Metals X Limited

Wingellina Nickel Project

Proposed Borefield Drill Line

Targeted Vertebrate Fauna Assessment

May 2012

DRAFT REPORT

METALS X LIMITED

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Executive Summary

Metals X Limited (Metals X) is currently evaluating the potential of developing the Southern Borefield and an associated pipeline route (the Project) as part of the proposed Wingellina Nickel Mine. Metals X commissioned Outback Ecology to perform a Targeted Vertebrate Fauna Assessment for four species of fauna of conservation significance (This Study), within an area of the Southern Borefield defined by a 50 m buffer surrounding a proposed drill line, a set of proposed drill pads and an associated access track. This Study was required in order to satisfy Condition 5 of Clearing Permit 4523/1, granted to Metals X by the Department of Mines and Petroleum on 6 October 2011.

Primarily, the purpose of This Study was to inspect the Study Area for the presence of burrows of four species of conservation significance (species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the Western Australian *Wildlife Conservation Act 1950* (WC Act) and/or the Department of Environment and Conservation's Priority Fauna list):

- the Greater Bilby (*Macrotis lagotis*; Vulnerable – EPBC Act, Schedule 1 – WC Act);
- Crest-tailed Mulgara (*Dasycercus cristicauda*; Vulnerable – EPBC Act, Priority 4 – DEC);
- Brush-tailed Mulgara (*Dasycercus blythi*; Vulnerable – EPBC Act, Schedule 1 – WC Act); and
- Great Desert Skink (*Liopholis kintorei*; Vulnerable – EPBC Act, Schedule 1 – WC Act).

The field survey was performed by Outback Ecology and was conducted between 16 and 22 October 2011. Targeted searches were performed for burrows, tracks and scats on foot at each proposed drill pad and on foot and by vehicle for the proposed access and drill tracks. Habitats were assessed at each search location. Baited, motion-sensor cameras were also used throughout the Study Area.

Based on assessment of habitat, each location searched was determined to be capable of supporting one or more of the species targeted. The likelihood of the Greater Bilby and Crest-tailed Mulgara making use of the habitats present was considered low in accordance with current knowledge on the distribution of these species. Conversely, it was considered more likely that the Great Desert Skink and Brush-tailed Mulgara would make use of some of the habitats present.

No burrows of any of the four species were encountered in the Study Area. Thus, Condition 5 of Clearing Permit 4523/1 was met by This Study. As a consequence of a flora and vegetation survey performed concurrently to This Study, five minor re-alignments to the proposed access track were recommended (Outback Ecology 2012a). A desktop analysis of these proposed re-alignments and associated habitats, in light of the findings of This Study, suggested that Condition 5 of Clearing Permit 4523/1 would still be met should these proposed re-alignments be adopted.

Although no burrows of any of the species targeted were found in the Study Area, motion-sensor cameras captured two records of Brush-tailed Mulgara at the northern end of the proposed access track. This confirms its presence within the Wingellina borefield (L69/12), and may have implications for future management of the Project and/or the Wingellina Nickel Mine. Targeted surveys for the Brush-tailed Mulgara (eg exclusion trapping) may be necessary prior to clearing or construction of infrastructure in habitat considered suitable for the species. Additionally, it is recommended that a Significant Species Management Plan is developed, to manage impacts to this species in the area and to satisfy state and federal regulators prior to the commencement of operations.

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1. INTRODUCTION

1.1. Project Background and Location

Metals X Limited (Metals X) is currently evaluating the potential of developing the Southern Borefield and an associated pipeline route (the Project) as part of the proposed Wingellina Nickel Mine. The Project is located approximately 192 km east of Warburton, near the junction of the Western Australia, South Australia and Northern Territory borders (**Figure 1**). Metals X commissioned Outback Ecology to perform a Targeted Vertebrate Fauna Assessment for four species of fauna of conservation significance (This Study), within an area of the Southern Borefield defined by a 50 m buffer surrounding a proposed drill line, a set of proposed drill pads and an associated access track (the Study Area; **Figure 2**). This Study was required in order to satisfy Condition Five of a Clearing Permit granted to Metals X by the Department of Mines and Petroleum on 6 October 2011 (Clearing Permit 4523/1; **Appendix A**).

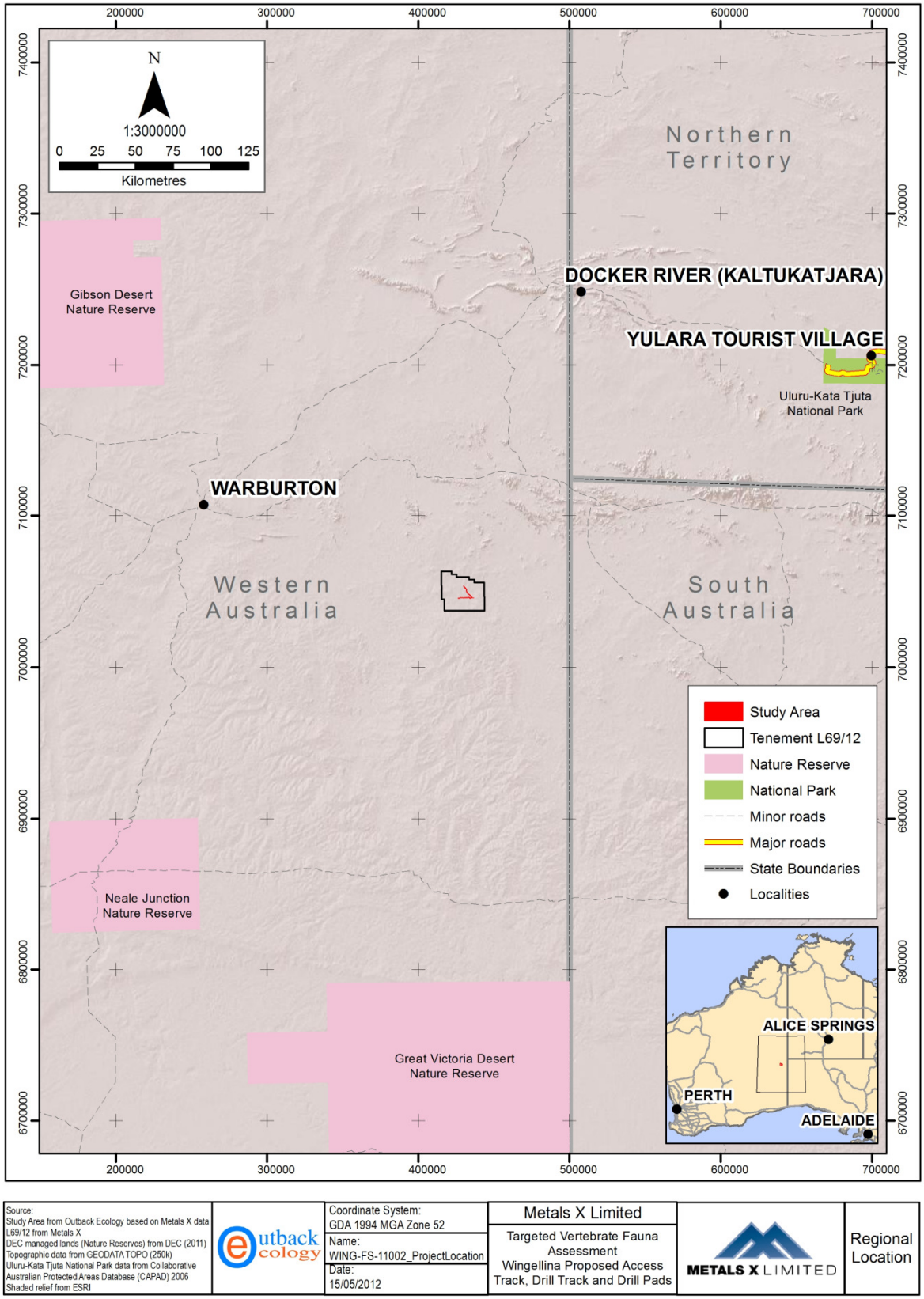

Figure 1: Regional location of the Study Area

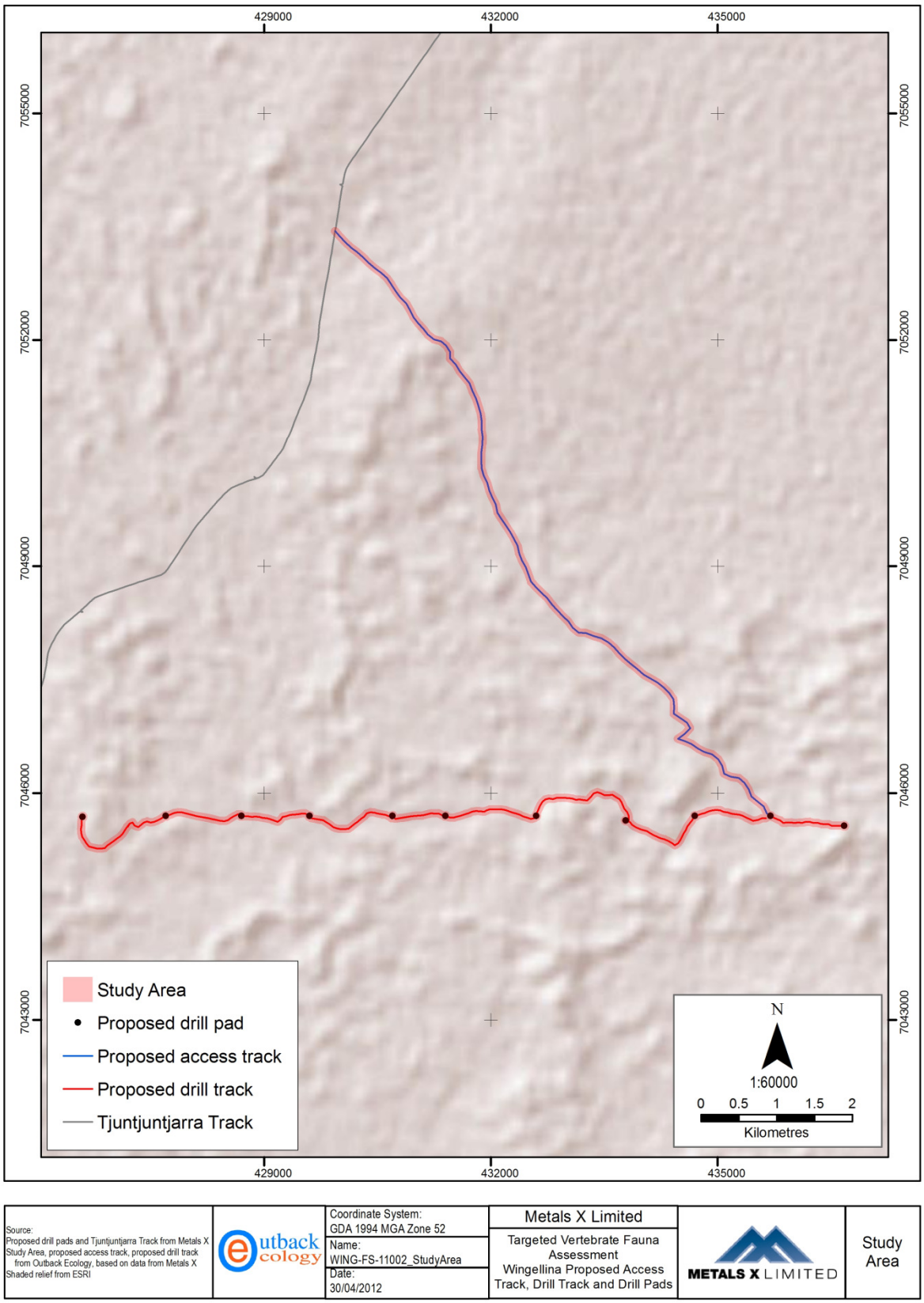

Figure 2: The Study Area

1.2. Report Scope and Objectives

The purpose of This Study was to inspect the Study Area for the presence of burrows of the Greater Bilby (*Macrotis lagotis*), Crest-tailed Mulgara (*Dasycercus cristicauda*), Brush-tailed Mulgara (*Dasycercus blythi*) and Great Desert Skink (*Liopholis kintorei*). Each of these species is of conservation significance because of listing under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the Western Australian *Wildlife Conservation Act 1950* (WC Act) and/or the Department of Environment and Conservations Priority Fauna list (**Section 2.2**). The specific objectives of This Study were to:

- provide a brief description of the existing environment within the Study Area;
- provide a summary of the results of database searches and a literature review for the species of interest, as obtained during a recent Level 1 Fauna Assessment in the vicinity of the Study Area (Outback Ecology 2012b);
- conduct a field survey to inspect the Study Area for the presence of burrows, tracks and scats of the species of interest, and report any observations;
- describe the habitat types encountered during the field survey in terms of their potential to support populations of the species of interest; and
- to summarise the potential impacts of the proposed clearing on burrows and/or habitat of the species of interest and provide recommendations for the Project in light of the conditions imposed by Clearing Permit 4523/1.

2. BACKGROUND INFORMATION

2.1. Existing Environment

The Study Area occurs within the Great Victoria Desert bioregion, as defined by the Interim Bioregions of Australia (IBRA) classification system (McKenzie *et al.* 2003). This bioregion encompasses approximately 418,800 km^2 of land within Western Australia and South Australia, and is characterised by dunefields with playa lakes and lunettes (Australian Natural Resources Atlas 2009). A high proportion of the native mammal species of this bioregion are thought to have become extinct within the bioregion, including the Numbat (*Myrmecobius fasciatus*), Greater Bilby (*Macrotis lagotis*), Burrowing Bettong (*Bettongia lesueur*) and stick-nest rats (*Leporillus* spp.), and other species are thought to be in decline, such as the Malleefowl (*Leipoa ocellata*) and Scarlet-chested Parrot (*Neophema splendida*). The Great Victoria Desert bioregion is comprised of six sub-bioregions. The Study Area falls within the Eastern, or Maralinga, sub-bioregion. This sub-bioregion contains extensive sand plains of deep Quaternary aeolian sands, salt lakes and major valley floors with lake-derived dunes (Barton and Cowan 2002). Specifically, the soil-landscapes of the Study Area are defined as being within mapping unit AB48, which consists of very gently undulating plains traversed by longitudinal dunes (see Northcote *et al.* 1960-1968, Tille 2006). The vegetation is primarily a tree steppe of mulga and *Eucalyptus* spp. over hummock grasslands on the aeolian sands, with *Acacia*, *Eremophila* and *Santalum* spp. dominating the colluvial soils (Barton and Cowan 2002).

The Great Victoria Desert bioregion is characterised by having an arid climate, with warm to extremely hot summers and mild to warm winters (Australian Natural Resources Atlas 2009). Rainfall is low and variable, and rain may fall during both summer and winter (Australian Natural Resources Atlas 2009). The closest Bureau of Meteorology (BOM) weather station is the Giles Meteorological Office, approximately 150 km north of the Study Area. The Giles Meteorological Office has a long-term mean annual rainfall of 289 mm, with the bulk of the rain falling between November and March and a mean of 32 rain days per annum (BOM 2012). The November to March period of maximum rainfall coincides with a period of peak temperatures, with mean maximum temperatures ranging from 20.0°C in July to 37.3°C in January and mean minimum temperatures ranging from 6.9°C in July to 23.5°C in January (BOM 2012).

For more information on the bioregion, climate and soil-landscapes of the Study Area, see Outback Ecology (2012b).

2.2. Species Information

2.2.1. The Greater Bilby (*Macrotis lagotis*)

The Greater Bilby, or Bilby, is a distinctive desert bandicoot possessing long, silky blue-grey fur, long, rabbit-like ears, a long, pointed snout and a well-furred tail with a white, terminal tuft (Menkhorst and Knight 2010, Van Dyck and Strahan 2008). Individuals are delicately built, with males reaching up to 2,500 g in weight and females up to 1,100 g (Van Dyck and Strahan 2008). The Greater Bilby is the only extant member of its genus, and is listed as Vulnerable under the EPBC Act and as Schedule 1 fauna under the WC Act.

The Greater Bilby was once widely distributed across Australia and was common throughout this range (DSEWPaC 2012e), but populations underwent a sudden and widespread collapse in the early 1900s (Van Dyck and Strahan 2008). The species is now restricted to approximately 20% of its former range, with wild populations restricted predominantly to the Tanami Desert in the Northern Territory, the Great Sandy and Gibson Deserts in Western Australia, and an outlying population in south-west Queensland (DSEWPaC 2012e). This decline in distribution and abundance is thought to be primarily associated with predation by the European Red Fox (*Vulpes vulpes*) and the Feral Cat (*Felis catus*), although the extent of the role of the latter is uncertain (DSEWPaC 2012e, Pavey 2006b, Van Dyck and Strahan 2008). In addition to predation, habitat degradation and competition from introduced herbivores, drought, unsuitable fire regimes and habitat destruction resulting from mining and other development have also been identified as substantial threats to the remaining populations of the Greater Bilby (Pavey 2006b).

Historically, the Greater Bilby used a variety of habitat types, including eucalypt open forests and woodlands, tall shrublands and open woodlands, tablelands and hummock grasslands (DSEWPaC 2012e). As the range of this species has contracted, it is now more often found in inland habitat types such as desert sandplains, dune fields with hummock grasslands, and massive red earths and *Acacia* shrublands (Maxwell *et al.* 1996). It is thought that the areas the species currently inhabits are the least favourable portions of its former range (Pavey 2006b). The Greater Bilby digs large burrows in sandy substrates that can reach up to 3 m long and 1.8 m deep and its distribution may be limited by the availability of suitable burrowing habitat (DSEWPaC 2012e, Van Dyck and Strahan 2008). Its distribution also appears to halt abruptly when pastoral land begins (DSEWPaC 2012e), suggesting that habitat modification as a result of grazing renders these areas unsuitable for the species.

The Greater Bilby is not reliant on surface water, as individuals are thought to meet most of their water requirements from food sources (Van Dyck and Strahan 2008). Its diet consists of insects, larvae, seeds, bulbs, fruit and fungi (Van Dyck and Strahan 2008), which it consumes whilst foraging well after dark. The Greater Bilby digs for much of its food, and in the process produces diggings of different sizes and shapes (see Moseby *et al.* 2009). The presence of these diggings, along with scats and tracks, can be sufficient to determine the presence of the species in an area (although inactive burrows may persist in the landscape for extended periods; see Lavery and Kirkpatrick 1997).

Previous survey work immediately adjacent to the Study Area determined that fauna habitats in the area are capable of supporting the Greater Bilby (Outback Ecology 2012b), and the NatureMap database indicates that the species and/or its habitat may occur in the area (DEC 2012a). The DEC Threatened and Priority Fauna database also lists a single record for the Greater Bilby in the vicinity of the Blackstone Range, to the north-west of the Study Area (DEC 2012b). This record is from 1966, however, and recent surveys in the vicinity of the Study Area and in the wider region have failed to detect the presence of the Greater Bilby. For further information on database searches and surveys in the vicinity of the Study Area, see Outback Ecology (2012b).

2.2.2. The Brush-tailed Mulgara (*Dasycercus blythi*)

The Brush-tailed Mulgara, often simply referred to as the Mulgara, is a small, robustly built, dasyurid possessing a short tail that is typically fattened at the base and covered in black hairs for most of its length (Van Dyck and Strahan 2008). Individuals can have a head and body length of up to 165 mm with a tail length of up to 100 mm, and can have a body mass of up to 110 g (Van Dyck and Strahan 2008). Although *D. blythi* was described more than a century ago, in recent years it has been lumped with the Crest-tailed Mulgara, *D. cristicauda* (Menkhorst and Knight 2004, Van Dyck and Strahan 2008). It is under this incorrect species name that the Brush-tailed Mulgara is currently listed as Vulnerable under the EPBC Act (with the common name 'Mulgara'; DSEWPaC 2012b, and see Pavey *et al.* 2012). In WA, the Brush-tailed Mulgara is listed under its correct name, *D. blythi*, as Priority 4 fauna by the Department of Environment and Conservation.

Historically, the Brush-tailed Mulgara occurred across much of the arid interior of Australia (DSEWPaC 2012b, Van Dyck and Strahan 2008), but since then its abundance has declined in the north-east and south-east portions of its former range (Menkhorst and Knight 2004). Currently, it is thought to occur from south-western Queensland across the Simpson, Tanami and Great Sandy Deserts of the southern and central Northern Territory, into the central deserts of Western Australia (Pavey *et al.* 2012). In the Simpson Desert in the Southern Northern territory, the Brush-tailed Mulgara is sympatric with its congener, the Crest-tailed Mulgara (Pavey *et al.* 2012). The Brush-tailed Mulgara is susceptible to predation by the Feral Cat and European Red Fox, which are reported to readily prey on Mulgara species in arid Australia (Pavey *et al.* 2012).

The Brush-tailed Mulgara occurs in arid zone habitats in association with dune systems; it has been reported to occur on sand ridges (Menkhorst and Knight 2004) and from spinifex grasslands in dune swales (Van Dyck and Strahan 2008). The species has also been reported from gibber plains and sand plains with only poorly developed, low dunes (Pavey *et al.* 2012), as well as from mulga shrublands with loamy soils (Menkhorst and Knight 2004). Within its distribution the Brush-tailed Mulgara occurs in burrows, with multiple side-tunnels and pop-holes, with males and females typically only occupying the same burrow during the mating season. At other times of year individuals are generally solitary (Van Dyck and Strahan 2008). Burrow entrances are usually characterised by having an approximately equal height and width, a rounded base and a high arch (Moseby *et al.* 2009). Scats are also usually present at entrances (Moseby *et al.* 2009).

A nocturnal hunter, the Brush-tailed Mulgara is one of the largest native predatory mammals remaining in Australia's deserts (Pavey *et al.* 2012). Its diet consists of a wide variety of insects, other arthropods and vertebrates such as small rodents and even small birds (Menkhorst and Knight 2004, Pavey *et al.* 2012, Van Dyck and Strahan 2008). Like many other desert marsupials, the species is thought to be able to live without free water (Menkhorst and Knight 2004).

Previous survey work immediately adjacent to the Study Area determined that fauna habitats in the area are capable of supporting the Brush-tailed Mulgara (Outback Ecology 2012b), and the Protected Matters database indicates that the species and/or its habitat may occur in the area (under the incorrect name *D. cristicauda*; DSEWPaC 2012a). Previous survey work in the immediate vicinity has not recorded the species (HGM Maunsell 2002, Outback Ecology 2009, 2012b), but it is known to occur further afield in the Spinifex Native Title Determined Area, approximately 240 km south-west of the Study Area. For further information on database searches and surveys in the vicinity of the Study Area, see Outback Ecology (2012b).

2.2.3. The Crest-tailed Mulgara (*Dasycercus cristicauda*)

The Crest-tailed Mulgara, traditionally known as the Ampurta, is a small, robustly built, dasyurid marsupial possessing a tail that has a distinctive crest, or fin, of uniform-length black hairs along its dorsal surface (Menkhorst and Knight 2004, Van Dyck and Strahan 2008). Individuals can have a head and body length of up to 230 mm with a tail length of up to 125 mm, and can have a body mass of up to 185 g (Van Dyck and Strahan 2008). In the past this species has been referred to as the Ampurta, *Dasycercus hillieri*, but more recent taxonomic revision has determined that *D. hillieri* should no longer be regarded as a separate taxon and that this species should be recognised only as the Crest-tailed Mulgara, *D. cristicauda* (Woolley 2005). It is under its defunct synonym, however, that the Crest-tailed Mulgara is currently listed as Vulnerable under the EPBC Act (Ampurta/*Dasycercus hillieri*; DSEWPaC 2012c, and see Pavey *et al.* 2012). In WA, the Crest-tailed Mulgara is listed under its current name, *D. cristicauda*, as Schedule 1 fauna under the WC Act.

Historically the Crest-tailed Mulgara occurred across much of the arid interior of Australia, extending southward as far as the Nullarbor Plain and westward as far as the Canning Stock Route (Van Dyck and Strahan 2008). Since then the abundance of the species has declined in these western and southern portions of its former range, and it has more recently been reported only from the southern Simpson Desert in the Northern Territory and the northern Strzelecki and Tirari Deserts in South Australia (DSEWPaC 2012c, Pavey *et al.* 2012, Van Dyck and Strahan 2008). In the Simpson Desert in the Southern Northern territory, the Crest-tailed Mulgara is sympatric with its congener, the Brush-tailed Mulgara (Pavey *et al.* 2012). It is possible that the Crest-tailed Mulgara still occurs in part of its former distribution within the Pilbara region of Western Australia, but this is unconfirmed (Pavey *et al.* 2012). The decline of the Crest-tailed Mulgara may be a product of predation by the European Red Fox and Feral Cat (DSEWPaC 2012c), which are reported to readily prey on Mulgara species in arid Australia (Pavey *et al.* 2012). In addition, habitat degradation from the Camel (*Camelus*

dromedarius), European Rabbit (*Oryctolagus cuniculus*) and grazing stock are also suspected threats to this species (DSEWPaC 2012c).

The Crest-tailed Mulgara occurs in arid zone habitats, and appears to be largely restricted to dune systems; it occurs on dune crests and steep slopes with Sandhill Cane Grass (*Zygochloa paradoxa*) clumps and Nitre Bush (*Nitraria billardieri*) hummocks (Menkhorst and Knight 2004, Pavey *et al.* 2012, Van Dyck and Strahan 2008), although it has been reported from areas around salt lakes that have Nitre Grass cover (Van Dyck and Strahan 2008). Within its distribution the Crest-tailed Mulgara occurs in burrows on dune crests, excavated with multiple side-tunnels and pop-holes at the bases of Sandhill Cane Grass clumps or Nitre bush hummocks (Van Dyck and Strahan 2008). As with those of its congener, the Brush-tailed Mulgara, the entrances of the burrows of the Crest-tailed Mulgara are usually characterised by having an approximately equal height and width, a rounded base and a high arch (Moseby *et al.* 2009). Scats are also usually present at entrances (Moseby *et al.* 2009).

A nocturnal opportunist, the Brush-tailed Mulgara is a non-specialist carnivore that forages predominantly along dune crests and flanks, with occasional ventures into the swales (Van Dyck and Strahan 2008). Its diet consists of a wide variety of small mammals, lizards and large arthropods (Chen *et al.* 1998, Menkhorst and Knight 2004, Van Dyck and Strahan 2008). Although the biology of the Crest-tailed Mulgara is not as well studied as that of its congener, the Brush-tailed Mulgara (see Woolley 2006), it is probable that the Crest-tailed Mulgara too can live without free water.

Previous survey work immediately adjacent to the Study Area determined that fauna habitats in the area are capable of supporting the Crest-tailed Mulgara, but database searches did not indicate that the species or its habitat may occur in the area (Outback Ecology 2012b). Previous survey work in the immediate vicinity did not record the Crest-tailed Mulgara (HGM Maunsell 2002, Outback Ecology 2009, 2012b), and although it has been reported from further afield in the Uluṟu-Kata Tjuṯa National Park (Balding 1996), approximately 270 km north-east of the Study Area, it is possible that these records actually refer to Brush-tailed Mulgara (given what is now known regarding the taxonomy and distribution of the two Mulgara species; Pavey *et al.* 2012, Woolley 2005). The habitat type preferred by Mulgara in Uluṟu-Kata Tjuṯa National Park, ie sand plains and lower slopes of dunes usually dominated by spinifex grass (Balding 1996), is consistent with the notion that these records are actually mis-identified Brush-tailed Mulgara and not Crest-tailed Mulgara (due to the differences in habitat preferences exhibited between the two species; eg see Pavey *et al.* 2012). For further information on database searches and surveys in the vicinity of the Study Area, see Outback Ecology (2012b).

2.2.4. The Great Desert Skink (*Liopholis kintorei*)

The Great Desert Skink, traditionally known as the Tjakura, is a large, smooth bodied lizard that measures, on average, 200 mm long and up to 350 g in body mass (Pavey 2006a). The species was previously described as *Egernia kintorei* (Gardner *et al.* 2008) and is listed as such on the Clearing

Permit issued to Metals X (**Appendix A**), but it is under the current name *Liopholis kintorei* that the taxon is listed as Vulnerable under the EPBC Act and as Schedule 1 fauna under the WC Act.

The current distribution of the Great Desert Skink is thought to consist of seven isolated populations in Australia (DSEWPaC 2012d). Three of these populations occur in the eastern interior of Western Australia in the Gibson and Great Sandy Desert at Patjarr, Lake Mackay and Rudall River National Park. In the Northern Territory, populations persist in the Tanami Desert, Uluṟu-Kata Tjuṯa National Park and the Yulara lease lands, while in South Australia one population is known to exist at Watarru on the Aṉangu Pitjantjatjara Lands. Several threatening processes which may have been factors in the decline of this species have been identified. These include inappropriate fire management, predation by introduced predators, and habitat modification by European Rabbits, which have the potential to dig up and disrupt burrow systems (Pavey 2006a).

The Great Desert Skink lives communally in warren systems with multiple entrances, dug amongst spinifex grasslands, in sandy soils on arid red sand flats or in loamy clay soils (Moseby *et al.* 2009, Pavey 2006a, Wilson and Swan 2010). Extended family groups live in these burrow systems, most often comprising one pair of adults and their offspring from two or more breeding events, with individuals sharing the use and maintenance of more than one tunnel in each system (DSEWPaC 2011, McAlpin *et al.* 2011). Such cooperative behaviour is rare in lizards (McAlpin *et al.* 2011). The large, elaborate burrow systems are utilised by many other fauna, including some species of conservation significance such as Mulgara and the importance of these burrow systems to ecosystem function is therefore likely to be considerable (McAlpin 2001). Active burrow systems are usually characterised by at least one communal scat pile or latrine, as well as signs of freshly dug sand at one or more of the entrances (DSEWPaC 2011, Pavey 2006a).

The Great Desert Skink forages nocturnally (Wilson and Swan 2010), consuming a wide variety of invertebrates and small vertebrates as well as the leaves, flowers and fruits of plants (Pavey 2006a). It has been noted that burrow systems appear to be constructed in close proximity to mounds of the termite *Drepanotermes perniger*, which is an important part of the Great Desert Skink's diet (McAlpin *et al.* 2011). There is also some suggestion that active burrows are more likely to be found in areas burnt less than 25 years previously and that within these areas, populations begin to decline after 15 years post-fire (DSEWPaC 2011).

Previous survey work immediately adjacent to the Study Area determined that fauna habitats in the area are capable of supporting the Great Desert Skink (Outback Ecology 2012b), and the Protected Matters database indicates that the species and/or its habitat may occur in the area (DSEWPaC 2012a). However, previous survey work in the immediate vicinity did not record the species itself (HGM Maunsell 2002, Outback Ecology 2009, 2012b). The species is known to occur further afield in Uluṟu-Kata Tjuṯa National Park, approximately 270 km north-east of the Study Area, and in the Aṉangu Pitjantjatjara Lands, a very large area of land the centre of which is approximately 267 km south-east of the Study Area (Balding 1996, Robinson *et al.* 2003). For further information on database searches and surveys in the vicinity of the Study Area, see Outback Ecology (2012b).

3. METHODOLOGY

3.1. Background Information

3.1.1. Survey Timing And Weather

The field survey ran from 16 to 22 October 2011 and the weather experienced was appropriate to conduct the survey. Maximum and minimum temperatures at Giles were 32.5°C and 8.2°C, respectively, during the survey period (**Table 1**). No rain fell at Giles during the survey period (**Table 1**). Total rainfall at Giles Meteorological Office in the six months prior to the survey was 49.4 mm, which is lower than the long-term average of 86.7 mm for this period (**Figure 3**). June and July 2011 received more rain than the average, but April, May, August and September received less (**Figure 3**); such variability is typical of rainfall patterns for the area (**Section 2.1**).

Table 1: Daily weather observations at Giles, for the survey period

Date	Temperature (°C)		Rainfall (mm)	Relative humidity (%)	
	Min	Max		9.00 am	3.00 pm
16/10/2011	12.7	30.5	0.0	7	0
17/10/2011	13.0	31.2	0.0	15	3
18/10/2011	15.0	33.5	0.0	9	4
19/10/2011	11.8	22.9	0.0	32	12
20/10/2011	8.2	25.2	0.0	26	14
21/10/2011	10.3	29.6	0.0	18	6
22/10/2011	15.2	32.5	0.0	11	4

Source data: BOM (2012)

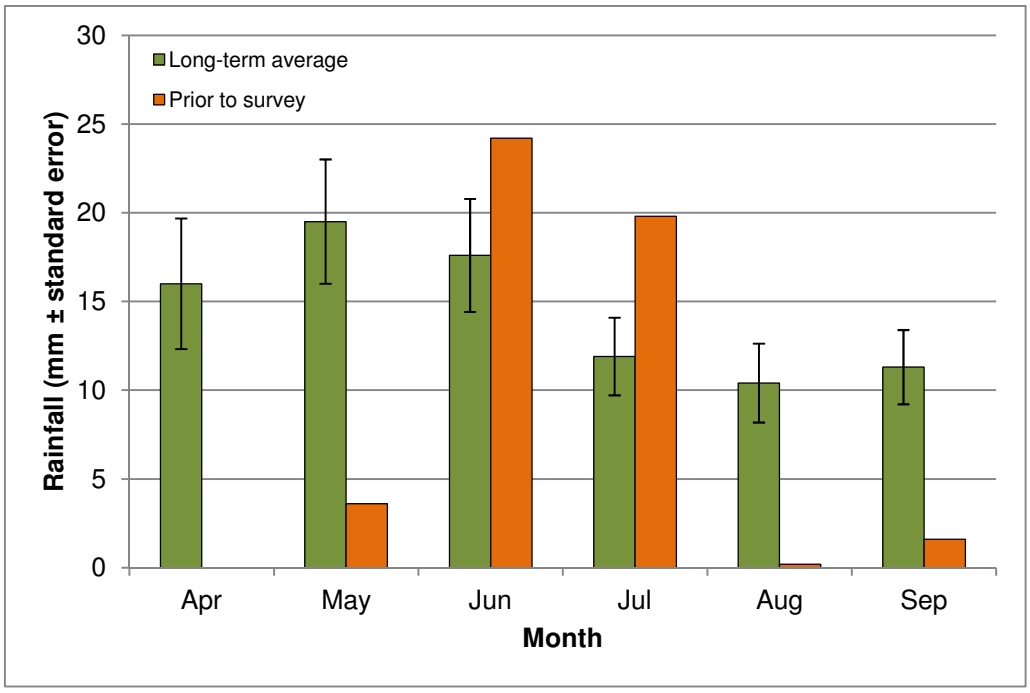

Figure 3: Long-term rainfall and rainfall for six months prior to the survey, at Giles

Source data: BOM (2012), 1956 to 2012

3.1.2. Study Team And Licensing

The field survey of the Study Area was conducted by Outback Ecology (**Table 2**). Permission to access the Study Area was granted by the Ngaanyatjarra Council (17614; Permission to Enter and Remain on Aboriginal Reserve). The field survey was conducted under a Licence to Take Fauna for Scientific Purposes (DEC, Regulation 17 Licence) with details as follows:

- licence number SF008288;
- issue date 17 October 2011; and
- valid from 17 October to 1 December 2011.

Table 2: Study team for the targeted field survey of the Study Area

Person	Discipline	Qualifications	Position
Mike Young	Zoologist	BSc (Mar Sci) (Hons Zool) PhD (Evol Biol)	Outback Ecology Senior Environmental Scientist

3.2. Fauna Surveying

3.2.1. Targeted Searches

Each of the proposed drill pads (a total of 11) was surveyed by walking a spiral transect up to an approximate radius of 65 m, extending from the centre of the proposed pad (**Figure 4**). The proposed drill and access tracks were surveyed by walking a parallel linear transect on both sides of each track, and by using a vehicle to drive a slow-speed linear transect along the proposed track alignments themselves (**Figure 4**). During each of these surveys, the ground was inspected for burrows, tracks and scats of the species targeted (eg as per Moseby *et al.* 2009). In addition, habitats present were categorised in accordance with the types previously identified by Outback Ecology (2012b), and a brief assessment was made of the capacity of each area surveyed to support the species targeted.

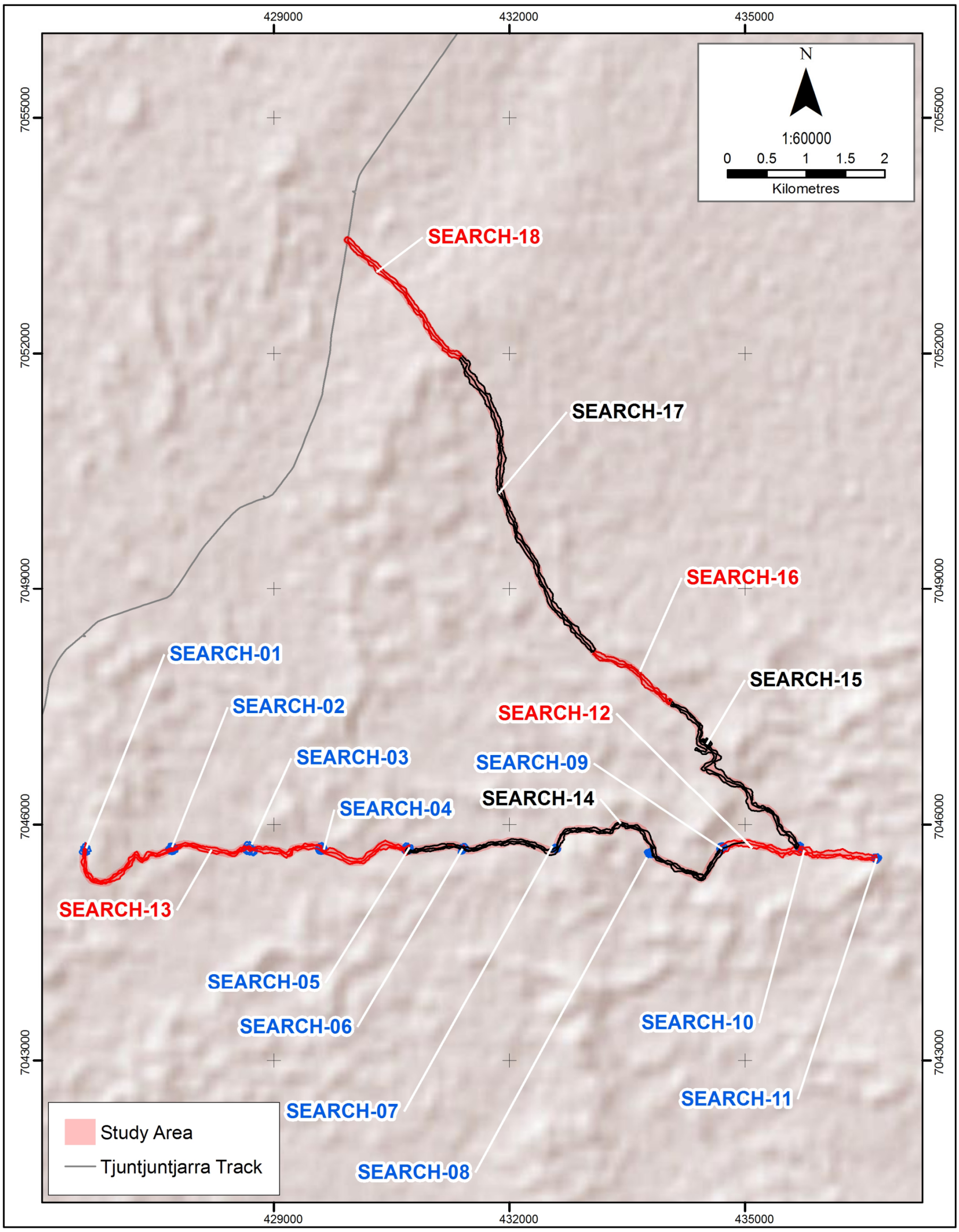

Figure 4: Paths taken when performing targeted searches

(targeted searches along tracks are alternately coloured red and black to assist in delineating the extent of each search)

3.2.2. Motion-Sensor Cameras

One motion-sensor camera (either Bushnell TrophyCam XLT Viewer or Reconyx HyperFire PC900) was deployed for two trap nights at each of the 11 proposed drill pads (**Table 3**, **Figure 5**). In addition, one motion-sensor camera was deployed for one trap night at each of three locations along the proposed access track (**Table 3**, **Figure 5**). Differences between trapping effort for the proposed drill pads and the proposed access track were based simply on camera availability. For each deployment, the camera was positioned at ground level and in an area most appropriate to capture images of the species targeted. Each camera location was baited using a mixture of anchovies, peanut butter, rolled oats and oil placed approximately 1 m in front of the lens.

Table 3: Survey effort for motion-sensor cameras during This Study

Deployment	Location	Camera type	Camera position (WGS84)	Trap nights
CAMERA-01	Pad Mirt01	TrophyCam	52J 426610mE 7045766mN	2
CAMERA-02	Pad Mirt02	Reconyx	52J 427662mE 7045704mN	2
CAMERA-03	Pad Mirt03	Reconyx	52J 428697mE 7045671mN	2
CAMERA-04	Pad Mirt04	TrophyCam	52J 429634mE 7045678mN	2
CAMERA-05	Pad Mirt05	TrophyCam	52J 430735mE 7045743mN	2
CAMERA-06	Pad Mirt06	TrophyCam	52J 431414mE 7045743mN	2
CAMERA-07	Pad Mirt07	Reconyx	52J 432622mE 7045691mN	2
CAMERA-08	Pad Mirt08	Reconyx	52J 433783mE 7045608mN	2
CAMERA-09	Pad Mirt09	TrophyCam	52J 434681mE 7045697mN	2
CAMERA-10	Pad Mirt11	TrophyCam	52J 436686mE 7045553mN	2
CAMERA-11*	Pad Mirt10	Reconyx	52J 435683mE 7045696mN	1
CAMERA-12*	Pad Mirt10	TrophyCam	52J 435733mE 7045705mN	1
CAMERA-13	Access track	TrophyCam	52J 434538mE 7047056mN	1
CAMERA-14	Access track	TrophyCam	52J 431892mE 7050162mN	1
CAMERA-15	Access track	Reconyx	52J 429979mE 7053431mN	1

* These two deployments combine to give two trap nights for this location

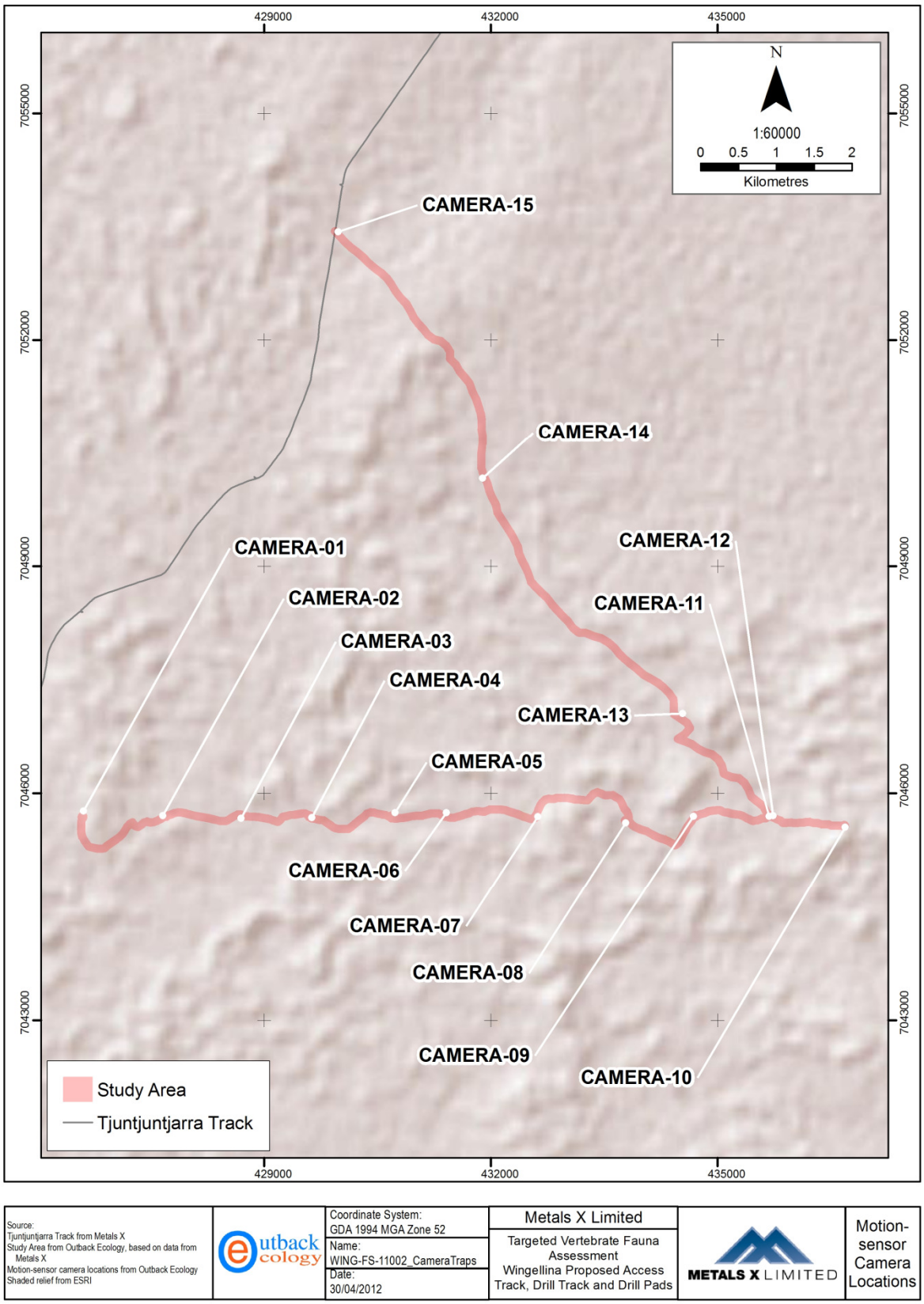

Figure 5: Motion-sensor camera deployment locations

4. RESULTS AND DISCUSSION

4.1. Fauna Habitats

The habitat types encountered during This Study were consistent with types identified by Outback Ecology (2012b). Most locations within the Study Area are capable of supporting one or more of the species targeted (**Table 4**, **Plate 1** to **Plate 18**), but the likelihood of each species being present is also influenced by current knowledge of the distributions of each species (see **Section 2.2**). For example, though all habitat types encountered during This Study were considered capable of supporting the Greater Bilby, the species was considered unlikely to occur within the Study Area as surveys in the local area and wider region have failed to record it in recent times (**Table 4**).

The likelihood of each species of being supported by the habitat types at each location (**Table 4**) was assessed using the following definitions:

Confirmed – the presence of the species in the Study Area has been recorded unambiguously during the last ten years (ie during recent surveys of the Study Area or from recent records obtained via database searches);

Very likely – the Study Area lies within the known distribution of the species and contains suitable habitat(s), plus the species generally occurs in suitable habitat and has been recorded nearby within the last 20 years;

Likely – the Study Area lies within the known distribution of the species and the species has been recorded nearby within the last 20 years; however, either:

a. the Study Area contains only a small area of suitable habitat, or habitat that is only marginally suitable; or
b. the species is generally rare and patchily distributed in suitable habitat;

Possible – there is an outside chance of occurrence, because:

a. the Study Area is just outside the known distribution of the species, but it does contain suitable and sufficient habitat (the species may be common, rare, or patchily distributed); or
b. the Study Area lies within the known distribution of the species, but the species is very rare and/or patchily distributed; or
c. the Study Area lies on the edge of, or within, the known distribution and has suitable habitat, but the species has not been recorded in the area for over 20 years; or

Unlikely – the Study Area lies outside the known distribution of the species, the Study Area does not contain suitable habitat, and the species has not been recorded in the area for over 20 years.

Table 4: Habitat types present at areas surveyed during This Study

Search	Location	Habitat type†	Likelihood of occurrence of species targeted*	Example
SEARCH-02	Pad Mirt02	Dense Mulga Woodland at the north of the pad, trending toward Scattered Eucalypts on Mixed Shrubland	• **Greater Bilby: Unlikely**. Habitat appropriate and on edge of historical distribution, but no modern records in vicinity (see Outback Ecology 2012b) • **Brush-tailed Mulgara: Unlikely**. Although species was found nearby during SEARCH-18, habitat inappropriate at these locations • **Crest-tailed Mulgara: Unlikely**. Habitat inappropriate, and outside of likely distribution of the species • **Great Desert Skink: Unlikely**. Although within distribution, habitat inappropriate at this location	**Plate 2**
SEARCH-03	Pad Mirt03	Dense Mulga Woodland		**Plate 3**
SEARCH-10	Pad Mirt10	Dense Mulga Woodland		**Plate 10**
SEARCH-05	Pad Mirt05	Scattered Eucalypts on Mixed Shrubland at the north of the pad, trending toward Dense Mulga Woodland	• **Greater Bilby: Unlikely**. Comments as above • **Brush-tailed Mulgara: Likely**. Habitat marginally suitable, and species was found nearby during SEARCH-18 • **Crest-tailed Mulgara: Unlikely**. Habitat marginally suitable, but outside of likely distribution of the species • **Great Desert Skink: Unlikely**. Although within distribution, habitat inappropriate at these locations	**Plate 5**
SEARCH-07	Pad Mirt07	Scattered Eucalypts on Mixed Shrubland		**Plate 7**
SEARCH-01	Pad Mirt01	Mulga on Hummock Grassland	• **Greater Bilby: Unlikely**. Comments as above • **Brush-tailed Mulgara: Very likely**. Habitat suitable, and species was found nearby during SEARCH-18 • **Crest-tailed Mulgara: Unlikely**. Habitat suitable, but outside of likely distribution of the species • **Great Desert Skink: Possible**. Within distribution and habitat appropriate at these locations, although the species is generally patchily distributed	**Plate 1**
SEARCH-04	Pad Mirt04	Mulga-Mallee on Hummock Grassland		**Plate 4**
SEARCH-06	Pad Mirt06	Mulga on Hummock Grassland		**Plate 6**
SEARCH-08	Pad Mirt08	Mulga-Mallee on Hummock Grassland		**Plate 8**
SEARCH-09	Pad Mirt09	Mulga-Mallee on Hummock Grassland		**Plate 9**
SEARCH-11	Pad Mirt11	Mulga on Hummock Grassland		**Plate 11**
SEARCH-12	Drill track	Mulga on Hummock Grassland interspersed with Mulga-Mallee on Hummock Grassland		**Plate 12**
SEARCH-13	Drill track	Mulga-Mallee on Hummock Grassland, interspersed with Mulga on Hummock Grassland, Scattered Eucalypts on Mixed Shrubland and Dense Mulga Woodland		**Plate 13**
SEARCH-14	Drill track	Mulga-Mallee on Hummock Grassland, interspersed with patches of Mulga on Hummock Grassland		**Plate 14**
SEARCH-15	Access track	Mulga on Hummock Grassland and Mulga-Mallee on Hummock Grassland		**Plate 15**
SEARCH-16	Access track	Mulga on Hummock Grassland and Mulga-Mallee on Hummock Grassland		**Plate 16**
SEARCH-17	Access track	Mulga on Hummock Grassland and Mulga-Mallee on Hummock Grassland		**Plate 17**
SEARCH-18	Access track	Mulga on Hummock Grassland and Mulga-Mallee on Hummock Grassland	• **Greater Bilby: Unlikely**. Comments as above • **Brush-tailed Mulgara: Confirmed**. Recorded during This Study (**Section 4.2**) • **Crest-tailed Mulgara: Unlikely**. Comments as above • **Great Desert Skink: Possible**. Comments as above	**Plate 18**

† habitat types are as defined by Outback Ecology (2012b), * likelihoods indicate probability of individuals using or occurring in this habitat type or habitats nearby, and are not indications of whether burrows of each species are present at the locations searched

Plate 1: Habitat - SEARCH-01

Plate 2: Habitat - SEARCH-02

Plate 3: Habitat - SEARCH-03

Plate 4: Habitat - SEARCH-04

Plate 5: Habitat - SEARCH-05

Plate 6: Habitat - SEARCH-06

Plate 7: Habitat - SEARCH-07

Plate 8: Habitat - SEARCH-08

Plate 9: Habitat - SEARCH-09

Plate 10: Habitat - SEARCH-10

Plate 11: Habitat - SEARCH-11

Plate 12: Habitat - SEARCH-12

Plate 13: Habitat - SEARCH-13

Plate 14: Habitat - SEARCH-14

Plate 15: Habitat - SEARCH-15

Plate 16: Habitat - SEARCH-16

Plate 17: Habitat - SEARCH-17

Plate 18: Habitat - SEARCH-18

4.2. Targeted Fauna

No records were obtained for the Greater Bilby, Crest-tailed Mulgara and Great Desert Skink, either during motion-sensor camera deployments or the on-ground targeted searches for burrows. No burrows of the Brush-tailed Mulgara were observed during any of the on-ground searches, but two records for this species were obtained during the camera trap deployment at CAMERA-15 (**Plate 19** to **Plate 21**). CAMERA-15 was located amongst Mulga on Hummock Grassland and Mulga-Mallee on Hummock Grassland habitat types (**Plate 22**), at the northern-most end of the proposed access track (**Figure 6**).

4.3. Other Fauna

During This Study, other vertebrate fauna species were observed during targeted searches and use of motion-sensor cameras. Briefly, these species were:

- Spinifex Hopping-mouse (*Notomys alexis*);
- Cat (*Felis catus*) (introduced);
- Dunnart (*Sminthopsis* sp.);
- Little Button-quail (*Turnix velox*);
- Rainbow Bee-eater (*Merops ornatus*); and
- Barred Wedgesnout *Ctenotus* (*Ctenotus schomburgkii*).

Of these species, only the Rainbow Bee-eater is of conservation significance (listed as Migratory under the EPBC Act and Schedule 3 under the WC Act). A single Rainbow Bee-eater was observed during This Study, at location 430750mE 7045649mN (WGS84 UTM Zone 52J).

Plate 19: Image of a Brush-tailed Mulgara from first record at CAMERA-15

Plate 20: Image of a Brush-tailed Mulgara from second record at CAMERA-15

Plate 21: Enlarged image of a Brush-tailed Mulgara from Plate 19

Plate 22: Habitat - CAMERA-15

Figure 6: Location of CAMERA-15, where Mulgara records were obtained

5. CONCLUSIONS

5.1. Potential Impacts Of The Project on the Targeted Fauna

No burrows of any of the four species targeted were recorded during This Study. Therefore, it is unlikely that the Project will impact on any of the species targeted via direct destruction of burrows.

It is possible that the Project may have other direct impacts on some of the targeted species via habitat clearing, as well as indirect impacts via other processes, but these potential impacts are not relevant to the conditions imposed on Metals X under Clearing Permit 4523/1. See Outback Ecology (2012b), however, for a discussion of these potential impacts.

5.2. Recommendations

As no burrows of any of the four species targeted were recorded within the Study Area, there is no requirement for Metals X to alter the locations of the proposed drill pads, drill line or access tracks in order to meet Condition 5 of Clearing Permit 4523/1.

A targeted vegetation and flora survey performed concurrently with This Study found that five minor re-alignments of the proposed access track would be necessary for Metals X to satisfy Condition 4 of Clearing Permit 4523/1 (Outback Ecology 2012a). Subsequent to these re-alignments being proposed, a brief desktop analysis was performed in order to determine whether Condition 5 of Clearing Permit 4523/1 would still be met should the proposed re-alignments be adopted. This assessment involved discussion of the proposed re-alignment areas with the flora survey team, examination of aerial and on-ground photographs of the habitats of the proposed re-alignment areas, and interpretation of these in light of the outcomes of the targeted fauna assessment. It was concluded that should Metals X re-align the proposed access track in the five places identified as a result of the targeted vegetation and flora survey (Outback Ecology 2012a), the Project would still be unlikely to result in habitat clearing within 50 m of any burrows of the fauna species targeted and that therefore Metals X would still have met Condition 5 of Clearing Permit 4523/1.

Although no burrows of any of the species targeted were found in the Study Area, the capture of two sets of images of the Brush-tailed Mulgara at the northern end of the proposed access track confirms the presence of this species within the tenement of the Wingellina borefield (L69/12). This may have implications for future management of the Project and/or the Wingellina Nickel Mine in general. Targeted survey for Brush-tailed Mulgara may be required prior to future works in the area (eg for any proposed pipeline emanating from the proposed drill line), and a Significant Species Management Plan (SSMP) should be developed to manage impacts to the species and satisfy state and federal regulators prior to the commencement of operations in the general area. Additionally, the SSMP should specify that tissue samples be taken from any Brush-tailed Mulgara captured/obtained; samples should then be submitted to the Western Australian Museum to allow for genetic analysis, to address the current uncertainty regarding the distributions of the two Mulgara species in Australia.

6. REFERENCES

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Appendix A

Clearing Permit 4523/1

Government of **Western Australia**
Department of **Mines and Petroleum**

Our Ref: File No: A1336/201101 - CPS 4523/1
Enquiries: Jessica Allen Tel: (08) 9222 3102 Fax: (08) 9222 3077
Email: jessica.allen@dmp.wa.gov.au

Mr Richard Coles
Metals X Limited
PO Box 2606
Perth WA 6001

Dear Mr Coles

Permit to Clear Native Vegetation under the *Environmental Protection Act 1986*
Metals X Limited (CPS 4523/1)

Please find enclosed your permit to clear native vegetation granted under s.51E of the *Environmental Protection Act 1986*. This authorisation gives you approval to clear, subject to certain terms, conditions or restrictions. A copy of your permit is now available for the public to view, as required by the regulations.

Read your permit carefully. If you do not understand your permit, contact this Department immediately. There are penalties for failing to comply with the requirements of your permit.

If you are aggrieved by a decision of the Department of Mines and Petroleum, an appeal may be lodged with the Minister for Environment. If you choose to appeal, it must be in writing, clearly setting out the grounds of your appeal, and received by the Minister for Environment within **21** days of being notified. More information on lodging an appeal is available from the Office of the Appeals Convenor on telephone (08) 6467 5190. Completed appeals should be posted or delivered to:

Office of the Appeals Convenor
Level 22 Forrest Centre
221 St Georges Terrace
PERTH WA 6000

Tel: (08) 6467 5190
Fax: (08) 6467 5199
Email: admin@appealsconvenor.wa.gov.au
Web: www.appealsconvenor.wa.gov.au

Third parties may also appeal against the issue of this permit. **Please note that clearing must not commence until the date stated on the permit (29 October 2011) or until notified on the outcome of any appeal. In addition, clearing must not commence until all other environmental approvals have been obtained.**

Under Condition 7 of your permit to clear native vegetation, you are required to submit an annual clearing report. This clearing report should be forwarded to the Executive Director, Environment, prior to the due date.

Compliance with the terms, conditions or restrictions of this permit does not absolve the Permit Holder from responsibility for compliance with the requirements of all Commonwealth and State legislation.

If you have any queries regarding this decision, please do not hesitate to contact Jessica Allen in the Department's Native Vegetation Assessment Branch on (08) 9222 3102 or email jessica.allen@dmp.wa.gov.au.

Yours sincerely

Phil Gorey
EXECUTIVE DIRECTOR
ENVIRONMENT

Officer with delegated authority under Section 20
of the Environmental Protection Act 1986

6 October 2011

Encs

GOVERNMENT OF
WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

PERMIT DETAILS
Purpose Permit Number: 4523/1
File Number: A1336/201101
Duration of Permit: From 29 October 2011 to 29 October 2016

PERMIT HOLDER
Metals X Limited

LAND ON WHICH CLEARING IS TO BE DONE
Miscellaneous Licence 69/12

PURPOSE FOR WHICH THE CLEARING MAY BE DONE
1. Clearing for the purpose of groundwater exploration and associated works.

CONDITIONS

Type of clearing authorised
1. The Permit Holder must not clear more than 20 hectares of native vegetation. All clearing must be within the areas cross-hatched yellow on attached Plan 4523/1.

Avoid, minimise etc clearing
2. In determining the amount of native vegetation to be cleared authorised under this Permit, the Permit Holder must have regard to the following principles, set out in order of preference:

   (i) avoid the clearing of native vegetation;
   (ii) minimise the amount of native vegetation to be cleared; and
   (iii) reduce the impact of clearing on any environmental value.

Weed control
3. When undertaking any clearing or other activity authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of *weeds*:

   (i) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
   (ii) ensure that no *weed*-affected soil, *mulch, fill* or other material is brought into the area to be cleared; and
   (iii) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

Flora management
4. (a) Prior to undertaking any clearing authorised under this Permit, the Permit Holder shall engage a *botanist*, in accordance with *Guidance Statement No. 51* to inspect that area for the presence of rare flora listed in the *Wildlife Conservation (Rare Flora) Notice 2010(2)* and *priority flora.*

   (b) Where rare flora or *priority flora* are identified in relation to Condition 4(a) of this Permit, the Permit Holder shall ensure that:

   (i) no clearing occurs within 50 metres of identified rare flora, unless approved by the *CEO*; and
   (ii) no clearing of identified *priority flora* occurs and no clearing occurs within 10 metres of identified *priority flora,* unless approved by the *CEO.*

Fauna management

5. (a) Prior to undertaking any clearing authorised under this Permit, the areas shall be inspected by a *fauna specialist* for the presence of:

    (i) *Macrotis lagotis* (Bilby) burrows;
    (ii) *Dasycercus blythi* (Brush-tailed Mulgara) burrows;
    (iii) *Dasycercus cristicauda* (Crest-tailed Mulgara) burrows; and
    (iv) *Egernia kintorei* (Great Desert Skink) burrows.

    (b) Where *Macrotis lagotis* (Bilby), *Dasycercus blythi* (Brush-tailed Mulgara), *Dasycercus cristicauda* (Crest-tailed Mulgara) or *Egernia kintorei* (Great Desert Skink) burrows are identified in relation to Condition 5(a) of this Permit, the Permit Holder shall ensure that no clearing occurs within 50 metres of the identified *Macrotis lagotis* (Bilby), *Dasycercus blythi* (Brush-tailed Mulgara), *Dasycercus cristicauda* (Mulgara) or *Egernia kintorei* (Great Desert Skink) burrows, unless approved by the *CEO*.

Records to be kept

6. (a) In relation to the clearing of native vegetation authorised under this Permit:

    (i) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
    (ii) the date that the area was cleared;
    (iii) the size of the area cleared (in hectares); and
    (iv) purpose for which clearing was undertaken.

    (b) In relation to flora management pursuant to Condition 4 of this Permit:

    (i) the location of each rare and *priority flora* species, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
    (ii) the species name of each rare and *priority flora* species identified; and
    (iii) a copy of the *botanist's* survey report.

    (c) In relation to fauna management pursuant to Condition 5 of this Permit:

    (i) the location of each habitat identified recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
    (ii) the species name of fauna reasonably likely to utilise, or that have been observed utilising the habitat; and
    (iii) a copy of the *fauna specialist's* report.

Reporting

7. (a) The Permit Holder shall provide a report to the Executive Director, Environment, Department of Mines and Petroleum by 31 July each year for the life of this Permit, demonstrating adherence to all conditions of this Permit, and setting out the records required under Condition 6 of this Permit in relation to clearing carried out between 1 July and 30 June of the previous financial year.

    (b) Prior to 29 October 2016, the Permit Holder must provide to the Executive Director, Environment, Department of Mines and Petroleum a written report of records required under Condition 6 of this Permit where these records have not already been provided under Condition 7(a) of this Permit.

Definitions

The following meanings are given to terms used in this Permit:

botanist means a person with specific training and/or experience in the ecology and taxonomy of Western Australian flora;

CEO means the Chief Executive Officer, Department of Environment and Conservation (Western Australia);

fauna specialist means a person with training and specific work experience in fauna identification or faunal assemblage surveys of Western Australia fauna;

fill means material used to increase the ground level, or fill a hollow;

Guidance Statement No. 51 means the Environmental Protection Authority Guidance Statement No. 51, Guidance for the Assessment of Environmental Factors - Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (2004);

mulch means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation;

priority flora means those plant taxa described as priority flora classes 1, 2, 3 or 4 in the *Department*'s *Declared Rare and Priority Flora List for Western Australia* (as amended);

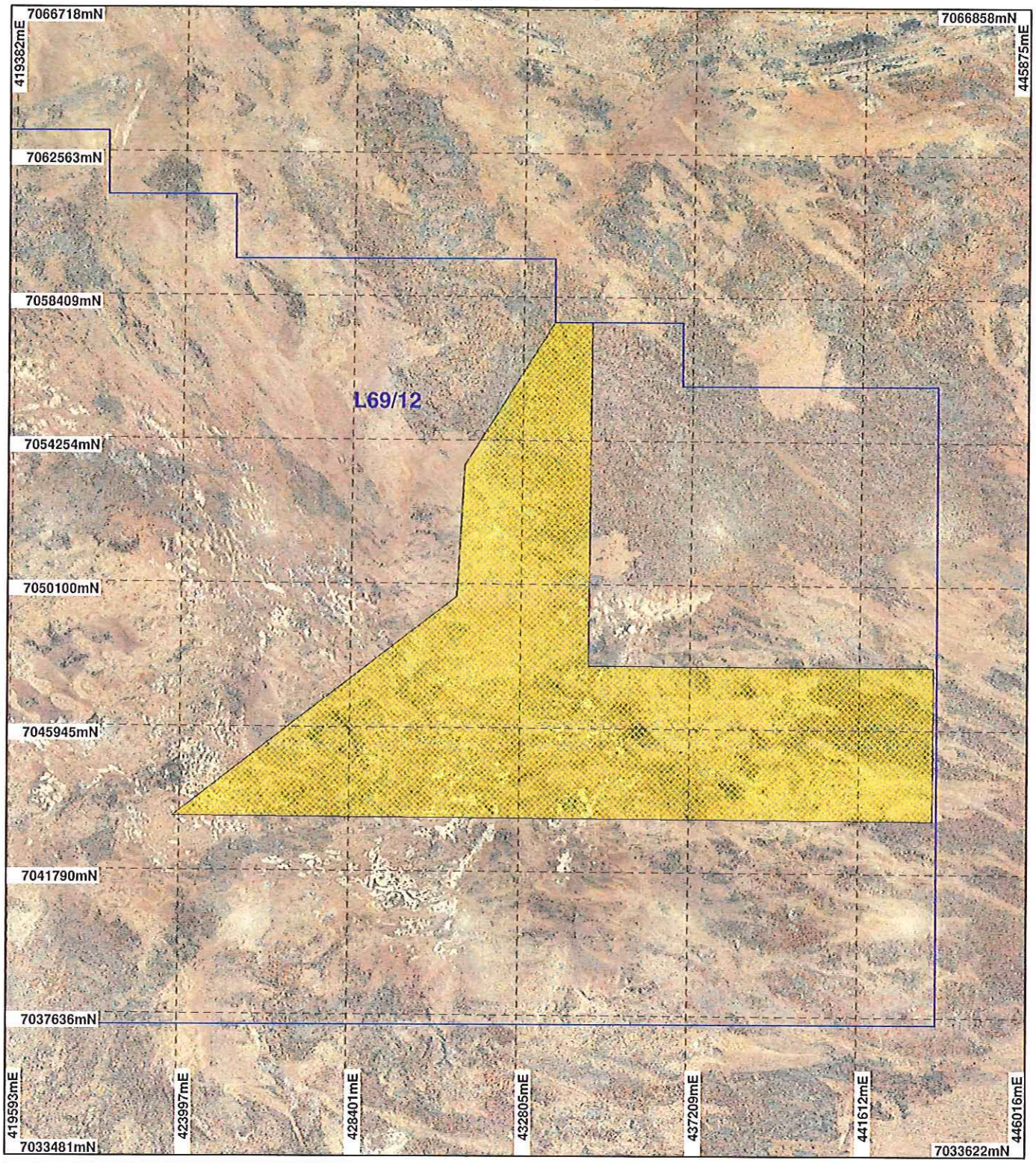
weed/s means a species listed in Appendix 3 of the "Environmental Weed Strategy" published by the Department of Conservation and Land Management (1999), and plants declared under section 37 of the *Agriculture and Related Resources Protection Act 1976.*

Phil Gorey
EXECUTIVE DIRECTOR
ENVIRONMENT
DEPARTMENT OF MINES AND PETROLEUM

Officer with delegated authority under Section 20
of the Environmental Protection Act 1986

6 October 2011

PLAN 4523/1



LEGEND

Clearing Instruments

- Areas Approved to Clear
- Mining Tenements

Vines 1.3m Orthomosaic - Landgate 2005

N

0 3.75 km

Scale 1:150000
(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

Date 6/10/2011

PHIL GOREY

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

Information derived from this map should be confirmed with the data custodian acknowleged by the agency acronym in the legend.

** Project Data. This data has not been quality assured. Please contact map author for details.*