any regional impacts caused by land clearing at the Browse LNG Precinct could have impacts on the longevity of the wild population.

In conclusion, the land clearing permitted under DEC permit #3771/1 will:

- impact part of the significant habitat of the productive breeding colony of Greater Bilbies at the Browse LNG Precinct
- impact unsurveyed and potentially significant Bilby habitat that may support Bilby populations
- impact part of the significant habitat of a Bilby population significant to the Dampier Peninsula region
- impact part of the significant habitat of a Bilby population significant to one of three refugia for the wild population, and therefore a population that is potentially significant to the species.

Further research is needed to establish the extent of bilby populations and habitat within the clearing area and Dampier Peninsula, to therefore assess the significance of this population and habitat to the region. Until that time, due to the significant potential risk to the Greater Bilby population in the region and refugia, the application of the precautionary principle is appropriate. Therefore, the land clearing is considered to be in direct conflict with principle (b) of the Clearing Permit Decision Report and the DEC clearing permit #3771/1 should be revoked until further research proves otherwise.

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