Our Ref: 2219AB

26 April 2017

Jessica Healy
Shire of Broome
Engineering Technical Officer
Via email: jessica.healy@broome.wa.gov.au

Dear Jessica

**Targeted Bilby Survey - Crab Creek Road, Broome**

# 1. Background

360 Environmental Pty Ltd (360 Environmental) is pleased to provide the Shire of Broome with this letter report with regard to the Targeted Bilby Survey that was undertaken on Crab Creek Road, Broome.

The Shire of Broome commissioned 360 Environmental in April 2017, to undertake a Bilby survey on Crab Creek Road, Broome (Figure 1). 360 Environmental had conducted a vertebrate fauna survey in adjacent areas, in September 2016 for the Water Corporation as part of the construction of a Pivot at Broome North Waste Water Treatment Plant (WWTP).

# 2. Summary of Bilby Ecology

## 2.1. Description

The Bilby (*Macrotis lagotis*) is a distinctive omnivorous marsupial with an adult weight range of approximately 800 - 2,500 g. The Bilby is the only extant member of its genus *Macrotis*, its sole congener *M. leucura* (Lesser Bilby) most likely went extinct in the 1960s after a broad-scale decline extending over at least 50 years (Burbidge *et al.* 1988). The Bilby has long, soft, blue-grey fur, large ears, long pointed snout and black and white tail that is crested throughout its length (Van Dyck & Strahan 2008).

## 2.2. Distribution

The Bilby was common throughout most of its range until the early 1900s when there was a sudden and widespread collapse. Its distribution may still be contracting and fragmenting. Direct and indirect impacts on food by a changing fire regime and the grazing of rabbits and livestock, predation by foxes and feral cats and drought in varying combinations are probably responsible for the decline (Woinarski *et al*. 2014). Contraction in its geographic range means it is now only found in a few locations, primarily in Queensland, the Northern Territory and in WA (Dampier Peninsula and Pilbara). The population size is estimated to be fewer than 10,000 mature individuals and is undergoing continuing decline estimated to exceed 10% over the last three generations (12 years) and that is likely to continue (Woinarski *et al*. 2014).

## 2.3. Ecology

Bilbies occupy a variety of habitats that includes Mitchell Grass and stony downs country of cracking clays, the desert sandplains and dune fields sometimes containing laterite, with hummock grassland (Spinifex) and massive red earths with Acacia shrubland (Southgate *et al*. 2007 Van Dyck 2008). Free surface water is not typically available in the Bilby's range; as a result they derive most of their water from food. They are omnivorous and have a diet that consists of insects and their larvae, seeds, fruit and fungi and the proportions of these components in the diet can vary depending on location (Southgate & Carthew 2006).

Bilbies are powerful diggers and can construct burrows systems that may be 3 m long and up to 1.8 m deep but which contain no nest material. The entrance, often against a termite mount, spinifex mound, spinifex tussock or small shrub, is always left open. Bilbies remain in their burrows throughout the day and do not venture out until well after dark (Van Dyck 2008). Bilbies typically use two to three burrows each night and live in small groups of two to four individuals (Lavery & Kirkpatrick 1997).

Diggings, scratchings and burrows of Bilbies can be confused with that of other species, particularly Goannas (Thompson & Thompson 2008). Bilby burrows entrances have been shown to be circular in shape and higher than they are wide, measuring approximately 300 mm high and 250 mm wide, although those in the open are much smaller (Thompson & Thompson 2008). Typically there are up to four burrows in a given area and a pop-hole. Feeding areas are characterised by numerous scattered excavations, up to 25 cm deep, from which the soil has been flung on all sides.

Male Bilbies have been found to have an average home range of 3.16 $km^2$ (Moseby & O'Donnell 2003). They are mostly solitary and typically occur at low densities of $< 1$ $km^2$ and are relatively mobile, moving between a series of scattered burrows that can be more than 1 km apart (Moseby & O'Donnell 2003; Southgate *et al*. 2005). Male Bilbies

can also move up to 5 km between burrows on consecutive nights (Southgate *et al.* 2007). These factors make it difficult to detect their presence i.e. detectability is low for this species.

# 3. Objective

The objective of the survey was to identify signs of the Bilby in the proposed clearing area, which is located along either side of Crab Creek Road, approximately 3 km in length (Figure 1).

# 4. Methods

## 4.1. Conservation Status

The Bilby is listed as vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and as S1 under the Western Australia (WA) *Wildlife Conservation Act 1950* (WC Act).

## 4.2. Database Searches

A search of DPaW's threatened fauna database (10 km radial search) was undertaken in order to see if there were any past records of the Bilby surrounding the Survey Area (DPaW 2016) (Figure 2).

## 4.3. Field Survey

The targeted Bilby survey was undertaken by Laura Stevens[1] on 20 April 2017. The purpose of the field survey was to determine the presence of Bilby burrows in the Survey Area.

The search primarily comprised of walking transects, on both sides of the road along the entire length of the Survey Area. While walking transects, potential Bilby burrows were searched for. This involved searching at the base of vegetation, assessing shape, size, dimensions and depth of any burrows observed, as well as evidence of recent use in terms of movement around the entrance (tracks, scats and spoil heaps). Evidence of Bilby presence throughout the Survey Area, including scats, tracks, and diggings were also searched for while walking transects.

[1] Laura Stevens has several years of experience conducting fauna surveys in northern WA, including targeted surveys for the Bilby. Laura completed the field survey and reporting. The report and documented evidence (e.g. burrow photos) were reviewed by Dr Ron Firth who has >15 year of experience, including in the Crab Creek Road area and with Bilbies.

# 5. Results

## 5.1. Database Searches

The DPaW threatened fauna database search returned 11 records of the Bilby from between 1996 to 2015, with six of these 11 records in the vicinity of the Survey Area (Appendix A and Figure 2).

## 5.2. Field Survey

The entire Survey Area contained suitable Bilby habitat by way of soft red sands, with open Acacia woodland and tussock grasses.

Throughout the Survey Area many burrows were observed, including in areas with more compacted sand, along the edges of the road. The burrows ranged in size and shape; many of which were semi-circular, while others were slightly more spherical in shape. All of the observed borrows measured approximately 10-15 cm in diameter. A number of the burrows were disused as there were no tracks and there was leaf litter at the entrances (Plates 1-3).

Plate 1: Semi-circular burrow

Plate 2: Example of a burrow < 10 cm diameter

Plate 3: Disused burrow

During the survey no Bilby tracks, scats, burrows or individuals were seen. The burrows that were recorded can be attributed to Goannas and Dragons. The larger semi-circular burrows are most likely those of the Sand Goanna (*Varanus gouldii*). Some of the smaller, more spherical burrows are also likely to have been constructed by Dragons (Lizards in the Agamidae family).

Throughout the Survey Area there were also a great number of Goanna tracks. Sand Goannas as well as a number of Dragons (likely those in the genus *Ctenophorus*) were also directly observed, to support the conclusion that the observed burrows were not Bilby burrows.

It is important to note that Bilbies have large home ranges and can have multiple burrows. As stated in Section 2, male Bilbies have an average home range of more than 3 $km^2$, and they move between a series of scattered burrows that can be more than 1 km apart (Moseby & O'Donnell 2003; Southgate *et al*. 2005). Bilbies can move up to 5 km between burrows on consecutive nights (Southgate *et al.* 2007). The DPaW database had 11 records that were either based on night and day sightings, diggings or dead animals and not observed burrows. Therefore burrows could be several kilometres away based on their known movements and consequently the likelihood of Bilby burrows being present in the Survey Area is considered low.

# 6. Summary

In summary, no Bilby burrows were recorded in the survey area despite several records in the wider area from the DPaW threatened fauna database. Please contact Felicity Jones or Laura Stevens on 08 9388 8360 if you require any clarifications going forward.

**For and on behalf of**
**360 Environmental Pty Ltd**

**Felicity Jones**
*Enc:*
*Attachment A DPaW Data*
*Attachment B References*

# FIGURES

FOR INFORMATION ONLY

NORTH

BROOME ROAD

CRAB CREEK ROAD
LOT 594 ON PLAN 71791

PROPOSED AREA TO CLEAR

EXISTING CLEARED AREA

CRAB CREEK ROAD
LOT 539 ON PLAN 73704

PROPOSED AREA TO CLEAR

LOT 501 ON PLAN 403769

LOT 531 ON PLAN 073704

REV 1
29/03/2017

0 50 100 150 200m
1:5000
(FULL SIZE A1)

LEGEND:

- EXISTING CLEARED AREA
- FAUNA SURVEY AREA

Shire of Broome
people • place • prosperity

ENGINEERING
CRAB CREEK ROAD
FAUNA SURVEY AREA
SK-001

422000 424000 426000

8022000

8020000

422000 424000 426000

## Legend

- North Waste Water Treatment Plant (WWTP) Survey Area
- DPaW Bilby Records

- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2016
- LOCALITY MAP SOURCED LANDGATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2013
(© Western Australian Land Information Authority 2015)

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WATER CORPORATION

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

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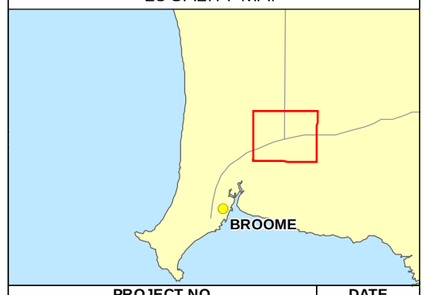
0 75 150 300 450 600 750
Meters
1:15,000 @ A3

LOCALITY MAP




| PROJECT NO | DATE |
|---|---|
| 2219 | 26/04/2017 |

**HORIZONTAL DATUM AND PROJECTION**
GDA 1994 MGA Zone 51

| CREATED | CHECKED | APPROVED | REVISION |
|---|---|---|---|
| MH | LS | LS | 0 |

**Shire of Broome**
**Broome North Waste Water Treatment Plant (WWTP) and Sewer Pipeline**

**Targeted Greater Bilby Survey**

# Figure 2

**WWTP - DPaW Bilby Records**



K:\Projects\1.0 EBS\1810 - Flora and Fauna Survey Broome\Figures\1810 Figure 6a - WWTP Bilby Records.mxd

# APPENDIX A
## DPAW Data

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Macrotis lagotis | TFAUNA | 80560 | 24168 | Peramelida | Macrotis | lagotis | bilby, dalgy | Animalia | VU | MAMMAL | Very certai | Definite sig | 2 | ROEBUCK | Off Broome | 1000 | 122.28360000000 | -17.89310000000 | 4 | 5 | 2015 |
| Macrotis lagotis | TFAUNA | 80491 | 24168 | Peramelida | Macrotis | lagotis | bilby, dalgy | Animalia | VU | MAMMAL | Very certai | Dead | 1 | ROEBUCK | Crab Creek | 1000 | 122.29150000000 | -17.89010000000 | 22 | 1 | 1998 |
| Macrotis lagotis | TFAUNA | 80488 | 24168 | Peramelida | Macrotis | lagotis | bilby, dalgy | Animalia | VU | MAMMAL | Very certai | Night sight | 1 | ROEBUCK | Water Pum | 1000 | 122.27920000000 | -17.89170000000 | 6 | 12 | 2002 |
| Macrotis lagotis | TFAUNA | 80486 | 24168 | Peramelida | Macrotis | lagotis | bilby, dalgy | Animalia | VU | MAMMAL | Very certai | Night sight | 1 | ROEBUCK | Opposite C | 1000 | 122.27920000000 | -17.89170000000 | 12 | 9 | 2002 |
| Macrotis lagotis | TFAUNA | 80458 | 24168 | Peramelida | Macrotis | lagotis | bilby, dalgy | Animalia | VU | MAMMAL | Very certai | Night sight | 1 | BILINGURR | 1 mile on H | 1000 | 122.24310000000 | -17.92160000000 | 3 | 9 | 1996 |
| Macrotis lagotis | TFAUNA | 24726 | 24168 | Peramelida | Macrotis | lagotis | bilby, dalgy | Animalia | VU | MAMMAL | Moderateh | Diggings | 1 | ROEBUCK | Crab Creek | 1000 | 122.28560000000 | -17.89140000000 | 1 | 1 | 2009 |
| Macrotis lagotis | TFAUNA | 24725 | 24168 | Peramelida | Macrotis | lagotis | bilby, dalgy | Animalia | VU | MAMMAL | Moderateh | Diggings | 1 | ROEBUCK | Crab Creek | 1000 | 122.28920000000 | -17.88940000000 | 1 | 1 | 2009 |
| Macrotis lagotis | TFAUNA | 19846 | 24168 | Peramelida | Macrotis | lagotis | bilby, dalgy | Animalia | VU | MAMMAL | Moderateh | Dead | 0 | BILINGURR | 4km North | 1000 | 122.22390000000 | -17.92500000000 | 14 | 5 | 1998 |
| Macrotis lagotis | TFAUNA | 19841 | 24168 | Peramelida | Macrotis | lagotis | bilby, dalgy | Animalia | VU | MAMMAL | Moderateh | Day sightin | 1 | ROEBUCK | Crab Creek | 1000 | 122.27920000000 | -17.89170000000 | 12 | 9 | 2002 |
| Macrotis lagotis | TFAUNA | 1279 | 24168 | Peramelida | Macrotis | lagotis | bilby, dalgy | Animalia | VU | MAMMAL | Very certai | Dead | 1 | ROEBUCK | Crab Creek | 1000 | 122.29190000000 | -17.89160000000 | 22 | 1 | 1998 |

# APPENDIX B
## References

# References

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