

**Peer review of the Browse Bilby Review, a report detailing the consolidated information relating to the occurrence of the Bilby *Macrotis lagotis* near the proposed Browse LNG Precinct (close to James Price Point) and more broadly on the Dampier Peninsula.**

Conducted by:  
Dr Richard Southgate  
Envisage Environmental Services

Contracted by:  
Sinclair Knight Merz

Date: 21 May 2012

**Purpose**

The purpose of this document is to provide a review of the report ‘Browse Bilby Review – Consolidated Information Relating to the Occurrence of the Bilby (*Macrotis lagotis*) in the vicinity of the Browse LNG Precinct and more broadly on the Dampier Peninsula’ referred to henceforth as the Browse Bilby Review (BBR).

The BBR was compiled by Sinclair Knight Merz (SKM) for Woodside Energy Limited (Woodside) on behalf of the Western Australian Department of State Development (DSD) following a request from the Environmental Protection Authority (EPA) for more information on the presence of Bilbies in relation to the proposed Precinct. The available information regarding purported Bilby occurrence within the development area and broader region was collated from existing studies and other evidence to determine the likely significance records and whether further regional assessment was considered necessary.

The review of the BBR was initiated by the Department of State Development (the Client). A response was requested for the following questions:

1. Do the studies conducted to date support the conclusion made in the Strategic Assessment Report [SAR] that Bilbies are present in low densities in the James Price Point area?
2. Based on your knowledge of the species, historical data, anecdotal evidence, findings of the studies conducted to date and uniformity of pindan habitat across the peninsula, is it reasonable to conclude that:
  - a) These animals are unlikely to represent a significant isolated colony or population, and
  - b) Given the extent of similar habitat on the Dampier Peninsula (some 4 million hectares) and the mobility of the species, clearing of up to 3,000 hectares and construction activities for the Precinct are unlikely to have significant direct impacts on a possible breeding colony recorded in 2011 near the Precinct (some three to four kilometres distant from clearing) that could not be managed?
3. What are the key considerations for developing an effective Bilby management plan on the Dampier Peninsula?

## Background

Woodside Energy Limited (Woodside) is the operator of the Browse Liquefied Natural Gas (LNG) Development on behalf of the Browse Joint Venture. The Browse LNG Development will recover natural gas and condensate resources from the Browse Basin gas fields that are located offshore, approximately 450 km north-north west of Broome, in the Kimberley region of Western Australia.

Subject to government approvals, onshore site investigations and other technical studies, Woodside proposes to develop the fields through an onshore gas processing facility (the Downstream Development) within a State Government approved gas processing LNG Precinct near James Price Point, 60 km north of Broome on the Dampier Peninsula. The proposed Browse LNG Precinct is designed to be a multiple-user Kimberley gas hub and has been defined in a Strategic Assessment Report (SAR) released for public comment by the Department of State Development (DSD) in December 2010. Woodside is the foundation proponent at the Precinct.

The proposed Browse LNG Precinct development area for construction and operation is approximately 28 km<sup>2</sup> comprising the following areas:

- The main Browse LNG Precinct and processing plant (20.9 km<sup>2</sup>)
- The northern and southern pipeline corridor areas (2.5 km<sup>2</sup>)
- The Light Industrial Area (2 km<sup>2</sup> within an area of 9.7 km<sup>2</sup>)
- Workers' Accommodation Camp (2 km<sup>2</sup> within an area of 20.6 km<sup>2</sup>)

A buffer surrounds and includes the terrestrial component of the Processing plant and Southern Pipeline area and part of the Light Industrial Area (approximately 84 km<sup>2</sup>). The Browse LNG Precinct area is currently accessed via Manari Road. A new access road is proposed to link Broome-Cape Leveque Road and the Precinct. An additional access track to the north east of the proposed Precinct that is known as the North East Access Track (NEAT) has been used up to 2011 for accessing various environmental survey sites.

The proposed development within the Browse LNG Precinct would be expected to eliminate or substantially alter habitat potentially suitable for wildlife. Furthermore, activities and operations to protect or manage the Browse LNG Precinct assets within the surrounding buffer zone may affect the suitability of habitat for some wildlife species.

## **Main assertions of the Browse Bilby Report**

1. Bilbies appear to be absent in Woodside's main Downstream Development area and present in low and probably transient numbers in the surrounding Browse LNG Precinct area and wider development buffer zone.

None of these studies identified any direct evidence of Bilby individuals. Likely burrows and diggings were identified with the majority of these located to the north east of the main proposed Browse LNG Downstream Development and Precinct area. Only one of these was considered to be recent and this was the 'active' burrow system to the south of this area. Bilby activity along the NEAT was sparse and transient.

2. The habitat in the Browse LNG main Downstream Development site and Precinct appears to be of lower suitability for Bilbies based on the available evidence.

The current limited evidence of Bilbies outside and nearby to the proposed Browse LNG Downstream Development and Precinct area suggests that individuals seem to prefer open woodland and open forest pindan habitat (along the NEAT and southwest of the proposed development), with lower preference for pindan shrubland and other vegetation communities. The Browse LNG development site and Precinct area is composed primarily of pindan shrubland vegetation and hence low suitability and only likely to support low density transient populations in favourable conditions.

3. Pindan habitat is extensively represented on the Dampier Peninsula

While limited regional information is available, it is expected that the Bilby species is present widely on the peninsula at low numbers, and observations from the broader Browse LNG Downstream Development and Precinct area are not likely to represent an isolated population or colony.

4. Regional assessment for Bilby on the Dampier Peninsula may be problematic

The higher density of vegetation coverage across the Dampier Peninsula would not be suitable for sign-based aerial survey approaches used in arid desert areas.

Ground-truthing would be important for any detailed large scale regional assessment of Bilby on the Dampier Peninsula.

5. An appropriate regional management plan should be developed and implemented

The development and implementation of an appropriate regional management plan is advocated to mitigate against threatening processes to the Bilby, such as predation by foxes and cats, habitat degradation due to introduced herbivores and altered fire regimes. This is likely to offer the best approach for effective use of resources for improving conservation outcomes for the species on the Dampier Peninsula.

## Resources

The reviewer was referred to or provided with access to the following reports:

ENV Australia. 2008. *Perpendicular Head-North Head, Packer Island, Gourdon Bay and Coulomb-Quondong Vertebrate Fauna Assessment*. Unpublished report RP002, prepared for Department of Industry and Resources, September 2008. Included in Part 4 of the DSD 2010 (BLNG Strategic Assessment Report).

Biota Environmental Sciences. 2009. *James Price Point Terrestrial Fauna Survey: Wet Season 2009*. Report prepared for Department of State Development. Included in Part 4 of the DSD 2010 (BLNG Strategic Assessment Report).

AECOM. 2010. *Supplementary Terrestrial Fauna and Habitat Assessment, James Price Point, W.A.* Unpublished report prepared for Department of State Development and included as an Appendix to DSD 2010.

Biota Environmental Sciences 2011a. James Price Point Browse LNG Precinct Targeted Terrestrial Fauna Survey – March 2010. Unpublished report prepared for Environmental Resources Management on behalf of Woodside Energy Limited.

Ecologia. 2011. James Price Point Light Industrial Area, Workers' Accommodation Camp and Southern Pipeline Level 2 Vertebrate Fauna Assessment. Unpublished report prepared for Sinclair Knight Merz on behalf of Woodside Energy Limited.

AECOM. 2011. *Browse LNG Precinct Access Road Targeted Fauna Survey – Greater Bilby*. Unpublished report prepared for Main Roads Western Australia.

Browse LNG Precinct Strategic Assessment Report (SAR) 2010. Part 4: Environmental Assessment – Terrestrial Impacts. Department of State Development Government of Western Australia.

## Limitations

The response provided in relation to the questions posed by the Client is general in nature. More specific detail to support my response can be supplied if more time is allocated for preparation of a response. A number of minor errors or misinterpretations regarding the Bilby ecology and survey techniques identified in the BBR are not addressed in my review.

The buffer area identified in Fig. 3.1 of the BBR was estimated using the scale shown in the figure.

## Summary response to DSD questions

1. Do the studies conducted to date support the conclusion made in the Strategic Assessment Report that Bilbies are present in low densities in the James Price Point area?

[The SAR released by the DSD states "... it is likely this species occupies most of the Dampier Peninsula in very low densities" (Page 2-95).]

Overall the studies conducted do support the conclusion that Bilbies are present in low densities in the James Price Point area.

However, it needs to be recognised that a number of the studies conducted within the James Price Point area were unsuited to document Bilby occurrence. This is because these surveys were untargeted to detect Bilby sign at a regional scale or the personnel were inexperienced in distinguishing sign. This is not a reflection on the overall quality of the work conducted by the consultants, more a reflection of the focus and objectives of each particular survey. None of the survey reports outlined a clear rationale or protocol to detect a species like the Bilby or the confidences that would be attributed to various forms of sign likely to be encountered.

Hence, it is unwise and incorrect to additively compile survey effort to make inferences about Bilby density (*cf* occupancy). Statements within the BSAR about the past and present density of Bilbies within the James Price Point area need to be tempered with this in mind.

It is also misleading to emphasise that none of the surveys recorded direct evidence of individual Bilbies. It is extremely rare for Bilbies to be observed (sighted) while conducting survey work and most targeted studies of Bilby distribution and occupancy rely on sign (the use of burrows and diggings to flag potential activity and tracks and scats to validate occurrence).

Among the surveys conducted, those by AECOM 2010 and AECOM 2011 have employed the most effective technique to detect Bilby occurrence within the vicinity of the Precinct and more broadly. The technique used by AECOM involved searching roughly a 50 m x 400 m area (2 ha) to sight or record sign (tracks, scats and burrows) of animals. The plots were widely separated and likely to be independent for a species the size of a Bilby. The technique was roughly equivalent to the track-based monitoring approach advocated to document the occurrence of medium-large animals throughout arid and semiarid Australia (Southgate and Moseby 2008; Moseby, Nano and Southgate 2009). However, the age of sign (mainly burrows and diggings) was not reported clearly during the AECOM surveys and no effort was made to describe the suitability of substrate conditions to detect sign at a site.

The targeted survey conducted by Ecologia 2011 used searches for bilby sign but without a specified plot size and sample time. Unequal effort appears to have been applied among the four sites sampled and it was evident that there was difficulty in distinguishing among forms of sign. No reported effort was made to search for scats within the sand apron associated with diggings. These issues were evident with some of the other consultants responsible for surveys.

The absence of a clear estimate of age of sign has made it difficult to compare the occupancy of Bilby sign within the James Price point area and more broadly. If no fresh activity was encountered during the AECOM 2010 and 2011 surveys, the proportion of occurrence is lower than that encountered in the northern Tanami Desert which is at a similar latitude to the Precinct (Table 1). However, when comparing similar aged Bilby sign, the proportion it is not dissimilar. This suggests that at times the Bilby activity in parts of the Dampier Peninsula may be comparable to those in the Northern Tanami.

Table 1 The proportional occurrence of bilby sign at James Price Point and the Northern Tanami Desert.

Location	Fresh Sign	Old sign	Plots sampled	Proportion fresh	Proportion old	Proportion Source
James Price Point		5	29		0.17	AECOM 2010
		4	20		0.2	AECOM 2011
Northern Tanami	4		24	0.16		Southgate <i>et al.</i> 2005
	4	6	29	0.14	0.21	Paltridge (pers. comm.)

2. Based on your knowledge of the species, historical data, anecdotal evidence, findings of the studies conducted to date and uniformity of pindan habitat across the peninsula, is it reasonable to conclude that:

a) These animals are unlikely to represent a significant isolated colony or population.

Current information on the Bilby within the sandy desert regions of their extant range suggests individuals do not show strong site fidelity or dependence on a specific locality. The factors that cause individuals or group of individuals to move or vacate an area are unclear but probably relate to the suitability of foraging conditions, food availability or an urge to search for mates.

Bilbies have historically occurred throughout Dampier Peninsula and have recently been recorded from the Gourdon Bay area as reported in the BBR. It is highly likely that the some of the sign encountered in the vicinity of the Browse LNG Precinct by various survey consultants has been produced by Bilbies. If the material provided by Malcolm Lindsay is valid, there is no doubt that Bilbies have been present in the area during 2011.

The amount of sign encountered and its spatial and temporal distribution suggest the specific Browse LNG Precinct does not sustain or represent a significant isolated colony or population. However, the occurrence of sign within the region and the evidence of successfully breeding individuals documented by Lindsay (outlined in the BBR) indicate that the Pindan shrubland and woodland can at times become a population source and should not be considered or discounted as a habitat sink (where deaths exceed births).

The northern edge of the Bilby distribution (Dampierland, northern edge of the Great Sandy and Tanami Deserts) is of considerable importance to the conservation of the species because it represents the only part of their range where a population can persist without the need from intensive management.

b) Given the extent of similar habitat on the Dampier Peninsula (some 4 million hectares) and the mobility of the species, clearing of up to 3,000 hectares and construction activities for the Precinct are unlikely to have significant direct impacts on a possible breeding colony recorded in 2011 near the Precinct (some three to four kilometres distant from clearing) that could not be managed?

The BBR does not present any information on the proportion distribution of vegetation types within the Precinct or more broadly on the Peninsula. Evidence provided in supporting material to the BBR suggest the vicinity of the Precinct has a mix of habitat types including Pindan Shrubland, Pindan Woodland and Pindan Open Forest and these habitat types may extend throughout remainder of the Dampier Peninsula. Likely sign of bilby activity was recorded from all three habitats. The incident of breeding appears to have occurred in Open Forest habitat.

Providing the remainder of the Peninsula has mix of habitat types, the clearing of up to 3,000 hectares and construction activities for the Precinct are unlikely to have significant direct impacts on the viability of the Bilby population on the Peninsula or at the location near the Precinct where evidence of breeding was reported. Bilbies can tolerate disturbance. For example, Bilby activity occurred along part of the easement for the Ghan Railway line north of Tennant Creek during the construction phase and they have continued occur in the vicinity of the railway line since. More significant indirect threats associated with development and operations in the Precinct are likely to have negative impacts unless adequately managed.

### 3. What are the key considerations for developing an effective Bilby management plan on the Dampier Peninsula?

Three key considerations are required in the development of an effective Bilby management plan on the Dampier Peninsula.

- i. Clearly determine occupancy of the Bilby and predator species and their relationship to habitat and fire pattern

Management of threatened fauna such as the Bilby requires good information on distribution and occupancy. Low intensity *in situ* forms of management around a wild population are better for the conservation of a species than high intensity management on *ex situ* populations e.g. predator exclusion or control around a reintroduced population.

- A survey of bilbies and other terrestrial medium-large fauna using 2 ha track-based monitoring plots (Moseby, Nano and Southgate 2009) is necessary throughout the Dampierland Bioregion.
- This monitoring technique enables the occurrence of a range of species to be recorded simultaneously including invasive predators and herbivores.

- The majority of plots need to be spaced at least 4 km apart.
- Multiple repeat visits to a sample plot are required to accurately determine occupancy because detection is imperfect (MacKenzie *et al.* 2006).
- Plots should be randomly located but stratified in relation to access tracks, vegetation community and fire age mapping. The relationship between the Bilby, habitat, fire age and association with other species can be determined through the application of this approach.
- The existing road network on Dampier Peninsula and elsewhere in the Bioregion would probably enable the sampling of a sufficient number of stratified plots to allow a robust spatial analysis.
- Track-based monitoring provides an opportunity for the engagement and employment of Traditional Owners.

There was no evidence provided in the BBR to support the assertion that the higher density of vegetation coverage across the Dampier Peninsula would make it unsuitable for sign-based aerial survey approaches used in arid desert areas. Information and photographs provided by consultants in the supporting documents suggests the ground cover and overstorey was relatively open. It is a different issue if the use of helicopters to conduct survey of sign is limited because of OHS requirements.

- ii. Implement fire management in parts of the Dampier Peninsula to increase the spatial and temporal heterogeneity fire in the landscape.

There is a reasonably strong positive association between Bilby prevalence and dietary food plants. A number of the important food plants used by the Bilby are promoted by fire and hot summer fires followed by rain are most favourable conditions for production. Large wildfires are a threat to Bilbies not from the immediate lack of cover (unlike many other species) but when vegetation recovers and becomes homogeneously dense over large tracts, preventing Bilbies from foraging and moving through the landscape. A road network may have a positive influence on increasing fire heterogeneity within an area but provide a corridor for weed invasion.

- Mapping of fire pattern in relation to Pindan shubland, woodland, open forest extent and landscape features to determine if and where persistent natural fire edge boundaries and ecotones occur.
- A regional fire management plan would need to include the provision to conduct hot summer fires within a proportion of the landscape each year.
- Monitoring for Bilby activity on these burns and those of different age burns would be important to determine the efficacy of the fire management plan.
- Provision would be necessary to reduce the spread of wildfires in the Dampier Peninsula through mosaic burning to augment the effect of natural fire boundaries.
- Reduction and control of buffel grass (*Cenchrus ciliaris*) would be important to reduce wildfire and fire age homogenisation within the landscape.
- Monitoring to determine the influence of tracks to service facilities including bore fields, pipe lines and electricity on fire pattern and weed dispersal.



- iii. Implement measures to ensure construction, development and ongoing operations do not allow predator populations to increase in abundance, particularly those of feral cats and foxes. Foxes are currently considered absent or uncommon vagrants on the Peninsula however, their range across Australia is continuing to extend northward.

A build up of fox and feral cat numbers would have a severe negative impact on threatened species. The continued presence of dingoes is of less concern. A dingo population in low abundance is not threatening to species like the Bilby and may act to reduce the abundance of foxes and feral cats. A road network may increase predator activity within an area.

- Management would require ongoing predator monitoring to compare levels within the Precinct with those on the Peninsula using track-based monitoring and remote camera techniques.
- Regular trapping to target feral cats and foxes around accommodation and plant facilities.
- Waste collection and disposal should be tightly controlled to prevent feral cats and foxes scavenging food.
- Free-standing water should be fenced or contained to prevent access by foxes and feral cats.
- Dingo/dogs should be tolerated unless their impact proves detrimental to target populations.
- Monitoring to determine the influence of tracks to service facilities including bore fields, pipelines and electricity on predator movements.

A number of other relevant management measures to mitigate the potential impact of development and operations within the Precinct have been identified in the SAR.

## References

- MacKenzie, D. I., Nichols, J. D., Royle, J.D., Pollock, K.H., Bailey, L.L. and Hines, J.E. (2006). 'Occupancy estimation and modelling. Inferring patterns and dynamics of species occurrence.' (Elsevier: Academic Press.)
- Moseby, K., Nano, T. and Southgate, R. 2009 'Tales in the sand: a guide to identifying Australian arid zone fauna using spoor and other signs' Metso. p114.
- Southgate, R. I., Paltridge, R. M., Masters, P. and Nano, T. (2005). An evaluation of transect, plot and aerial survey techniques to monitor the spatial pattern and status of bilby (*Macrotis lagotis*) in the Tanami Desert. *Wildlife Research* **32**, 43-52.
- Southgate, R. and Moseby, K. (2008). 'Track-based monitoring for the deserts and rangelands of Australia'. Report for the Threatened Species Network at WWF-Australia