



Browse LNG Development A Targeted Bilby (*Macrotis lagotis*) Survey of the Quondong Point area

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A TARGETED BILBY (*MACROTIS LAGOTIS*) SURVEY OF THE QUONDONG POINT AREA



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EXECUTIVE SUMMARY

Woodside Energy Limited is currently leading a Joint Venture in the proposed Browse Liquefied Natural Gas Development. The project will recover natural gas and condensate resources from the Torosa, Brecknock and Calliance fields which are located offshore, 425 kilometres north of Broome, Western Australia. Subject to government approvals, additional appraisal works and further technical studies, Woodside Energy Limited intends to develop the fields through an onshore gas processing facility within a proposed gas processing precinct near James Price Point on the Dampier Peninsula. The proposed Browse LNG Precinct located approximately 60 kilometres north of Broome, Western Australia, has been subject to a Strategic Assessment Report that was released for public comment in December 2010.

ENV.Australia Pty Ltd was commissioned by Sinclair Knight Merz, through a Consolidated Environmental Services partnership on behalf of Woodside in April 2011, to undertake a Level 2, targeted Bilby (*Macrotis lagotis*) survey. This survey was conducted in order to fulfil a strategic assessment report commitment to confirm the presence or absence of a population of Bilby in the Quondong Point area. The Bilby is a threatened species and listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and is listed as Schedule 1 (Fauna that is rare or likely to become extinct) under the *Wildlife Conservation (Specially Protected Fauna) Notice 2010*.

This report focuses on the results of the survey at Quondong Point area as requested by Sinclair Knight Merz. Other relevant environmental studies have been completed in the James Price Point coastal area in relation to the Browse LNG Development. A consolidated assessment report of relevant studies that will more fully detail the status of Bilbies in the Browse LNG Precinct area, based on available information with reference to existing literature, is being developed by Sinclair Knight Merz for Woodside.

The field survey was conducted from the 26 May to 2 June 2011. The survey included five trapping transects, with each transect consisting of 20 cage traps spaced approximately 50 metres (m) apart (each transect was approximately 950 m long). Total trap effort for the survey was 440 trap nights. During the survey a total of 18 km of walked transects were conducted during daylight to search for signs of the Bilby (burrows, tracks and scats) and two motion sensitive cameras were placed at two potential burrow locations. Total camera trap effort for the survey was eight camera trap nights. Potential burrows were classified as likely, possible and unlikely to have been dug by Bilbies.

No Bilbies were caught in the traps or recorded by the motion sensitive cameras. However, twelve potential Bilby burrows were recorded. One burrow is almost certainly a Bilby burrow and the remaining eleven burrows are considered to be possible Bilby burrows, but these were degraded in appearance and therefore were unable to be positively identified. The main Bilby burrow system consisted of two entrances and one pop hole. The Bilby is the only known species in the area that would dig such a large, cylindrical pop hole. This Bilby burrow system was confirmed by a Bilby expert who has extensively undertaken and published Bilby research.

1 INTRODUCTION

1.1 THE PROJECT

Woodside Energy Limited (Woodside) is currently leading a Joint Venture in the proposed Browse Liquefied Natural Gas (LNG) Development. The project will recover natural gas and condensate resources from the Torosa, Brecknock and Calliance fields which are located offshore, 425 kilometres (km) north of Broome, Western Australia (WA). Subject to government approvals, additional appraisal works and further technical studies, Woodside intends to develop the fields through an onshore gas processing facility within a proposed gas processing precinct near James Price Point on the Dampier Peninsula. The Browse LNG Precinct located approximately 60 km north of Broome, WA and has been subject to a Strategic Assessment Report (SAR) that was released for public comment in December 2010.

1.1.1 Objectives

ENV.Australia Pty Ltd (ENV) was commissioned by Sinclair Knight Merz (SKM) through a Consolidated Environmental Services (CES) partnership on behalf of Woodside in April 2011 to undertake a Level 2 targeted Bilby (*Macrotis lagotis*) survey of the Quondong Point area (the Study area). This survey was conducted to fulfil a Browse LNG precinct SAR commitment to undertake targeted Bilby surveys to confirm the presence or absence of a population.

This report focuses on the results of the survey at the Quondong Point area as requested by SKM. Other environmental studies that relate to Bilbies have been completed in the James Price Point area in relation to the Browse LNG Development. A consolidated assessment report of relevant studies that will more fully detail the status of Bilby in the Browse LNG Precinct area based on available information with reference to existing literature is being developed by Sinclair Knight Merz for Woodside.

The survey included a desktop review and field survey comprising a:

- review of relevant fauna databases and literature to collate historical records of the Bilby for the region;
- broad habitat assessment of the study area;
- series of transects through the study area; and
- trapping programme.

1.1.2 Summary of Bilby Taxonomy, Conservation Status, Threats and Ecology

The Bilby (*Macrotis lagotis*) belongs to the Family Thylacomyidae, in the Order Peramelemorphia, and belongs to the Subclass Marsupialia (Marsupials) in the Class Mammalia (Mammals).

The Bilby is a threatened species and listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and is listed as Schedule 1 (Fauna that is rare or likely to become extinct) under the *Wildlife Conservation (Specially Protected Fauna) Notice 2010*. The listing is primarily as a result of the decline in distribution since European settlement.

The Bilby once occurred throughout most of the arid and semi-arid regions of the Australian mainland, south of about latitude 18°S (Johnson 2008; Friend *et al.* 2008). The Bilby's range has significantly contracted since European settlement and it now remains patchily distributed through the Tanami desert in the Northern Territory (NT) west to Broome and south to Warburton in WA. There are isolated populations north of Birdsville in south-western Queensland and north-east of Alice Springs in the NT (Johnson 2008).

The Bilby was common throughout most of its range until the early 1900s when there was a sudden and widespread collapse (Abbott 2001, Johnson 2008). This collapse and range contraction has been attributed to predation from cats and foxes, habitat destruction from introduced herbivores and changed fire regimes. Feral cats have been attributed to the reduced success of reintroduced populations (Pavey 2006).

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, Johnson 2008). Free surface water is not typically available in the Bilbies 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 and Carthew 2006).

Bilbies are powerful diggers and can construct burrows systems that may be 3 m long and up to 1.8 m deep (Johnson 2008). Bilbies are mostly solitary and typically occur at low densities of < 1 km² and are relatively mobile, moving between scattered burrows that can be more than 1 km apart (Moseby and 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). The entire population size of the Bilby has been estimated at 10,000 individuals (Friend *et al.* 2008).

1.1.3 Location

The study area is located approximately 60 km north of Broome on the Dampier Peninsula (Figure 1).

1.1.4 Climate

The nearest accessible climate data to the study area is available from the Bureau of Meteorology (BoM) Broome Airport weather station located approximately 60 km south of the study area. Climate in this region is characterised by two distinct seasons, a wet season (December to March) when approximately 80% of the rainfall occurs, and a dry season (between April to November) characterised by little to no rain.

Maximum and minimum temperatures as well as rainfall, during survey period can be seen in Table 1. Minimum temperatures during the survey were somewhat cooler than the long term May average of 18.2 °C (1939-2011) and this was also the case for maximum temperatures (long term May average [1939-2011] of 31.5) (Table 1).

Table 1. Daily temperatures and rainfall from the Broome Airport for the days on which the survey was undertaken (BoM 2011).

Date	27/05/2011	28/05/2011	29/05/2011	30/05/2011	31/05/2011	1/06/2011	2/06/2011
Max Temp (°C)	28.9	29.2	30.4	30.6	30.5	30.5	30.1
Min Temp (°C)	12.2	10.8	12	11.2	13.7	12.7	12.6
Rainfall (mm)	0	0	0	0	0	0	0

1.1.5 Interim Biogeographic Regionalisation for Australia

The Interim Biogeographic Regionalisation for Australia (IBRA) divides Australia into 85 bioregions based on major biological and geographical/geological attributes (Thackway and Cresswell 1995). These bioregions are subdivided into 403 subregions, as part of a refinement of the IBRA framework (DSEWPac) (2011a).

The study area is located in the Pindanland subregion (DL2) of the Dampierland bioregion (Thackway and Cresswell 1995). Graham (2001) describes the subregion as comprising three basic components, these are:

- Quaternary sandplain overlying Jurassic and Mesozoic sandstones with Pindan, often with hummock grasslands on hills;
- Quaternary marine deposits on coastal plains, with mangal, samphire – *Sporobolus* sp. grasslands, *Melaleuca alsophila* low forests, and *Spinifex* sp. – *Crotalaria* sp. strand communities;
- Quaternary alluvial plains associated with the Permian and Mesozoic sediments of Fitzroy Trough support tree savannahs of ribbon grass (*Chrysopogon* sp.) – bluegrass (*Dichanthium* sp.) grasses with scattered coolabah (*Eucalyptus microtheca*) – *Bauhinia cunninghamii*. There are riparian forests of river red gum (*Eucalyptus camaldulensis*) and Cajuput (*Melaleuca* sp.) fringe drainages.

2 METHODS

2.1 BACKGROUND TO SURVEY METHODS

2.1.1 Protection of Fauna and Fauna Habitat

Fauna, habitat, and faunal ecological communities are protected formally and informally by various legislative and non-legislative measures, which are outlined below. Species listed under these acts and other non-legislative measures are considered 'conservation significant' in this assessment.

Legislative Protection

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Western Australia *Wildlife Conservation Act 1950* (WC Act).
- Western Australia *Environmental Protection Act 1986* (EP Act).

Non-Legislative Protection

- Western Australian DEC Priority lists.
- Informal recognition of fauna of interest.

A short description of these legislative and non-legislative measures is given below, and definitions of the species conservation codes and ecological community categories they use, and those used by the DEC, are provided in Appendix A.

Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act aims to protect matters of national environmental significance. Under the EPBC Act, the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) lists protected species and Threatened Ecological Communities (TECs) by criteria set out in the Act. Species are considered to be conservation significant if they are listed as Threatened (i.e. Critically Endangered, Endangered or Vulnerable), or Migratory.

Wildlife Conservation Act 1950

The DEC, lists taxa under the provisions of the WC Act as protected and are classified as Schedule 1 to Schedule 4 according to their need for protection (Appendix A). The Act makes it an offence to 'take' threatened species without an appropriate licence. There are financial penalties for contravening the WC Act.

Environmental Protection Act 1986

Significant habitat necessary for the maintenance of fauna indigenous to Western Australia as well as TECs are given special consideration in environmental impact assessment, and areas covered by TECs have special status as Environmentally Sensitive Areas (ESAs) under the EP Act, and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

DEC Priority Lists

The DEC produces a list of Priority species that have not been assigned statutory protection under the WC Act. Priority Fauna are under consideration as 'Scheduled' fauna, but are in urgent need for further survey or require regular monitoring, and although not currently threatened may become so in the future (Appendix A).

In addition, the DEC maintains a list of Priority Ecological Communities which identifies those communities that need further investigation before possible nomination for TEC status.

Although DEC Priority species and communities have no formal legal protection, they are under consideration as 'Scheduled' taxa under the WC Act or as ESAs under the EP Act.

Informal Recognition of Threatened Fauna

Certain populations or communities may be of local significance or interest because of their patterns of distribution and abundance. For example, fauna may be locally significant because they are range extensions to the previously known distribution or are newly discovered taxa and therefore have the potential to be listed as Threatened in the future. In addition, many species are in decline as a result of threatening processes, and relict populations of such species may assume local importance.

2.1.2 EPA Requirements for Fauna Surveys

The survey was carried out in a manner compliant with the EPA requirements for the environmental surveying and reporting of fauna surveys in Western Australia, as documented in;

- *Terrestrial Biological Surveys as an Element of Biodiversity Protection. Position Statement No. 3* (EPA 2002).
- *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia. Guidance Statement No. 56* (EPA 2004).
- *Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA-DEC 2010).

There are two levels of fauna survey as delineated by the EPA:

- *Level One:* Desktop study to collate historical knowledge, in conjunction with a reconnaissance survey (site inspection).
- *Level Two:* Trapping and opportunistic field survey to characterise the fauna present, combined with a Level One survey. Where the scale and nature of the proposed impact is moderate to high, a Level Two survey will be required in most areas of the State and is typically required for resource development projects.

2.1.3 Desktop Review

A desktop review of historical records and past surveys undertaken in the study area has been compiled. The database review included the following;

- Commonwealth Department of Sustainability, Environment, Water, Population and Communities protected Matters Search Tool (DSEWPaC 2011b) circle search around the point 122°13' 40 " E, and 17°30' 55" S with a 10 km buffer;
- DEC Threatened fauna database search (DEC 2011a) rectangle search from 122°09' 26" E, 122°35' 20" E, 17°36' 47" S, 18°09' 48" S; and
- NatureMap database search (DEC 2011b) circle search around the point 122°13' 40 " E, and 17°30' 55" S with a 30 km buffer.

The DEC Threatened fauna database search indicated the location and date of three previous Bilby records in the vicinity of the study area (Table 2). All of these records were more than 40 km from the study area.

Table 2: Bilby records from the DEC Threatened Fauna Database

Location	Year of Record
Dampier Peninsula	1965
6 miles East of Broome at old Main Roads camp near Water Supply Reserve.	1970
Crab Creek Road	1998

2.1.4 Recent Fauna Surveys of the Quondong Point Area

ENV undertook a dry season Level 2 survey in 2008, but no signs of Bilby were recorded (ENV 2008).

AECOM Australia undertook a Level 2 dry season survey in 2009 and recorded potential foraging diggings of the Bilby (AECOM 2010).

Co-ordinates for several potential Bilby burrows were provided to ENV by Woodside prior to the survey.

2.1.5 Trapping Programme

The field survey was conducted from the 26 May to 2 June 2011. The trapping programme consisted of cage traps (five transects) mostly set in a linear formation (Transect 5 was set in the form of a right angle) (Figure 1). Each transect consisted of 20 cage traps spaced approximately 50 m apart (each transect was approximately 950 m long). Transects 1 and 2 were set for five nights, Transects 3 and 4 were set for four nights and Transect 5 was set for three nights. Trap effort was 440 trap nights. Cage traps were baited with a mixture of oats, water, peanut butter, sardines and re-baited every second day. Traps were checked each morning at, or around dawn. Areas where possible previous signs of the Bilby were recorded in the Quondong Point Area were also searched. The co-ordinates for the beginning and end of each transect are located in Appendix B.

2.1.6 Walked Transects

Focussing on the Quondong Point area, a series of 90 transects, each 200 m in length, were traversed on foot (18 km were walked in total) during the day and searches for signs of Bilby activity (tracks, diggings, burrows and scats) was conducted (Figure 2). The beginning and end of each transect location was recorded using a Garmin 62s GPS. Each transect west of Manari road was spaced approximately 10 m from the previous transect. The co-ordinates for each transect are provided in Appendix C. Any potential burrows that were located were classified in relation to their likelihood (Likely, Possible or Unlikely) to have been constructed by Bilbies (Appendix D). Definitions of the Bilby burrow likelihood are described below.

Likely: Burrow occurs within the known range of the Bilby and shape and size of burrow entrance (and pop holes if located) is consistent with a Bilby. Or there are Bilby tracks in close proximity to the burrow and the burrow is not degraded or old and not partially collapsed or covered with leaf litter. Or a recognised Bilby expert has seen the burrow or photos and confirms that it is consistent with a burrow constructed by a Bilby.

Possible: Burrow occurs within the known range of the Bilby and shape and size of burrow entrance (and pop holes if located) is consistent with a Bilby, though it may be degraded to some extent.

Unlikely: Burrow occurs within the known range of the Bilby and the shape and size of burrow entrance is somewhat consistent with a Bilby; however it is too degraded to assign with any certainty.

2.1.7 Motion Sensitive Cameras

Two Moultrie Game Spy D-55IR Digital Game Cameras Motion sensitive cameras were established at three locations. Two of these were located at sites of previously recorded burrows (that were recorded by a Woodside Site Representative and provided to ENV in 2011) for a total of three nights each, and one at a burrow system recorded during this survey

(BilbyDig9 – Figure 3) for a total of two nights. Total camera trap effort for the survey was eight camera trap nights. The same bait used in the cage traps was placed in the field of view of the cameras as an attractant.

2.1.8 Habitat Assessment

A very broad and general habitat assessment was undertaken in the areas surveyed. This only included a cursory assessment of the suitability of the substrate for foraging in and constructing burrows as this is one of the major ecological requirements that determine the species distribution.

2.1.9 Permits

Fauna was trapped and collected in accordance with DEC Permit SF008044 issued to Dr Ron Firth (ENV).

3 RESULTS

3.1 VARIABLES INFLUENCING THE SURVEY

It is important to note that the variables associated with individual surveys, which are often difficult to predict, as is the extent to which they influence survey outcomes. Survey variables of the fauna survey are detailed in Table 3.

Table 3: Variables Associated with the Survey

Variable	Impact on Survey Outcomes
Access	There were no access restrictions while surveying the Quondong Point area.
Experience levels	<p>The scientists who conducted these surveys were practitioners suitably qualified in their respective fields:</p> <ul style="list-style-type: none"> • Co-ordinating Zoologist: Dr Ronald Firth (Principal Zoologist); • Field Staff: Dr Ronald Firth, Matthew Love and James Sansom;
Timing, weather, season.	<p>The Bilby does not undertake seasonal periods of inactivity or torpor, as such targeted trapping surveys can be conducted throughout the year.</p> <p>The rainfall for the three months preceding the survey (February to April 2011) was 380.8 mm, which is above the long term average of 306.6 mm for the same period (BoM 2011). Conditions were considered favourable for Bilby surveys, particularly looking for signs (tracks and burrows) as it was the dry season, as such there was no rain to wash away tracks or degrade recently constructed burrows.</p>
Sources of information	At the bioregion level, the Kimberley of Western Australia has been the subject of limited targeted biological surveys. Those that have occurred have been primarily for the resource development sector such as, the Ord Irrigation Scheme and the Browse LNG Development. Site-specific data is limited, but this is not considered a limiting factor for this survey.
Completeness	The field survey was conducted from the 26 May to 2 June 2011 in the Quondong Point area. The survey included five trapping transects, with each transect consisting of 20 cage traps spaced approximately 50 metres (m) apart (each transect was approximately 950 m long). Total trap effort for the survey was 440 trap nights. During the survey 18 km of walked transects were conducted during daylight to search for signs of the Bilby (burrows, tracks and scats) and two motion sensitive cameras were placed at potential burrow locations. Total camera trap effort for the survey was eight camera trap nights. Potential burrows were classified as likely, possible and unlikely to have been produced by Bilbies.

Variable	Impact on Survey Outcomes
	<p>Nocturnal searches on foot and from vehicles were not undertaken due to Woodside health and safety requirements for the survey.</p> <p>The Quondong Point area was adequately assessed for Bilbies during the survey.</p>

3.2 TRAPPING RESULTS

No Bilbies were captured during the survey. The only vertebrate species captured was one individual Pale Field Rat (*Rattus tunneyi*).

3.3 WALKED TRANSECTS AND BILBY BURROWS

Twelve potential Bilby burrows were recorded during the survey. These potential Bilby burrows were ranked according to their likelihood of being constructed by Bilbies (Appendix D). Eleven of the burrows recorded during this survey were considered to be possible Bilby burrows (Appendix D).

One new burrow system that was observed (BILBYDIG9 – Figure 3, Appendix D) was almost certainly produced by a Bilby (classified as likely). This burrow system consisted of two entrances and one pop hole. A pop hole is an exit hole that has no spoil (soil digging piles) on the surface because it has been dug from beneath the soil surface (Appendix E). The two entrances were approximately 1 m apart and the pop hole was approximately 1.2 m from the entrances. The cylindrical pop hole had a diameter of 8 cm (Appendix E). The burrow and pop hole were clear of debris and had not collapsed. The spoil from the burrows had not weathered (not flattened out) and there was no leaf litter covering the burrows, pop hole and spoil. All of this suggests that the burrow system had been constructed after the wet season because rain would tend to wash away and flatten out the spoil. Therefore, the burrow system was probably no more than two months old. However, no signs (tracks or scats) could be seen around the burrow system, suggesting that it had probably not been used in recent weeks.

There are no other species in the area that would dig such a large cylindrical pop hole. Photographic evidence of this was confirmed by Dr Richard Southgate, who has extensively undertaken and published research on the Bilby, who confirmed that the size of the pop hole was consistent with that of a Bilby.

3.4 MOTION SENSITIVE CAMERAS

No images of Bilbies or other vertebrate fauna were captured by the motion sensitive cameras.

3.5 HABITAT ASSESSMENT

All of the areas traversed during this survey had suitable substrate for Bilbies to forage and burrow. The vegetation of the area consisted of Pindan Woodland and the substrate was comprised of pindan red earths which are quite sandy and highly suitable for burrowing species such as the Bilby.

4 DISCUSSION

Possible signs of the Bilby, primarily foraging diggings and burrows have been recorded during several recent surveys in the James Price Point and Quondong Point areas (AECOM 2010). During this survey, several possible burrow entrances were recorded and one burrow system (BilbyDig 9) is almost certainly a result of Bilby activity. This burrow system consisted of two entrances and one pop hole. There are no other species in the area that would dig such a large cylindrical pop hole. This burrow system was confirmed by a recognised Bilby expert (Dr Richard Southgate). Furthermore, there are historical records of the Bilby in the general area.

The study area is located on the Dampier Peninsula which is in the current known distribution of the Bilby (Johnson 2008). Given the recent likely and possible signs from previous surveys and the burrow system recorded during this survey, there have almost certainly been individuals and possibly a population utilising areas within the Quondong Point area in 2011.

A previous report (AECOM 2010) suggested that if the Bilby occurs in the study area it would probably only occur as a few vagrant individuals rather than a resident colony. There is no evidence at this stage to support this conclusion. In order for this conclusion to be drawn, a long term capture-mark-recapture monitoring program and radio-tracking of individuals to record movements within and outside of the study area would be required.

Bilbies are mostly solitary and typically occur at densities less than 1 per km² and are relatively mobile, moving between scattered burrows that can be more than 1 km apart (Moseby and 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). Therefore, detecting burrows, particularly active burrows that can be some distance apart using foot transect traverses is reasonably difficult. It is also important to note that although trapping is a valid survey technique to employ surveying for Bilbies, they are reluctant to enter free standing baited traps (Southgate *et al.* 1995). Therefore a combination of foot traverse, camera trapping and cage trapping methods can be useful for assessing Bilbies.

Future surveys should employ systematic methods that have recently been developed by Moseby *et al.* (2009) so that survey effort, techniques, repeatability and the data obtained are comparable across different surveys and regions and are unbiased. This systematic method is based on a track based monitoring protocol whereby survey effort and the survey metrics used are standardised.

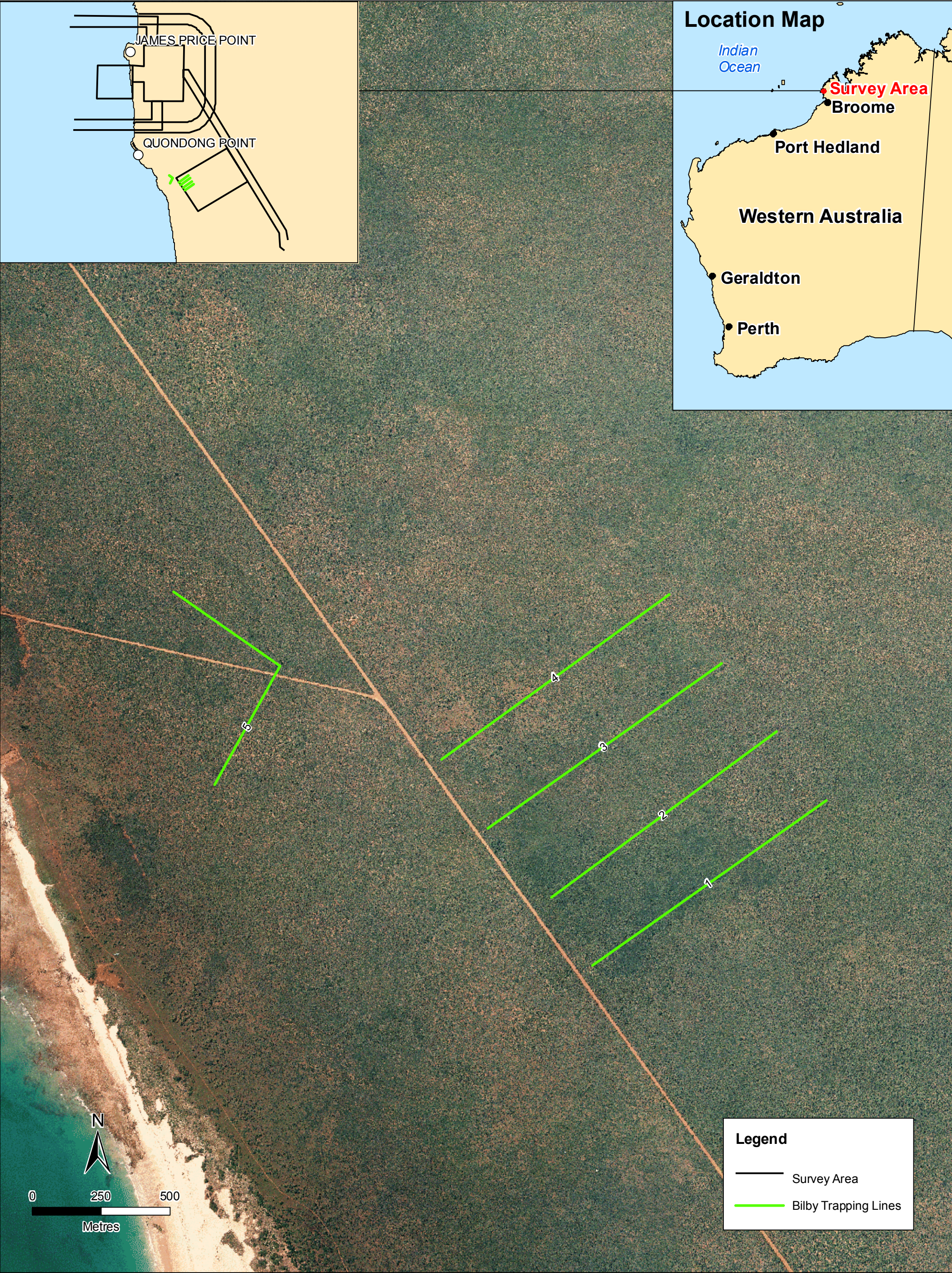
Longer term monitoring programs should also be considered as they would provide a better understanding of Bilby utilisation of the broader area utilising capture-mark-recapture and radio-tracking to monitor individuals and populations of the Bilby.

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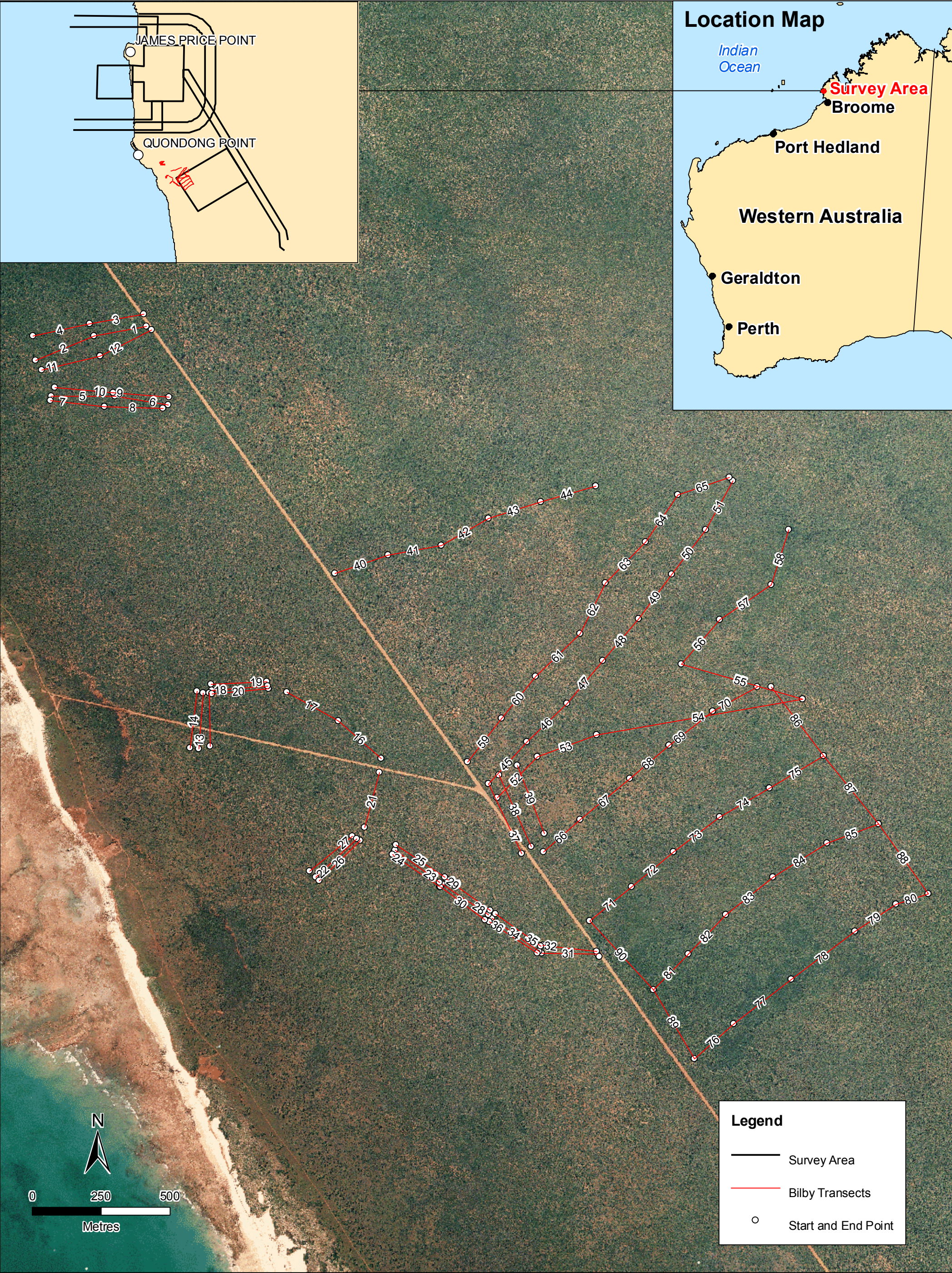
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FIGURES



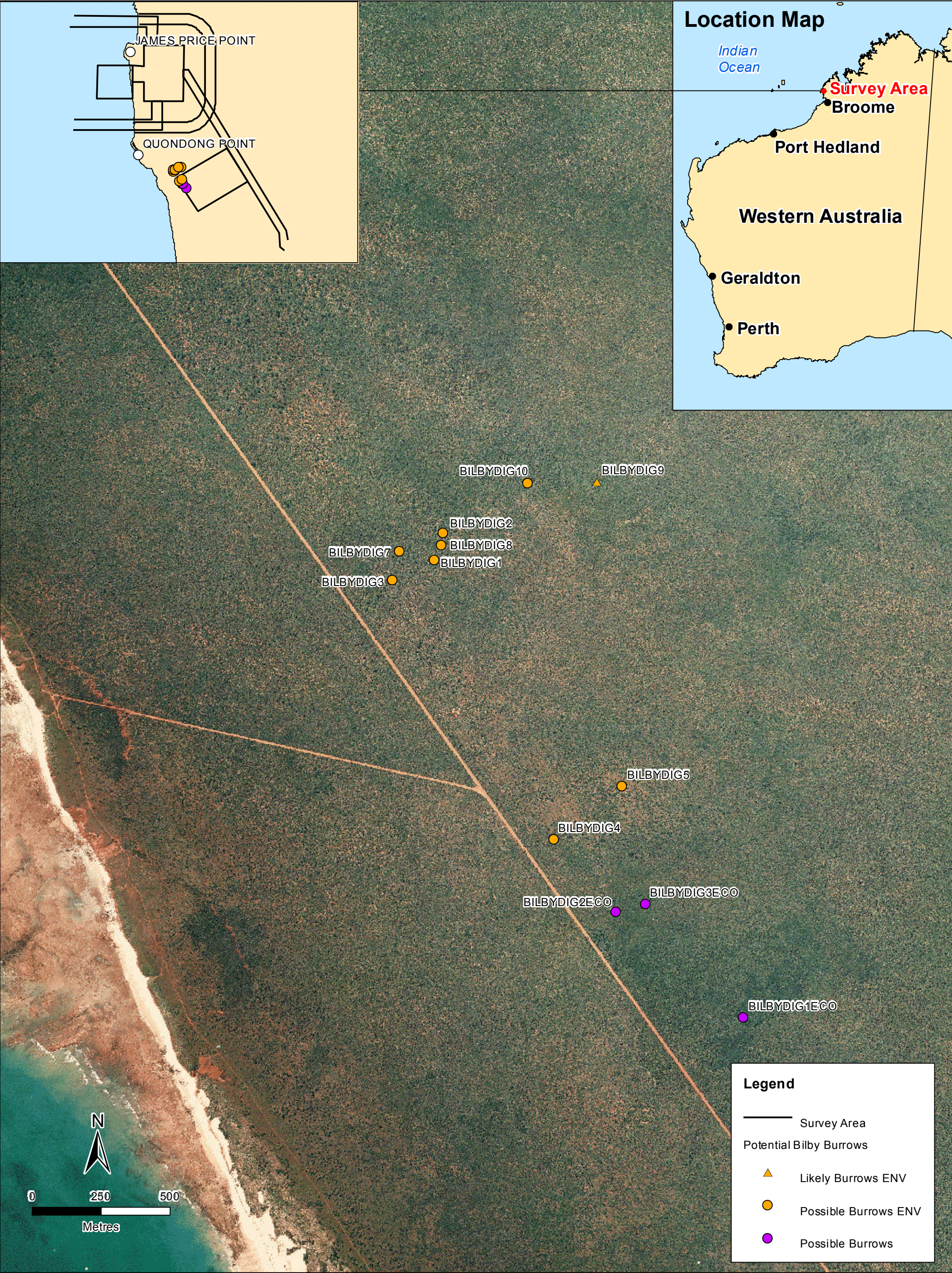
CLIENT	SKM	JOB NO.
AUTHOR	R. Firth	DATE
SCALE	1:12,500 @ A3	26-07-2011
DRAWN	S. Rho	PROJECTION
	GDA 94 MGA 51	

Bilby Trapping Lines
Quondong Point Area Bilby Survey



CLIENT	SKM	JOB NO.
AUTHOR	R. Firth	DATE
SCALE	1:12,500 @ A3	26-07-2011
DRAWN	S. Rho	PROJECTION
	GDA 94 MGA 51	

Bilby Transects
Quondong Point Area Bilby Survey



CLIENT	SKM	JOB NO.	J100507
AUTHOR	R. Firth	DRAWN	M. Mikkonen
SCALE	1:12,500 @ A3	DATE	04-11-2011
		PROJECTION	GDA 94 MGA 51

Potential Bilby Burrows
Quondong Point Area Bilby Survey

APPENDIX A

DEFINITIONS OF CONSERVATION CODES FOR FAUNA OF CONSERVATION SIGNIFICANCE

APPENDIX A

DEFINITIONS OF CONSERVATION CODES FOR FAUNA OF CONSERVATION SIGNIFICANCE

A1: Environment Protection and Biodiversity Conservation Act 1999 (Cth): Threatened Species and Threatened Ecological Communities Codes

The *EPBC Act* prescribes seven matters of national environmental significance:-

- World Heritage properties;
- National Heritage places;
- Wetlands of international importance;
- Threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas; and
- Nuclear actions (including uranium mining).

Species in the categories ExW, CE, E, V and M (see below), and Threatened Ecological Communities in the CE and E categories are protected as matters of national environmental significance under the *EPBC Act*.

Category	Code	Category
Extinct	Ex	Taxa for which there is no reasonable doubt that the last member of the species has died.
Extinct in the Wild	ExW	Taxa known to survive only in cultivation, in captivity or as a naturalised population well outside its past range; or not recorded in its known and/or expected habitat at appropriate seasons anywhere in its past range despite exhaustive surveys over a timeframe appropriate to its life cycle and form.
Critically Endangered	CE	Taxa facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	E	Taxa not critically endangered and facing a very high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Vulnerable	V	Taxa not critically endangered or endangered and facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Conservation Dependent	CD	Taxa which are the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within five years.

Category	Code	Category
Migratory	Mi	<p>Taxa that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations, that are included in an international agreement approved by the Minister for the Environment, Heritage and the Arts and that have been placed on the national List of Migratory Species under the provisions of the EPBC Act. At present there are four such agreements:</p> <ul style="list-style-type: none"> the Bonn Convention the China-Australia Migratory Bird Agreement (CAMBA) the Japan-Australia Migratory Bird Agreement (JAMBA) the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)
Marine	Ma	<p>Taxa protected in a Commonwealth Marine Protected Area by virtue of section 248 of the <i>EPBC Act</i>. These taxa include certain seals, crocodiles, turtles and birds, as well as various marine fish.</p> <p>Commonwealth marine areas are matters of national environmental significance under the <i>EPBC Act</i>.</p> <p>An action will require approval if the:</p> <ul style="list-style-type: none"> action is taken in a Commonwealth marine area and the action has, will have, or is likely to have a significant impact on the environment, or action is taken outside a Commonwealth marine area and the action has, will have, or is likely to have a significant impact on the environment in a Commonwealth marine area¹ <p>The Commonwealth marine area is any part of the sea, including the waters, seabed, and airspace, within Australia's exclusive economic zone and/or over the continental shelf of Australia, that is not State or Northern Territory waters.</p> <p>The Commonwealth marine area stretches from 3 to 200 nautical miles (approximately 5-370 km) from the coast. Marine protected areas are marine areas which are recognised to have high conservation value.</p>

A2: Western Australian Threatened Fauna Categories

Wildlife Conservation Act 1950 (WA)

Category	Code	Description
Schedule 1	S1	Rare or likely to become extinct.
Schedule 2	S2	Presumed extinct.
Schedule 3	S3	Birds subject to an agreement between the governments of Australia and Japan, the People's Republic of China & the Republic of Korea relating to the protection of migratory birds and birds in danger of extinction.
Schedule 4	S4	Other specially protected fauna.

A3: Department of Environment and Conservation Fauna Priority Codes

Category	Code	Description
Priority 1	P1	Taxa with few, poorly known populations on threatened lands.
Priority 2	P2	Taxa with few, poorly known populations on conservation lands.
Priority 3	P3	Taxa with several, poorly known populations, some on conservation lands.
Priority 4	P4	Taxa in need of monitoring: not currently threatened or in need of special protection, but could become so. Usually represented on conservation lands.
Priority 5	P5	Taxa in need of monitoring: not considered threatened, but the subject of a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

A4: IUCN Redlist Conservation Fauna Codes

Category	Code	Description
Extinct	EX	Taxa for which there is no reasonable doubt that the last individual has died.
Extinct in the Wild	EW	Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range and it has not been recorded in known or expected habitat despite exhaustive survey over a time frame appropriate to its life cycle and form.
Critically Endangered	CR	Taxa facing an extremely high risk of extinction in the wild.
Endangered	EN	Taxa facing a very high risk of extinction in the wild.
Vulnerable	VU	Taxa facing high risk of extinction in the wild
Near Threatened	NT	Taxa which has been evaluated but does not qualify for CR, EN, or VU now but is close to qualifying or likely to qualify in the near future.
Least Concern	LC	Taxa which has been evaluated but does not qualify for CR, EN, VU, or NT but is likely to qualify for NT in the near future.
Data Deficient	DD	Taxa for which there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status.

APPENDIX B

LOCATIONS OF BILBY TRAP LINES

APPENDIX B

LOCATION OF BILBY TRAP LINES

Transect	Zone	Start Easting	Start Northing	Middle Easting	Middle Northing	End Easting	End Northing
1	51K	414250	8053549			415100	8054149
2	51K	414100	8053799			414920	8054400
3	51K	413870	8054050			414720	8054650
4	51K	413700	8054300			414530	8054900
5	51K	413500	8054549	413112	8054640	414390	8055650

Australian Geocentric 1994 (GDA94) Zone 51K

APPENDIX C

LOCATIONS OF BILBY TRANSECTS

APPENDIX C

LOCATION OF BILBY TRANSECTS

Transect	Zone	Start Easting	Start Northing	End Easting	End Northing
1	51K	412258	8056210	412067	8056176
2	51K	412067	8056176	411854	8056088
3	51K	412247	8056254	412052	8056220
4	51K	412052	8056220	411843	8056176
5	51K	411911	8055956	412144	8055957
6	51K	412144	8055957	412336	8055926
7	51K	411907	8055941	412105	8055920
8	51K	412105	8055920	412316	8055911
9	51K	412338	8055953	412135	8055970
10	51K	412135	8055970	411924	8055990
11	51K	412089	8056104	411875	8056053
12	51K	412275	8056197	412089	8056104
13	51K	412463	8054877	412446	8054675
14	51K	412441	8054883	412416	8054679
15	51K	412484	8054877	412487	8054683
16	51K	413112	8054640	412954	8054777

Transect	Zone	Start Easting	Start Northing	End Easting	End Northing
17	51K	412954	8054777	412768	8054880
18	51K	412699	8054903	412494	8054888
19	51K	412493	8054908	412696	8054920
20	51K	412494	8054875	412701	8054895
21	51K	413103	8054589	413051	8054390
22	51K	413022	8054348	412874	8054207
23	51K	413323	8054190	413160	8054305
24	51K	413153	8054289	413324	8054172
25	51K	413343	8054208	413166	8054324
26	51K	412885	8054196	413033	8054341
27	51K	412852	8054229	413005	8054358
28	51K	413500	8054071	413333	8054183
29	51K	413508	8054087	413349	8054203
30	51K	413487	8054051	413325	8054174
31	51K	413897	8053928	413696	8053933
32	51K	413894	8053939	413697	8053960
33	51K	413904	8053920	413904	8053920
34	51K	413685	8053939	413514	8054058

Transect	Zone	Start Easting	Start Northing	End Easting	End Northing
35	51K	413692	8053956	413525	8054073
36	51K	413680	8053933	413505	8054046
37	51K	413622	8054293	413500	8054549
38	51K	413538	8054578	413657	8054320
39	51K	413605	8054614	413703	8054368
40	51K	412941	8055313	413136	8055380
41	51K	413136	8055380	413331	8055413
42	51K	413331	8055413	413502	8055514
43	51K	413502	8055514	413693	8055574
44	51K	413693	8055574	413892	8055629
45	51K	413500	8054549	413642	8054700
46	51K	413642	8054700	413786	8054841
47	51K	413786	8054841	413917	8054995
48	51K	413917	8054995	414048	8055149
49	51K	414048	8055149	414168	8055309
50	51K	414168	8055309	414291	8055471
51	51K	414291	8055471	414390	8055650
52	51K	413532	8054496	413679	8054645

Transect	Zone	Start Easting	Start Northing	End Easting	End Northing
53	51K	413679	8054645	413896	8054724
54	51K	413896	8054724	414645	8054856
55	51K	414645	8054856	414202	8054981
56	51K	414202	8054981	414343	8055143
57	51K	414343	8055143	414529	8055270
58	51K	414529	8055270	414592	8055470
59	51K	413424	8054627	413548	8054785
60	51K	413548	8054785	413674	8054938
61	51K	413674	8054938	413835	8055093
62	51K	413835	8055093	413928	8055278
63	51K	413928	8055278	414073	8055428
64	51K	414073	8055428	414189	8055597
65	51K	414189	8055597	414376	8055663
66	51K	413700	8054300	413836	8054416
67	51K	413836	8054416	414015	8054565
68	51K	414015	8054565	414158	8054688
69	51K	414158	8054688	414316	8054811
70	51K	414316	8054811	414480	8054901

Transect	Zone	Start Easting	Start Northing	End Easting	End Northing
71	51K	413870	8054050	414023	8054172
72	51K	414023	8054172	414174	8054301
73	51K	414174	8054301	414343	8054427
74	51K	414343	8054427	414523	8054532
75	51K	414523	8054532	414720	8054650
76	51K	414250	8053549	414392	8053676
77	51K	414392	8053676	414603	8053835
78	51K	414603	8053835	414835	8054010
79	51K	414835	8054010	414985	8054109
80	51K	414985	8054109	415100	8054149
81	51K	414100	8053799	414228	8053928
82	51K	414228	8053928	414364	8054070
83	51K	414364	8054070	414537	8054207
84	51K	414537	8054207	414734	8054333
85	51K	414734	8054333	414920	8054400
86	51K	414530	8054900	414720	8054650
87	51K	414720	8054650	414920	8054400
88	51K	414920	8054400	415100	8054149

Transect	Zone	Start Easting	Start Northing	End Easting	End Northing
89	51K	414250	8053549	414100	8053799
90	51K	414100	8053799	413870	8054050

Australian Geocentric 1994 (GDA94) Zone 51K

APPENDIX D

LOCATION AND LIKELIHOOD OF BILBY BURROWS

APPENDIX D

LOCATION AND LIKELIHOOD OF BILBY BURROWS

	Easting [#]	Northing [#]	Burrow likelihood
BILBYDIG1ECO	414428	8053698	Possible
BILBYDIG2ECO	413966	8054082	Possible
BILBYDIG3ECO	414071	8054110	Possible
BILBYDIG1	413303	8055360	Possible
BILBYDIG2	413337	8055459	Possible
BILBYDIG3	413152	8055288	Possible
BILBYDIG4	413739	8054345	Possible
BILBYDIG5	413987	8054539	Possible
BILBYDIG7	413177	8055392	Possible
BILBYDIG8	413331	8055413	Possible
BILBYDIG9	413895	8055646	Likely
BILBYDIG10	413645	8055640	Possible

[#]Australian Geocentric 1994 (GDA94) Zone 51K

APPENDIX E

PLATES

APPENDIX E PLATES



Plate 1. Bilby burrow system (BilbyDig9) and co-ordinates (GDA94 Zone 51 413895mE, 8055646mN).



Plate 2. Bilby pop hole (BilbyDig9) and co-ordinates (GDA94 Zone 51 413895mE, 8055646mN).



Plate 3. Possible Bilby Burrow (BilbyDig2) and co-ordinates (GDA94 Zone 51 413337mE, 8055459mN).



Plate 4. Conducting Transect



Plate 5. Possible Bilby Burrow (BilbyDig4) and co-ordinates (GDA94 Zone 51 413739mE, 8054345mN)



Plate 6. Possible Bilby Burrow (BilbyDig5) and co-ordinates (GDA94 Zone 51 413987mE, 8054539mN)



Plate 7. Possible Bilby Burrow (BilbyDig7) and co-ordinates (GDA94 Zone 51 413177mE, 8055392mN)



Plate 8. Possible Bilby Burrow (BilbyDig8) and co-ordinates (GDA94 Zone 51 413331mE, 8055413mN)