BGC Contracting

KING BAY EASTERN LEASES
FAUNA REPORT

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Prepared for
BGC Contracting PTY LTD

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TERRESTRIAL FAUNA OF THE BURRUP PENINSULA

1 INTRODUCTION

The Dampier Port Authority (DPA) are progressing the development of industrial land for that area on the Burrup Peninsula known as the King Bay Eastern Leases (Figure 1). BGC Contracting Pty Ltd (BGC) has entered into a 10-year lease with the DPA to quarry the site and create an industrial subdivision on the flat land derived there from.

The proposed development is bounded by King Bay Road to the North, King Bay to the South, Streckfuss Road to the west and by vacant crown land and Griffin Road to the east. It is approximately 11.8 hectares in size and comprises:

- Part of De Witt Location 471 which is part of Reserve 41636.
- Part of Vacant Crown Land Lot 475, currently Unallocated Crown Land (UCL) which was previously a portion of De Witt Location 200 Crown Lease 264/1985 which expired in 1994.

Reserve 41636 is currently vested with the Dampier Port Authority for the purpose of a light industrial area.

This land has been designated for the purposes of industry since the 1960s when part was leased to Hamersley Iron (HI). Woodside Petroleum assumed the HI portion and the balance of the area in 1976. By 1994 most of the area had been vested with the DPA for the purpose of port activities, with the exception of part of De Wit location 200 (Land Administration Plan 16683). This portion of the crown lease expired in July 1994 and was ceded back to the crown.

Most of the area (6 ha) proposed to be developed has been disturbed over the years, through clearing, quarry operations and the installation of power easements. The remainder (5.8 ha) is relatively undisturbed and of relatively steep topography.

This report provides a desktop review of the terrestrial fauna previously recorded or likely to occur, on the Burrup Peninsula. Specifically, this review identifies fauna that are likely to inhabit the lease and adjoining areas proposed for development by BGC Contracting Pty Ltd.

2 METHODS

A comprehensive desktop literature review was conducted. This involved a search of Western Australian Museum (WAM) and Department of Conservation and Land Management (CALM) databases, published literature and unpublished environmental reports. A search of the Department of Conservation and Land Management's (CALM) reserve list fauna species (CALM 2003), consultation with CALM scientists familiar with fauna in the region and checks of national and international agreements for the conservation of fauna were also undertaken. These include the China-Australia

Migratory Bird Agreement (CAMBA), Japan-Australia Migratory Bird Agreement (JAMBA) and the Convention on the Conversation of Migratory Species of Wild Animals (CMS).

Publications used to define geographic distribution patterns and species taxonomy in this report include Cogger (2000), Christidis and Boles 1994, Storr 1984, Storr *et al*. (1981, 1983, 1986, 1990, 1999), Johnstone & Storr (1998), Pizzey and Knight (1997), Strahan (1998). Unpublished reports include those of Astron Environmental (1999a, 1999b, 1999c, 2000, 2001, 2003), Biostat (2002), Biota (2001, 2002), Butler and Butler (1987), Butler (1994), Slack-Smith (1999, 2000), Woodside (1995, 1998, 1999).

3 FAUNA OF THE BURRUP PENINSULA

3.1 VERTEBRATE FAUNA

3.1.1 Overview

The Burrup Peninsula has been found to support a diverse terrestrial vertebrate fauna, comprising representatives of the Eyrean zoogeographic region with some Torresian species typically, arid-zone species that have adapted to high temperatures and intermittent rainfall.

The species diversity of the Burrup Peninsula is comparatively high considering its relatively small area compared with the Pilbara as a whole. This high diversity can be partly explained by the multitude of different macro-habitats found along the Burrup Peninsula, but also by the number of microhabitats providing food and shelter within each broadscale habitat type. As many as 47 species of mammal, 173 species of bird and 98 species of reptile may inhabit, or visit, the Burrup Peninsula, the surrounding area, and adjacent coastal fringes. Few of these species are restricted to the Burrup Peninsula alone. However, a number of key species, particularly reptiles but also some mammals (eg. Little Red Kaluta, *Dasykaluta rosamondae*), Pilbara Ningaui (*Ningaui timealeyi*)), are endemic to the Pilbara, with several species on the Burrup Peninsula representing isolated populations.

3.1.2 Mammals

Recent surveys and published distributions indicate that a total of 47 species of mammal (Table 2) may inhabit the Burrup Peninsula (Strahan 1998; Butler 1994; Woodside 1995, 1998, 1999; Biota 2001, 2002; WA Museum 2002, 2003). These consist of a single monotreme (Echidna), seven to eight dasyurid marsupials (Dunnarts, Quolls), four macropods (Wallabies), 19 species of bats from six families, eleven Murids (native rodents) and five introduced mammals. Of these 47 species, 23 species have been recorded from the immediate area surrounding the proposed development site (Butler 1994, Butler and Butler 1987).

Those mammals most likely to inhabit the extensive rockpile areas that occur within the lease include nomadic species, such as the Common Wallaroo (*Macropus robustus*) and Red Kangaroo (*M. rufus*), and those species with specific rockpile habitat preferences. These include the Common Rock Rat (*Zyzomys argurus*), the Common Planigale (*Planigale maculata*), Rothschild's Rock-wallaby (*Petrogale rothschildi*) and the Northern Quoll (*Dasyurus hallucatus*).

The lower slopes, vegetated with shrub species over hummock grasses, also provide suitable habitat for species such as the Little Red Kaluta (*Dasykaluta rosamondae*), Stripe-faced Dunnart (*Sminthopsis macroura*) and Delicate Mouse (*Pseudomys delicatulus*). The Western Pebble Mound Mouse (*Pseudomys chapmani)* has been recorded on the Burrup Peninsula, but only from old distinct mounds formed at the mouth of their nesting burrows. To date, no live *Pseudomys chapmani* have been captured on the Burrup Peninsula. It is unlikely that any live individuals are still present on the Burrup Peninsula and is presumed to be extinct on the Burrup. .

3.1.3 Birds

The largest vertebrate group represented on the Burrup Peninsula is birds, with 173 species from 56 families likely to inhabit or visit the region (Johnstone and Storr 1998, Storr 1984, Pizzey and Knight 1997). Of these, 131 species of bird have been observed on the Burrup Peninsula during recent field surveys (Butler 1994; Woodside 1995, 1998, 1999; Astron 1999c, 2001; Biota 2001, 2002; WA Museum 2003). None of these species are scarce or endemic to the Burrup Peninsula. The families, which make the greatest contribution to species richness, are the Scolopacidae (waders-17 species), Laridae (gulls and terns-9 species), Columbidae (pigeons and doves-7 species), Meliphagidae (honeyeaters-7 species), and Accipitridae (kites, goshawks, eagles and harriers-12 species). Table 3 contains a complete list of all birds that have been either observed in the region during surveys, inhabit the region temporarily based on recent distributions, or may visit the area due to anomalous meteorological events (such as heavy cyclonic rainfall).

Twenty-nine birds likely to be found on the Burrup Peninsula are currently listed under international migratory bird agreements. This list includes 21 waders and seabirds that are most likely to be confined to inter-tidal, estuarine and other more coastal habitats.

The diverse avifauna of the Burrup Peninsula represents, at the family level, 74% and, at the species level, 48% of the total species recorded from the entire Pilbara region. Over 35% of the birds recorded in Australia and its territories occur in the Pilbara, making it one of the most diverse regions in terms of species. There are a number of important differences in the diversity of, and type of birds occupying or visiting the Burrup Peninsula. First, there are no species endemic to the Burrup Peninsula; all birds recorded or purported to occur in the area occur elsewhere in the Pilbara. Second, the lower species diversity of the Burrup Peninsula is in part accounted for by the limited range of habitats available compared with the Pilbara as a whole. For example the Burrup Peninsula has no extensive areas of open fresh water, has only a limited area of natural mangal, and few extensive stands of natural woodland.

3.1.4 Reptiles

Ninety eight terrestrial reptile species including 16 geckos, 7 legless lizards, 8 dragon lizards, 8 monitor lizards, 27 skinks, 4 blind snakes and 18 land snakes, have been recorded from the Burrup Peninsula (Table 4). There are also representatives from other families, including three species of tree frogs, two species of southern frogs, a single species of water snake and at least four species of sea snake. A number of these reptile species are endemic to the Pilbara region, including the gecko species *Diplodactylus mitchelli* (Mitchell's Gecko) and *D. savagei*, the varanid *Varanus pilbarensis* (Pilbara Monitor), the skink species *Lerista quadrivincula* and *Egernia pilbarensis*, the death-adder *Acanthophis wellsi* and the python *Morelia olivacea barroni* (Pilbara Olive Python).

It should be noted that the taxonomic status of many Western Australian reptiles is constantly undergoing revision as new species are described. This is particularly evident in the smaller skink species, where at least 20 species new to science remain to be described by the WAM (Storr *et al.* 1999). Caution is therefore recommended as, although the list is complete for those species likely to occur in the region, the distribution of known species is poorly understood and new species may await discovery on the Burrup Peninsula.

3.2 INVERTEBRATE FAUNA

Generally, our understanding of the invertebrate fauna is very poor for the Burrup Peninsula. It has been only during recent specialised surveys for particular animal groups (e.g. land snails) that attention has been drawn to the highly restricted nature of the distribution of some species, with a subsequent review of their taxonomic status. Information on the status and abundance of several major animal groups remains unclear. These include arachnids and insects.

Recent taxonomic developments have identified the Burrup Peninsula as having a unique Land Snail fauna. The first formal survey of native molluscs was undertaken by the WAM on the tidal flat extending between King Bay and Hearson's Cove in 1999. The study identified 7 species of snail (1 aquatic, 6 land), one of which, *Rhagoda sp*., was known but previously undescribed and is restricted to the Dampier region (Slack-Smith, 1999). Another species (*Quistrachia legendrei*) has a distribution that is restricted to the mainland area of Dampier, the Burrup Peninsula and some of the islands of the Dampier Archipelago (Solem, 1997). Of the six species of land snails recovered from the Burrup by S. Slack-Smith, three species inhabit areas of rockpiles (Slack-Smith 1999, 2000).

3.3 SIGNIFICANT SPECIES

Four species formally identified as having conservation significance (i.e. protected by legislation and/or CALM Reserve listing) may potentially occur within the King Bay Eastern Lease area. Details on each of these species are presented in Table 1.

Table 1: List of significant species that may occur within the King Bay Eastern Leases Industrial Estate.

Species	Comment
Mammals	
Hydromys chrysogaster (Water Rat)	Priority 4 CALM Priority List Prefers freshwater rivers but is known to inhabit marine and estuarine environments (Strahan 1998). Anecdotal evidence suggests that this species may inhabit the Burrup Peninsula; however CALM are not aware of any confirmed sightings or captures (P. Kendrick *pers. comm*.).
Pseudomys chapmani (Western Pebble-mound Mouse)	Priority 4 CALM Priority List Prefers hummock grass lower stony slopes, where pebbles of a size manageable by them are found. Have only been recorded on the Burrup Peninsula from distinct mounds formed at the mouth of their nesting burrow, with no specimen from the Burrup ever being vouched and lodged in the WAM (Nora Cooper *pers. comm*.). This species is presumed to be extinct on the Burrup.

Species	Comment
Reptiles	
Morelia olivacea barroni (Pilbara Olive Python)	Schedule 1 Wildlife Conservation Act. Vulnerable under the EPBC Act 1999. The Pilbara Olive Python is a very large (<6.5m) nocturnal python, which is restricted to the Pilbara region. It is often associated with rockpiles around permanent water pools and is known to exist near seasonal creeks. As there is no permanent water pools or seasonal creeks located on the lease area it is unlikely that Pilbara Olive Pythons inhabit this area.
Notoscincus butleri	Priority 4 CALM Priority List Usually found in hummock grasslands on stony or sandy ground. A relatively poorly known species, *N. butleri* was recently collected on the northern side of Hearson Cove – King Bay axis area of the Burrup Peninsula (Biota 2001).

Other species of high conservation value (not formally recognised) that may occur in the proposed development area include:

- The two Camaenid Land Snails *Rhagada sp.* and *Quistrachia legendrei*. Both species occur within a very limited area around Dampier and the Burrup Peninsula, and are dependent on the crevices and holes within granophyre outcrops and ridges to survive high temperatures (Slack-Smith 1999, 2000). Due to a lack of intensive surveys of land snails on the Burrup Peninsula, there is still considerable uncertainty regarding the status of populations of these snails on the Burrup Peninsula.
- Rothschild's Rock Wallaby (*Petrogale rothschildi*) is known to inhabit rockpile areas of the Burrup Peninsula, and may be present in the rockpile habitat on this lease. Although this species is not currently listed as a CALM Priority Species, a Rock Wallaby Protection Programme on the Burrup has been developed by CALM (Karratha). Information about the protection programme should be sourced from CALM (Karratha) and used for all construction and operations personnel, and distributed for implementation.

3.4 INTRODUCED AND PEST SPECIES

Five species of introduced mammals (Fox *Vulpes vulpes*, Dog *Canis familiaris*, Cat *Felis catus*, Black Rat *Rattus rattus* and House Mouse *Mus musculus*). All introduced mammals pose a serious threat to endemic fauna, either directly through predation, or indirectly through competition for space and food. Several invertebrate pest species exist on the Burrup Peninsula, including Cockroaches (Blatodea), Crickets (Orthoptera) and other household pests, which have been introduced from the encroachment of development on the Burrup Peninsula. Similarly, the common honey-bee (*Apis mellifera*) also inhabits the Burrup Peninsula.

4 FAUNA HABITATS OF THE KING BAY INDUSTRIAL ESTATE EASTERN LEASES

4.1 OVERVIEW

Zoogeographically, most of the vertebrate species occurring around the Burrup Peninsula are widely distributed throughout the Pilbara and through much of the Eyrian Subregion. Most of the fauna habitats found on the lease area are commonly found throughout the Burrup Peninsula, with the exception of the narrow north-south running Rocky Gullies in the southern part of the lease. Although

the area is relatively small, eight main fauna habitat types (Figure 2), based on topography and vegetation types, have been identified on the site (Astron 2003) of the proposed King Bay Industrial Estate (Eastern Leases). These are:

1. Drainage Lines
2. Drainage Zones
3. Lower hill slopes
4. Upper undulating slopes and plateaus
5. Rockpiles
6. Rocky Gullies
7. Flats associated with King Bay
8. Samphire flats

4.2 LEASE AREA HABITAT DESCRIPTIONS

The broader area of the proposed BGC quarry covers approximately 11.8 hectares of the DPA's vested land known as the King Bay Eastern Leases Industrial Estate and the eight habitat types listed above consist of a number of vegetation associations that would be able to support a wide range of animal species.

Due to the steep topography of this site, the Upper Undulating Slopes (habitat 4) and Rockpiles (habitats 5) dominate the site, covering approximately 50% and 25% respectively of the total lease area. These habitats are common throughout the Burrup Peninsula. Rockpiles are characterised by areas of large rocks and boulders surrounding sparse, intermittent patches of vegetation leading into gentle Upper Undulating Slopes and Plateaus.

The north-western section of the lease comprises a section (approximately 12% of the total lease area) of previously disturbed land including the old access track and the power line. The two narrow Rocky Gullies (habitat 6) running north-south through the site are located in the southern section of the lease and drain into the Flats and Samphire Flats associated with King Bay (habitats 7 and 8) and a very narrow band of pebbled foreshore along the edge of King Bay. While the eastern facing Upper Undulating Slopes drain into a shallow Drainage Gully running north-south along the eastern boundary of the lease comprising Habitats 1, 2 and 3. The eight identified habitats and the main vegetation associations of each habitat are detailed below:

Drainage Line:
Generally very shallow but distinct drainage lines occur in this habitat. Vegetation consists of three main associations:

1. In the shallow drainage gully running north-south along the eastern boundary of the lease the vegetation consists of high shrubland of *Grevillea pyramidalis, Acacia inaequilatera* over hummock grassland of mixed *Triodia epactia* (Burrup form) and *Triodia angusta* (Burrup form).

2. The shallow drainage line running east-west across the western side of the lease consists of high open shrubland of *Grevillea pyramidalis, Acacia colei, A. elacantha* over open shrubland *Impocea costata* over hummock grassland of *Triodia epactia* (Burrup form).

3. The small pocket of vegetation on the upper shallow north-south drainage line, protected by rockpile hills consists of high shrubland of *Acacia inaequilatera, Ehretia saligna, Ipomoea costata* over open low hummock grassland of *Triodia epactia* (Burrup form).

Drainage Zone:

Shallow, broad drainage zones that can be quite extensive in size. Vegetation consists of high open/shrubland of *Grevillea pyramidalis, Acacia bivenosa* over hummock grassland of *Triodia angusta* (Burrup form).

Lower Hill Slopes:

Lower portion of the eastern and south-eastern facing hill slope, generally with rock or boulder mantle. Vegetation consists of two main associations:

1. The vegetation on the lower eastern facing slopes consists of hummock grassland of *Triodia epactia* (Burrup form) with *Rhynchosia minima* and very open herbs with scattered shrubs of *Acacia bivenosa*, *Grevillea pyramidalis*.

2. Found on the lower, protected south-eastern facing lower slope is low open shrubland *Indigofera monophylla* over hummock grassland of *Triodia epactia* (Burrup form), with scattered *Acacia bivenosa.*

Upper Undulating Slopes and Plateaus:

Often above rocky ridges or span between upper slopes of hills and also occur as small areas between rocky ridges. There are five main vegetation associations found within this habitat type:

1. On the upper undulating stony plateau, surrounded by rockpiled hills a scattered to very open mixed shrubland of *Grevillea pyramidalis, Acacia bivenosa* and *Hakea lorea* over open herb land over hummock grassland of *Triodia epactia* (Burrup form).

2. On the upper terrace in the south-western corner of lease the vegetation consists of predominately hummock grassland of *Triodia epactia* over scattered shrubs of *Grevillea pyramidalis* and *Acacia bivenosa*.

3. The undulating stony slopes on the western side of the lease consists of high shrubland of *Acacia colei* and *A. bivenosa* over hummock grassland *Triodia epactia* (Burrup form).

4. The eastern facing stony hillslopes and upper corridors and plateaus consist of hummock grassland of *Triodia epactia* (Burrup form) with open herbs with scattered *Grevillea pyramidalis*.

5. The south-south-west facing high slopes consist of shrubland of *Grevillea pyramidalis* over low open shrubland of *Trachymene oleracea, Trichodesma zeylanicum* over hummock grassland of *Triodia epactia* (Burrup form).

Rockpile:

Random stands of often dense vegetation that occurs in soil pockets, with two main vegetation associations:

1. In these soil pockets and crevices around the base of rockpiles and outcrops occurs open woodland of *Terminalia supranitifolia*, *Brachychiton acuminatus*, *Ehretia saligna* var *saligna* over low shrubland of *Scaevola* aff *spinescens*, *Rhagodia preissii* subsp *obovate*, over very open tussock grassland of *Cymbopogon ambiguus*.

2. The upper, landward side of the rockpiles associated with the south-western edge of King Bay consists of open shrubland of *Ipomea costata*, *Ehretia saligna* over very open hummock grassland of *Triodia epactia* (Burrup form).

Rocky Gullies:

Gullies are rock walled and generally narrow with a distinctive drain flowing through them. This habitat type occurs in the deep rocky gullies running north-south through the site and consists of open woodland of *Corymbia hamersleyana, Terminalia supranitifolia* over high shrubland of *Ficus opposita, Flueggea virosa* subsp *melanthesoides* over open low shrubland of *Dichrostachys spicata, Senna glutinosa* over hummock grassland of *Triodia angusta* (Burrup form) and *Triodia epactia* (Burrup form).

Flats Associated with King Bay:

These are the coastal flats that are not inundated but according to their vegetation type area definitely associated with King Bay. Two main vegetation associations occur:

1. On the low lying drainage area on the south-eastern corner of the lease the vegetation consists of high shrubland to open scrub of *Acacia ampliceps, A. ampliceps x bivenosa* over dense hummock grassland of *Triodia angusta* (Burrup form).

2. The south facing lower hill slopes tapering to the edges of King Bay consists of closed hummock grassland of *Triodia angusta* (Burrup form).

Samphire Flats Associated with King Bay:

Semi saline and irregularly inundated tidal flats. This is a narrow strip of flat bordering King Bay and the vegetation consists of dwarf shrubland of *Hemichroa diandra*, *Muellerolimon salicorniaceum, Halosarcia halocnemoides* over open low tussock grassland of *Sporobolus virginicus*.

5 FAUNA OF THE KING BAY INDUSTRIAL ESTATE EASTERN LEASES

The King Bay Industrial Estate Eastern Leases are sited on relatively steep (highest point 40.5 m AHD) topography and include two distinctive drainage lines into King Bay. The area encompasses eight identifiable vegetation types, all of which may provide habitat essential to a number of different animals found throughout the Burrup Peninsula.

According to CALM (P Kendrick *pers. com*), anecdotal evidence suggests that the Priority 4 Species *Hydromys chrysogaster* (Water Rat) may be present on some of the islands of the Dampier Archipelago and therefore the Burrup Peninsula. It is possible that this species could be found in the dense mangrove forest on the southern boundary of the lease. However, as this habitat is not going to be directly impacted by the proposed development this species is not likely to be affected.

Destruction of habitat for the Pilbara Olive Python *Morelia olivacea barroni* is of concern as recent surveys by the Nickol Bay Naturalists Club indicate that in some areas of favourable habitat, such as Hearson's Cove, east of the proposed development, the density of Pilbara Olive Python may be as high as 30 individuals/ha (S. Van Leeuwin *pers.com*). However, as areas of permanent water pools or creek lines associated with the Pilbara Olive Python are not found on the proposed development site, it is unlikely that many of this species are present in this area.

It is envisaged that the two rocky gullies on the southern section of the lease would provide a source of moisture for fauna. The hollow-forming trees found along these gullies, would also provide suitable habitat for hollow nesting species. The canopy cover and prolific, sweet smelling flowers of these woodland species would also attract a variety of additional birdlife. During a recent vegetation survey of the site, a colony of Variegated Fairy-Wrens (*Malurus lamberti*) was located in the south-eastern corner of the lease amongst *Acacia ampliceps* (V. Long *pers.com*). This species is not thought to be regionally significant (P. Kendrick *pers.com*).

There are a large number of bird species that occur on the Burrup Peninsula which are considered to be significant and have special conservation status. Australian legislation protects most of these while others are protected through international agreements with countries like Japan and China. It is unlikely that the proposed development will impact directly on any of the birds that inhabit or visit the area that are protected under the various domestic (Environment Protection and Biodiversity Conservation Act 1999) and international migratory bird agreements (China-Australia Migratory Bird Agreement, Japan-Australia Migratory Bird Agreement, Bonn Convention). Many of the species covered by the CAMBA and JAMBA agreements are migratory waders (*Scolopacidae* and *Charadriidae*), species that rest and feed along the west coast of Australia during their non-breeding period. Most waders may pass through on their way to more favourable foraging areas, or if in residence for any duration will restrict their activities to the immediate vicinity of the shoreline. The Families Falconidae and Accipitridae are also protected; however some (e.g. Osprey and Nankeen Kestrel) often take advantage of man-made structures either for nest platforms, observation points or feeding sites. Some consideration of this habit should be taken into account during the planning stages of the development to ensure that all elevated positions of the development do not encourage nesting of raptors, that may affect their breeding output.

The two Camaenid land snails, *Rhagada sp*. and *Quistrachia legendrei* that may inhabit granophyre outcrops and ridges are dependent of the crevices and holes created by rock piles to survive high

temperatures (Slack-Smith 1999, 2001). The habitat found in the Eastern Leases is suitable to these snail species. However, despite the considerable uncertainty regarding the population status on the Burrup Peninsula, the wide distribution of the land snail's suitable habitat in this region suggests that this development is not likely to have any significant impact on populations.

6 RECOMMENDATIONS

The species diversity of the Burrup Peninsula is comparatively high considering its relatively small area compared with the Pilbara as a whole. This high diversity can be explained in part by the multitude of different macro-habitats found along the Burrup Peninsula. Perhaps more important for many organisms are the number of microhabitats within each broad habitat that provide food and shelter. For example, at a broad-scale, the rocky outcrops and rock-piles identified in this report appear particularly inhospitable. However, fissures in rocks and cavities created by rock-piles are home to a number of small marsupials, many reptiles and land snails.

It is possible that this habitat is home to at least three rare and endangered animals.

(1) Pilbara Olive Python Morelia olivacea barroni
(2) Camaenid Land Snails *Rhagada sp.* and
(3) *Quistrachia legendrei*

It is recommended that a Fauna Management Plan be prepared by BGC Contracting Pty. Ltd. in liaison with the appropriate agencies (i.e. CALM) for the development site, with the principal aim to minimise the accidental death of native animals and to protect native animals consistent with the provisions of the Wildlife Conservation Act. The Fauna Management Plan should identify fauna at risk from the construction activities associated with the development, and highlight procedures for reporting deaths, observations as well as for the appropriate relocation of fauna.

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Table 2: **Mammals recorded and predicted on the Burrup Peninsula and surrounding areas**

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS [##]	Strahan (1998)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Biota (2001)	Biota (2002)	WA Museum (*2002, 2003)
Tachyglossidae (Echidna)	*Tachyglossus aculeatus*	Short Beaked Echidna			X	X	X	X	X	X	X
Dasyuridae (Quolls, Dunnarts)	*Dasyurus hallucatus*	Northern Quoll			X						X
	Dasykaluta rosamondae	Little Red Kaluta			X						X
	Ningaui timealeyi	Pilbara Ningaui			X	X	X	X	X		X
	Planigale maculata[1]	Common Planigale			X						X
	Planigale sp. 1[1]	Undescribed Planigale								X	
	Pseudantechnius roryi[2]										X
	Pseudantechinus woolleyae[2]	Woolley's Pseudantechinus		O							
	Sminthopsis macroura	Stripe-faced Dunnart		O							
Macropodidae (Kangaroos, Wallabies)	*Macropus robustus*	Common Wallaroo			X	X	X	X		X	X
	Macropus rufus	Red Kangaroo			X						
	Petrogale lateralis[3]	Black-footed Rock Wallaby	**S1**		X						
	Pterogale rothschildi	Rothchild's Rock Wallaby									X
Pteropodidae (Fruit Bats, Flying Foxes)	*Pteropus scapulatus*	Little Red Flying Fox			X						
	Pteropus alecto	Black Flying Fox		O							
	Pteropus sp.[4]								X		
Hipposideridae (Leafnosed-bats)	*Rhinonicteris aurantius*[5]	Orange Leafnosed-bat	**S1**	O							
Megadermatidae (False Vampires)	*Macroderma gigas*[6]	Ghost Bat	**P4**	O							

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS[##]	Strahan (1998)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Biota (2001)	Biota (2002)	WA Museum (*2002, 2003)
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat		O							
(Sheathtail-bats)	*Taphozous georgianus*	Common Sheathtail-bat			X				X	X	
Molossidae	*Chaerephon jobensis*	Northern Freetail-bat		O							
(Freetail-bats)	*Mormopterus beccarii*	Beccari's Freetail-bat		O							
	Mormopterus loriae[7]	Little Northern Freetail-bat	**P1**						X	X	
	Nyctinomus australis	White-striped Freetail-bat		O							
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat							X	X	
(Vespertilionid	*Chalinolobus morio*	Chocolate Wattled Bat		O							
Bats)	*Eptesicus pumilis*	Little Cave Eptesicus			X						
	Nyctophilus arnhemensis[8]	Northern Long-eared Bat							X		
	Nyctophilus bifax[9]	Eastern Long-eared Bat		O							
	Nyctophilus geoffroyi	Lesser Long-eared Bat		O							
	Nyctophilus timoriensis	Greater Long-eared Bat		O							
	Scotorepens greyii	Little Broad-nosed Bat		O							
	Vespadelus finlaysoni	Finlayson's Cave Bat							X	X	X*
Muridae	*Hydromys chrysogaster*[10]	Water Rat	**P4**		X						
(Mice & Rats)	*Mus musculus*	House mouse	**I**		X	X		X			X
	Notomys alexis	Spinifex Hopping-mouse									X
	Pseudomys chapmani[11]	Western Pebble-mound Mouse	**P4**	O							
	Pseudomys delicatulus	Delicate Mouse			X	X		X			X
	Pseudomys hermannsburgensis	Sandy Inland Mouse			X	X	X	X	X		X
	Rattus rattus	Black Rat	**I**		X						X
	Rattus tunneyi[12]	Pale Field-rat									X
	Zyzomys argurus	Common Rock Rat			X						X

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS[##]	Strahan (1998)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Biota (2001)	Biota (2002)	WA Museum (*2002, 2003)
	Leggadina lakedownensis[13]	Lakeland Downs Mouse	**P4**	O							
	Mesembriomys macrurus[14]	Gold-backed Tree-rat	**P4**	O							
Canidae	*Vulpes vulpes*	Fox	**I**		X						X
(Dogs)	*Canis familiaris*	Dog	**I**		X						
Felidae	*Felis catus*	Cat	**I**		X	X	X		X		
(Cats)											

Taxonomy according to Strahan (1998).

X – Recorded or observed.

O – Predicted based on distribution maps of Strahan (1998), but not recorded or observed.

 # – Comments:

1: ***Planigale maculata* and *Planigale* sp. 1**. Recent taxonomic revision identifies the newly described *Planigale* sp. 1 as genetically different to *P. maculata*. All records on Burrup probably *Planigale* sp. 1 (Biota, 2002).

2: ***Pseudantechinus roryi* and *P. wooleyae***. Taxonomic revision split *P. roryi* from *P. wooleyae*. Probably only *P. roryi* on Burrup (Biostat, 2002).

3: ***Petrogale lateralis***. The source of this record is an old, discredited Butler record. *P. lateralis* became extinct on Depuch about 30-40 years ago, but populations still exist on North West Cape and Barrow Island. One of Australia's most endangered mammals. It does not occur on the Burrup (*pers. comm.* P. Kendrick, CALM).

4: ***Pteropus* sp**. Flying fox observed but not identified to species level (Biota, 2001).

5: ***Rhinonicteris aurantius***. Lives only in gorge and range habitats containing high-humidity refuges, in the east and southern Pilbara. Nearest record is from the Fortescue River crossing at Mardie (*pers. comm.* P. Kendrick, CALM). Not expected on Burrup due to absence of suitable habitat, specimen found in Karratha probably arrived after transportation on a car radiator grill (Biota, 2002)

6: ***Macroderma gigas***. The ghost bat does occur as a vagrant in the hills to the south of Karratha however there do not appear to be any caves large enough to accommodate ghost bat breeding on the Burrup (*pers. comm.* P. Kendrick, CALM). Not expected on Burrup due to absence of suitable habitat (Biota, 2002).

7: ***Mormopterus loriae***. Identified as possibly present (Biota, 2001), then confirmed by two call sequences recorded at Cowrie Cove (Biota, 2002).

8: ***Nyctophilus arnhemensis***. Identified as possibly present in mangroves (Biota, 2001).

9: ***Nyctophilus bifax***. Occurs only in tall Melaleuca argentia forests that occur along major rivers and wetlands which are not present on the Burrup (*pers. comm.* P. Kendrick, CALM).

10: ***Hydromys chrysogaster***. Perhaps on the Burrup (anecdotal evidence of presence on the Dampier Archipelago islands), CALM is not aware of any confirmed captures or sightings (*pers. comm.* P. Kendrick, CALM).

11: ***Pseudomys chapmani***. This species is extinct on the Burrup, and from the adjacent mainland. Mounds present on the Burrup are old, flat, dead, empty, extinct ex-mounds (*pers. comm.* P. Kendrick, CALM). Targeted survey by Biota (2001) failed to identify any specimens.

12: ***Rattus tunneyi***. This species is extinct on the Burrup (*pers. comm.* P. Kendrick, CALM). Targeted survey by Biota (2001) failed to identify any specimens.

13: ***Leggadina lakedownensis***. Nearest records from Millstream. It's apparent preference for cracking clays make it an unlikely candidate for the Burrup (*pers. comm.* P. Kendrick, CALM; Biota, 2002).

14: ***Mesembriomys macrurus***. Nearest record in the Kimberley. A rare animal, and without any doubt absent from the Burrup (*pers. comm.* P. Kendrick, CALM). Presumed extinct in the Pilbara (Biota, 2002).

– Conservation Status Code:

S1: Species protected under Schedule 1 of the *Wildlife Conservation Act* 1950 (Wildlife Conservation Notice 2003). Fauna that is rare or likely to become extinct.

P1: Priority One species on the CALM Declared Rare and Threatened Fauna List (2003). Includes species with few, poorly known populations on threatened lands.

P4: Priority Four species on the CALM Declared Rare and Threatened Fauna List (2003). Includes species in need of monitoring.

I: Introduced species.

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Table 3: **Birds recorded and predicted on the Burrup Peninsula and surrounding areas**

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS[##]	Pizzey & Night (1997) Johnstone & Storr (1998)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Astron (1999)	Astron (2001)	Biota (2001)	Biota (2002)	WA Museum (2003)
Casuariidae (Emus)	*Dromaius novaehollandiae*	Emu		O									
Phasianidae (True Quails)	*Coturnix ypsilophora*	Brown Quail							X				X
Anatidae (Swans and Ducks)	*Chenonetta jubata* *Cygnus atratus* *Aythya australis* *Anas superciliosa* *Anas gracilis*	Australian Wood Duck Black Swan Hardhead Pacific Black Duck Grey Teal	**M** **M** **M** **M** **M**	O* O* O* O* O*									
Podicipedidae (Grebes)	*Podiceps cristatus* *Poliocephalus poliocephalis* *Tachybaptus novaehollandiae*	Great Crested Grebe Hoary-headed Grebe Australasian Grebe		O O O									
Sulidae (Gannets, Boobies)	*Sula leucogaster* *Sula dactylatra*	Brown Booby Masked Booby	**M** **M**	 O*	X								
Anhingidae (Darters)	*Anhinga melanogaster*	Darter		O*									
Phalacrocoracidae (Cormorants)	*Phalacrocorax varius* *Phalacrocorax carbo* *Phalacrocorax suleirostris*	Pied Cormorant Great Cormorant Little Black Cormorant		 O* O*	X								

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS[##]	Pizzey & Night (1997) Johnstone & Storr (1998)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Astron (1999)	Astron (2001)	Biota (2001)	Biota (2002)	WA Museum (2003)
	Phalacrocorax melanoleucos	Little Pied Cormorant		O*									
Fregatidae (FrigateBirds)	*Fregata ariel*	Lesser Frigate Bird	**M**		X								
Hydrobatidae (Petrels)	*Oceanites oceanicus*	Wilson's Storm Petrel											X
Pelecanidae (Pelicans)	*Pelecanus conspicillatus*	Australian Pelican			X								
Ardeidae (Herons, Egrets, Bitterns)	*Ardea novaehollandiae*	White-faced Heron			X								
	Ardea alba	Great Egret	**M**		X								
	Butorides striatus	Mangrove Heron			X								
	Egretta sacra	Eastern Reef Egret	**M**		X								
	Egretta garzetta	Little Egret		O									
	Butorides striatus	Striated Heron		O									
	Nycticorax caledonicus	Nankeen Night Heron			X								
Threskiornithidae (Ibises and Spoonbills)	*Threskiornis molucca*	Australian White Ibis		O*									
	Threskiornis spinicollis	Straw-necked Ibis		O*									
	Plegadis falcinellus	Glossy Ibis	**M**	O*									
	Platalea regia	Royal Spoonbill		O*									
	Platalea flavipes	Yellow-billed Spoonbill		O*									
Ciconiidae (Storks)	*Ephippiorhynchus asiaticus*	Black-necked Stork			X								

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS[##]	Pizzey & Night (1997) Johnstone & Storr (1998)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Astron (1999)	Astron (2001)	Biota (2001)	Biota (2002)	WA Museum (2003)
Accipitridae	*Pandion haliaetus*	Osprey	**M**		X		X	X			X		
(Osprey, Hawks, Eagles)	*Elanus caeruleus*	Black shouldered Kite/Buzzard	**M**		X						X		
	Hamirostra melanosternon	Black-breasted Kite/Buzzard	**R**		X								
	Haliastur indus	Brahminy Kite	**M**		X	X	X	X	X				X
	Haliastur sphenurus	Whistling Kite	**M**		X								
	Accipiter fasciatus	Brown Goshawk	**M**		X								
	Accipiter cirrhocephalus [1]	Collared Sparrowhawk											
	Haliaeetus leucogaster	White-bellied/breasted Sea-Eagle	**M**		X	X	X	X					
	Aquila audax	Wedge-tailed Eagle	**M**		X		X						
	Hieraaetus morphnoides	Little Eagle	**M**		X								
	Circus assimilis	Spotted Harrier	**M**		X				X		X		
	Circus approximans	Swamp Harrier	**M**		X								
Falconidae	*Falco berigora*	Brown Falcon	**M**		X			X			X		X
(Falcons)	*Falco cenchroides*	Nankeen/Australian Kestrel	**M**		X	X	X		X	X	X		
	Falco longipennis	Australian Hobby	**M**		X								
	Falco hypoleucos	Grey Falcon	**R**	O									
	Falco peregrinus	Peregrine Falcon	**S4**	O									
Gruidae	*Grus rubicundus*	Brolga	**M**	O									
(Cranes)													
Rallidae	*Gallirallus philippensis*	Buff banded Rail		O									
(Rails)	*Porzana tabuensis*	Spotless Crake		O									
	Porzana fluminea	Australian Spotted Crake		O*									

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	Fulica atra	Eurasian Coot		O*									
	Gallinula ventralis	Black-tailed Native-hen		O*									
Otididae (Bustards)	*Ardeotis australis*	Australian Bustard		O									
Turnicidae (Button-Quails)	*Turnix velox*	Little Button-quail			X	X		X					
Scolopacidae (Curlews, Sandpipers, Snipes, Godwits)	*Actitus hypoleucos*	Common Sandpiper	**M**		X								
	Arenaria interpres	Ruddy Turnstone	**M**		X								
	Calidris acuminata	Sharp-tailed Sandpiper	**M**		X								
	Calidris alba	Sanderling	**M**		X								
	Calidris tenuirostris	Great Knot	**M**	O									
	Calidris canutus	Red Knot	**M**		X								
	Calidris ferruginea	Curlew Sandpiper	**M**		X								
	Calidris ruficollis	Red-necked Stint	**M**		X								
	Limosa limosa	Black-tailed Godwit	**M**		X								
	Limosa lapponica	Bar-tailed Godwit	**M**		X								
	Numenius madagascariensis	Eastern Curlew	**P4, M**		X								
	Numenius phaeopus	Whimbrel	**M**		X								
	Numenius minutes	Little Whimbrel	**M**	O									
	Heteroscelus brevipes	Grey-tailed Tattler	**M**		X								
	Tringa nebularia	Common Greenshank	**M**		X								
	Xenus cinereus	Terek Sandpiper	**M**		X								

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS[##]	Pizzey & Night (1997) Johnstone & Storr (1998)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Astron (1999)	Astron (2001)	Biota (2001)	Biota (2002)	WA Museum (2003)
	Limicola falcinellus	Broad-billed Sandpiper	**M**	O									
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew	**P4,R**		X						X	X	
(Stone-curlews)	*Esacus neglectus*	Beach Stone-curlew	**R**		X								
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher			X								
(Oystercatchers)	*Haematopus fuliginosus*	Sooty Oystercatcher			X			X					
Recurvirostridae	*Recurvirostra novaehollandiae*	Red-necked Avocet	**M**		X								
(Stilts, Avocets)	*Himantopus himantopus*	Black-winged Stilt	**M**		X								
Charadriidae	*Charadrius leschenaultii*	Large Sand Plover	**M**		X								
(Lapwings, Plovers, Dotterels)	*Charadrius mongolus*	Mongolian Sand Plover	**M**		X								
	Charadrius veredus	Oriental Plover	**M**	O									
	Charadrius ruficapillus	Red-capped Plover	**M**		X								
	Elseyornis melanops	Black-fronted Dotterel	**M**		X								
	Pluvialis squatarola	Grey Plover	**M**		X								
	Pluvialis dominica	American Golden Plover	**M**	O									
	Vanellus miles	Masked Lapwing	**M**	O									
Glareolidae	*Stiltia isabella*	Australian Pratincole			X								
(Pratincoles)	*Glareola maldivarum*	Oriental Practincole	**M**	O									

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Laridae	*Larus novaehollandiae*	Silver Gull			X								
(Gulls, Noddies, Terns)	*Anous stolidus*	Common Noddy											X
	Childonias leucoptera	White-winged Black Tern	**M**		X								
	Sterna bengalensis	Lesser Crested Tern			X								
	Sterna bergii	Crested Tern			X								
	Sterna caspia	Caspian Tern	**M**		X								
	Sterna nereis	Fairy Tern	**R**		X								
	Sterna albifrons	Little Tern	**M, R**										X
	Sterna nilotica	Gull-billed Tern			X								
Columbidae	*Columba livia*	Feral/Domestic Pigeon	**I**		X								
(Pigeons, Doves)	*Geopelia cuneata*	Diamond Dove			X	X			X				
	Geopelia humeralis	Bar-shouldered Dove			X	X		X					X
	Ocyphaps lophotes	Crested Pigeon			X	X	X	X	X	X	X	X	
	Geopelia striata	Peaceful Dove			X	X	X	X	X				
	Phaps chalcoptera	Common Bronzewing		O									
	Geophaps plumifera	Spinifex Pigeon			X	X	X	X			X		X
Cacatuidae	*Cacatua sanguinea*	Little Corella			X	X	X	X				X	X
(Cockatoos)	*Cacatua roseicapilla*	Galah			X	X	X	X	X	X	X	X	
Psittacidae	*Barnardius zonarius*	Western Ringneck			X								
(Broad-tailed Parrots)	*Melopsittacus undulatus*	Budgerigar			X	X							

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Cuculidae	*Cuculus pallidus*	Pallid Cuckoo			X			X			X		X
(Cuckoos)	*Chrysococcyx basalis*	Horsfield's Bronze-cuckoo			X								
	Chrysococcyx osculans	Black-eared Cuckoo			X			X					
Strigidae	*Ninox novaeseelandiae*	Southern Boobook	**M**		X								X
(Hawk Owls)													
Tytonidae	*Tyto alba*	Barn Owl			X								
(Barn Owls)													
Podargidae	*Podargus strigoides*	Tawny Frogmouth			X								X
(Frogmouths)													
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar	**R**		X		X						
(Nightjars)													
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar			X								
(Owlet-nightjars)													
Apodidae	*Apus pacificus*	Fork-tailed Swift	**M**		X								
(Swiftlets, Swifts)													
Halcyonidae	*Dacelo leachii*	Blue-winged Kookaburra			X								
(Tree Kingfishers)	*Todiramphus chloris*	Collared/Mangrove Kingfisher			X			X					X
	Todiramphus pyrrhopygia	Red-backed Kingfisher			X		X	X	X		X	X	
	Todiramphus sanctus	Sacred Kingfisher			X		X						
Meropidae	*Merops ornatus*	Rainbow Bee-eater	**M**										X
(Bee-eaters)													

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Maluridae	*Malurus lamberti*	Variegated Fairy-wren			X								
(Fairy Wrens)	*Malurus leucopterus*	White-winged Fairy-wren			X						X		
Pardalotidae	*Pardalotus rubricatus*	Red-browed Pardalote			X			X					
(Pardalotes)	*Pardalotus striatus*	Striated Pardalote		O									
	Gerygone tenebrosa	Dusky Gerygone Weebill/Warbler			X			X					X
	Smicrornis brevirostris	Brown/Yellow Weebill		O									
Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater			X		X						
(Honeyeaters)	*Lichmera indistincta*	Brown Honeyeater			X	X	X	X					X
	Lichenostomus keartlandi	Grey-headed Honeyeater			X								
	Lichenostomus virescens	Singing Honeyeater			X	X	X	X	X		X	X	X
	Lichenostomus penicillatus	White-plumed Honeyeater					X	X					
	Manorina flavigula	Yellow-throated Miner			X	X	X	X	X	X	X	X	
	Ephthianura tricolor	Crimson Chat			X								X
Petruicidae	*Eopsaltria pulverulenta*	Mangrove Robin			X								X
(Thrushes, Flycatchers)													
Pachycephalidae	*Pachycephala lanioides*	White-breasted Whistler			X		X						X
(Whistlers)	*Pachycephala melanura*	Mangrove Golden Whistler			X								X
	Pachycephala rufiventris	Rufous Whistler			X								
Dicruridae	*Rhipidura fuliginosa*	Grey Fantail				X							X
(Fantails)	*Rhipidura leucophrys*	Willie Wagtail			X	X	X	X	X				X
	Rhipidura phasiana	Mangrove Fantail			X								
	Grallina cyanoleuca	Australian Magpie-lark			X	X	X			X			

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS[##]	Pizzey & Night (1997) Johnstone & Storr (1998)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Astron (1999)	Astron (2001)	Biota (2001)	Biota (2002)	WA Museum (2003)
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike			X	X	X	X	X	X	X		X
(Cuckoo-shrikes, Trillers)	*Lalage suerii*	White-winged Triller			X	X		X					
Artamidae	*Artamus cinereus*	Black-faced Woodswallow			X	X	X	X	X			X	
(Woodswallows)	*Artamus leucorhynchus*	White-breasted Woodswallow			X								
	Artamus personatus	Masked Woodswallow			X					X			
	Artamus minor	Little Woodswallow					X						
	Artamus pacificus	Fork-tailed Swift		O									
	Cracticus nigrogularis	Pied Butcherbird			X	X	X	X	X	X	X	X	
	Gymnorhina tibicen	Australian Magpie			X		X						
Corvidae	*Corvus bennetti*	Little Crow			X		X						
(Crows)	*Corvus orru*	Torresian Crow			X								
Pittidae	*Pitta moluccensis*	Blue-winged Pitta											X
(Pittas)													
Ptilonorhynchidae	*Chlamydera guttata*	Western/Spotted Bowerbird			X				X				
(Bowerbirds)													
Alaudidae	*Mirafra javanica*	Singing Bushlark			X		X				X		
(Old world Larks)													
Motacillidae	*Anthus australis*	Richard's Pipit			X	X	X	X			X	X	X
(Pipits)													
Passeridae	*Emblema pictum*	Painted Finch/Firetail			X	X		X			X		
(Finches)	*Taeniopygia guttata*	Zebra Finch			X	X	X	X	X	X		X	

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS[##]	Pizzey & Night (1997) Johnstone & Storr (1998)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Astron (1999)	Astron (2001)	Biota (2001)	Biota (2002)	WA Museum (2003)
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird			X								
(Flowerpeckers)													
Hirundinidae	*Hirundo ariel*	Fairy Martin			X								
(Swallows, Martins)	*Hirundo neoxena*	Welcome Swallow			X	X	X	X	X				
	Hirundo nigricans	Tree Martin			X	X				X			
	Hirundo ruscha	Barn Swallow		O									
Sylviidae	*Cinclorhamphus cruralis*	Brown Songlark			X					X			
(Old World Warblers)	*Cinclorhamphus mathewsi*	Rufous Songlark			X								
	Eremiornis carteri	Spinifex-bird			X							X	
Zosteropidae	*Zosterops luteus*	Yellow White-eye			X	X							X
(White-eyes)													

Taxonomy according to Christidis and Boles (1994), Pizzey and Knight (1997).

X – Recorded or observed.

O – Predicted based on distribution maps of Pizzey and Night (1997) or Johnstone and Storr (1998), but not recorded or observed; * indicates species that may utilize the region temporarily as part of a migration route (eg waders), as a result of displacement from tropical cyclones (eg Boobies) or as a result of unseasonal rains (Waterfowl).

 # – Comments:

1: *Accipiter cirrhocephalus.* Recorded in Biostat (2002) desktop survey, source unclear.

– Conservation Status Code:

R: Species included on Department of Conservation and Land Management's *Reserve List*. The reserve list comprises fauna which have recently been removed from the list of threatened fauna; have a restricted distribution; are uncommon, declining in range and/or abundance; or for which there is insufficient information to make an assessment of their status. Reserve List Species are described as fauna for which the impacts of any proposed development should be carefully considered, as there is a risk that such activities may result in the taxa meeting the criteria for listing as a threatened species.

M: Migratory species protected under the Environment Protection and Biodiversity Act 1999 falling under the Japan-Australia Migratory Bird Agreement (JAMBA), the China-Australia Migratory Bird Agreement (CAMBA), and the Convention on the conservation of migratory species of wild animals (Bonn Convention).

S4: Species protected under Schedule 4 (other specifically threatened fauna) of the *Wildlife Conservation Notice* 2002. Includes uncommon birds with a cosmopolitan distribution and species whose breeding areas are threatened by habitat destruction and other causes.

P4: Priority Four species on the CALM Declared Rare and Threatened Fauna List (2003). Includes species in need of monitoring.

I: Introduced Species.

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Table 4: Amphibian and reptile species recorded and predicted on the Burrup Peninsula and surrounding areas

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS[##]	Cogger (2000);Storr *et al.* (1981, 1983, 1986, 1990)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Astron (1999)	Biota (2001)	Biota (2002)	WA Museum (*2002, 2003)	CALM (2003)
Amphibians													
Hylidae	*Cyclorana maini*	Burrowing Frog			X			X				X	
(Tree Frogs)	*Cyclorana australis*											X	
	Litoria rubella	Desert Tree Frog			X							X	
Myobatrachidae	*Notaden nichollsi*											X*	
(Southern Frogs)	*Uperoleia russelli*			O									
Reptiles													
Geckonidae	*Crenadactylus ocellatus horni*	Clawless Gecko			X	X						X	X
(Geckos)	*Diplodactylus ciliaris aberrans*[1]	Spine tailed Gecko			X							X	X
	Diplodactylus conspicillatus[1]	Spectacled Gecko			X						X	X	X
	Diplodactylus elderi[1]	Jewelled Gecko				X	X					X	X
	Diplodactylus jeanae	Jean's Gecko		O									
	Diplodactylus mitchelli	Mitchell's Gecko		O									
	Diplodactylus savagei	Tree Dtella			X	X	X					X	X
	Diplodactylus stenodactylus	Fat-tailed Gecko			X	X	X					X	X
	Diplodactylus wellingtonae[1]											X	X
	Gehyra pilbara	Pilbara Gecko										X	X
	Gehyra punctata	Spotted Dtella			X	X	X			X	X	X	X
	Gehyra variegata	Tree Dtella			X		X				X	X	X
	Heteronotia binoei	Bynoes Gecko			X							X	X

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS[##]	Cogger (2000);Storr *et al.* (1981, 1983, 1986, 1990)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Astron (1999)	Biota (2001)	Biota (2002)	WA Museum (*2002, 2003)	CALM (2003)
	Heteronotia spelea	Desert Cave Gecko		O									
	Nephrurus levis pilbarensis	Smooth Knob-tailed Gecko		O									
	Oedura marmorata	Marbled Velvet Gecko			X							X	
Pygopodidae	*Delma borea*							X				X*	X
(Legless Lizards)	*Delma fraseri*				X								
	Delma nasuta				X	X							
	Delma pax				X	X	X					X	X
	Delma tincta	Dyed Pygopod										X	X
	Lialis burtonis	Burton's Snake Lizard			X	X	X	X		X		X	
	Pygopus nigriceps	Hooded/Black-headed Scaly-foot		O									
Agamidae	*Ctenophorus caudicinctus caudicinctus*	Ring-tailed Dragon			X		X	X	X	X	X		X
(Dragon Lizards)	*Ctenophorus inermis (cf C. nuchalis)*	Central Netted Dragon		O									
	Ctenophorus isolepis isolepis	Military Dragon			X	X				X	X		X
	Ctenophorus reticulatus	Western Netted Dragon		O									
	Gemmatophora gilberti gilberti	Gilbert's Dragon			X								
	Gemmatophora longirostris												
	Pogona minor minor	Western Bearded Dragon			X	X	X	X					
	Tympanocryptis cephala												
Varanidae	*Varanus acanthurus*	Ridge-tailed Monitor			X	X					X	X	X
(Monitor Lizards)	*Varanus brevicauda*	Short-tailed Monitor									X	X	
	Varanus eremius	Desert Pygmy Monitor			X							X	
	Varanus giganteus	Perentie			X								

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS[##]	Cogger (2000);Storr *et al.* (1981, 1983, 1986, 1990)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Astron (1999)	Biota (2001)	Biota (2002)	WA Museum (*2002, 2003)	CALM (2003)
	Varanus gouldii	Sand Monitor (Bungarra)			X								
	Varanus panoptes rubidus											X	
	Varanus pilbarensis											X	
	Varanus tristis tristis	Black-headed Monitor (Racehorse Goanna)			X				X			X	
Scincidae	*Carlia triacantha*	Three-spined Skink			X							X	X
(Skinks)	*Carlia munda*												X
	Cryptoblepharus carnabyi					X						X	X
	Cryptoblepharus plagiocephalus	Fence Skink			X							X	X
	Ctenotus duricola												
	Ctenotus grandis titan									X			X
	Ctenotus helenae			O									
	Ctenotus leonhardii												X
	Ctenotus pantherinus ocellifer				X	X		X				X	X
	Ctenotus rubicundus										X	X	X
	Ctenotus saxatilis				X	X	X	X			X	X	X
	Ctenotus serventyi						X	X				X	X
	Cyclodomorphus melanops											X	X
	Egernia depressa												X
	Egernia formosa			O									
	Egernia pilbarensis											X	X
	Glaphyromorphus isolepis						X					X	X
	Lerista bipes				X		X			X		X	

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS[##]	Cogger (2000);Storr *et al.* (1981, 1983, 1986, 1990)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Astron (1999)	Biota (2001)	Biota (2002)	WA Museum (*2002, 2003)	CALM (2003)
	Lerista muelleri (cf. pannawonica)				X		X	X		X	X	X	
	Menetia greyii	Common Dwarf Skink			X	X	X	X			X	X	
	Menetia surda				X	X		X				X	
	Morethia ruficauda exquisita	Fire-tailed Skink			X	X	X	X				X	
	Notoscincus butleri		P4							X			
	Notoscincus ornatus ornatus				X							X	
	Omolepida branchialis				X								
	Sphenomorphus isolepis				X								
	Tiliqua multifasciata			O									
Snakes													
Typhlopidae	*Ramphotyphlops australis*	Worm Snake			X							X	
(Blind Snakes)	*Ramphotyphlops braminus*	Worm Snake										X	
	Ramphotyphlops diversus ammodytes	Worm Snake			X	X	X	X				X	X
	Ramphotyphlops grypus	Worm Snake			X	X		X				X	
Boidae	*Aspidites ramsayi*	Woma	P1	O									
(Pythons)	*Aspidites melanocephalus*	Black-headed python											X
	Morelia olivacea barroni[2]	Olive Python	S1		X								
	Morelia perthensis	Pygmy Python			X								X
	Morelia stimsoni	Stimson's Python			X								X
Homalopsidae	*Fordonia leucobalia*	White-bellied Mangrove Snake			X								X
(Water Snakes)													

FAMILY	GENUS SPECIES[#]	COMMON NAME	CONSERVATION STATUS[##]	Cogger (2000);Storr *et al.* (1981, 1983, 1986, 1990)	Butler (1994)	Woodside (1995)	Woodside (1998)	Woodside (1999)	Astron (1999)	Biota (2001)	Biota (2002)	WA Museum (*2002, 2003)	CALM (2003)
Elapidae	*Acanthophis pyrrhus*	Desert Death Adder			X								
(Elapid Snakes)	*Acanthophis wellsi*	Pilbara Death Adder											X
	Demansia psammophis cupreiceps	Yellow-faced/Copper-tailed Whip Snake										X*	X
	Demansia rufescens	Rufous Whip Snake			X			X					X
	Denisonia fasciata	Rosen's Snake		O									
	Furina ornata	Moon Snake			X								X
	Pseudechis australis	Mulga Snake			X						X		
	Pseudonaja modesta	Ringed Brown Snake		O									
	Pseudonaja nuchalis	Gwadar			X		X	X					
	Rhinoplocephalus punctatus	Spotted Snake			X								
	Suta fasciata												
	Suta punctata												
	Vermicella approximans *(cf Simoselaps approximans)*	Northwestern Shovel-nosed Snake		O									
Hydrophiidae	*Aipysurus laevis*	Golden Sea Snake										X*	X
	Ephalophis greyi	Southern Mud Snake			X								X
(Sea Snakes)	*Hydrelaps darwiniensis*	Black-ringed Mud Snake		O									
	Hydrophis major	Olive-headed Sea Snake			X								

Taxonomy according to Cogger (2000) and Storr *et al* (1981, 1983, 1986, 1990).

X – Recorded or observed.

O – Predicted based on distribution maps of Cogger (2000) andStorr *et al* (1981, 1983, 1986, 1990), but not recorded or observed.

 # – Comments:

1: *Diplodactylus* spp. *cf. Strophurus* spp., WA Museum (2003).

2: *Morelia olivacea barroni.* Anecdotal records in rock-piles south of flats near Hearson Cove and also on northern Burrup (Biota, 2002).

– Conservation Status Code:

S1: Species protected under Schedule 1 of the *Wildlife Conservation Act* 1950 (Wildlife Conservation Notice 2002). Fauna that is rare or likely to become extinct.

P1: Priority One species on the CALM Declared Rare and Threatened Fauna List (2003). Includes species with few, poorly known populations on threatened lands.

P4: Priority Four species on the CALM Declared Rare and Threatened Fauna List (2003). Includes species in need of monitoring.

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LOCALITY MAP

Map area

Port Hedland

Karratha

WESTERN AUSTRALIA

PERTH

Woodside Energy Limited Gas Plant

Mermaid Sound

BURRUP PENINSULA

NORTH

Dampier Port Authourity

Woodside Supply Base

King Bay Supply Base

King Bay

Proposed Development Area

See inset Below

DAMPIER

Nickol Bay

Salt Ponds

KARRATHA

DPA Cargo wharf

DPA

Woodside Supply Base

King Bay Supply Base

Proposed Development

Mermaid Sound

Mermaid Marine Aust. Supply Base

King Bay

BGC

BGC Contracting

KING BAY EAST INDUSTRIAL AREA
LOCATION MAP

Figure 1

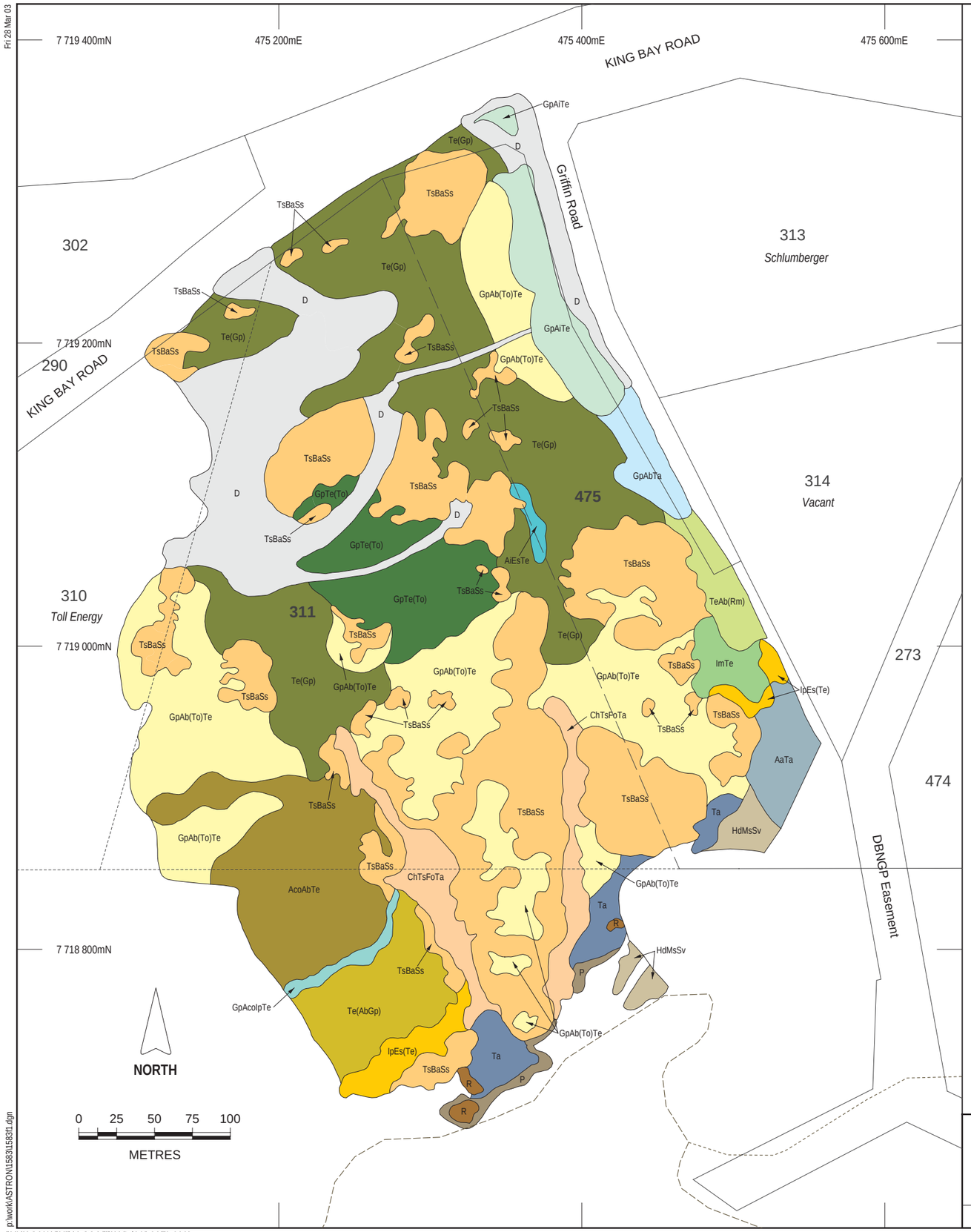
Auth: JN

Date: 12/02

Revision 'A'

ASTRON ENGINEERING ph: (08) 91 441679

g:dgn/1583/1583fig1.dgn



VEGETATION LEGEND

DRAINAGE LINE

GpAiTe — High shrubland (10-30%; >2m) of *Grevillea pyramidalis*, *Acacia inaequilatera* over hummock grassland (30-70%) of mixed *Triodia epactia* (Burrup form) and *Triodia angusta* (Burrup form).

GpAcoIpTe — High shrubland (10-20%; 2m) of *Grevillea pyramidalis*, *Acacia colei*, *A. elacantha* over open shrubland (2-10%; 1m) of *Ipomoea costata* over hummock grassland of *Triodia epactia* (Burrup form).

AiEsTe — High shrubland (10-30%; 2m) of *Acacia inaequilatera*, *Ehretia saligna*, *Ipomoea costata* over open low hummock grassland of *Triodia epactia* (Burrup form).

DRAINAGE ZONE

GpAbTa — High open / shrubland (2-20%; 1.5-2m) of *Grevillea pyramidalis*, *Acacia bivenosa* over hummock grassland (30-70%) of *Triodia angusta* (Burrup form).

LOWER HILL SLOPES

TeAb(Rm) — Hummock grassland of *Triodia epactia* (Burrup form) with (*with lianes of *Rhynchosia minima*) and very open herbs (2-10%) with scattered (<2%) shrubland of *Acacia bivenosa*, *Grevillea pyramidalis*.
(**R. minima* abundant but not mature at time of survey).

ImTe — Low open (2-10%) to shrubland (10-30%; <1m) *Indigofera monophylla* over hummock grassland (30-70%) of *Triodia epactia* (Burrup form). There are scattered (<2%) *Acacia bivenosa*.

UPPER UNDULATING SLOPES AND PLATEAUS

GpAb(To)Te — Scattered (<2%) to very open mixed shrubland (2-10%; 1-2m) of *Grevillea pyramidalis*, *Acacia bivenosa*, *Hakea lorea* over **open herbland of *Trachymene oleracea* over hummock grassland (30-70%) of *Triodia epactia* (Burrup form).
(***T. oleracea* abundant but mostly died off at time of survey).

Te(AbGp) — Hummock grassland (30-70%) *Triodia epactia* (Burrup form) over scattered (<2%) shrubs of *Grevillea pyramidalis*, *Acacia bivenosa*.

AcoAbTe — High open (2-10%) to shrubland (10-30%; 2m) of *Acacia colei*, *A. bivenosa* over hummock grassland (30-70%) of *Triodia epactia* (Burrup form).

Te(Gp) — Hummock grassland (30-70%) of *Triodia epactia* (Burrup form) with open mixed herbs (2-10%). There are scattered (<2%) *Grevillea pyramidalis* shrubs.

GpTe(To) — Shrubland (10-30%; 1-2m) of *Grevillea pyramidalis* over open herbland (2-10%; 1m) of *Trachymene oleracea*, *Trichodesma zeylanicum* over hummock grassland of *Triodia epactia* (Burrup form).

ROCKPILE

TsBaSs — Open woodland (2-10%; <5m) of *Terminalia supranitifolia*, *Brachychiton acuminatus*, *Ehretia saligna* var *saligna* over low shrubland (10-30%; 1-2m) of *Scaevola* aff *spinescens* (vl-1583-02), *Rhagodia preissii* subsp *obovata*, over very open tussock grassland (2%) of *Cymbopogon ambiguus*.

IpEs(Te) — Open shrubland (10-30%; 1-2m) of *Ipomoea costata*, *Ehretia saligna* over very open hummock grassland (2-10%) of *Triodia epactia* (Burrup form).

ROCKY GULLY

ChTsFoTa — Open woodland (2-10%; <10m) of *Corymbia hamersleyana*, *Terminalia supranitifolia* over high shrubland (10-30%; 1m) of *Ficus opposita*, *Flueggea virosa* subsp. *melanthesoides* over open low shrubland (2-10%; 1m) of *Dichrostachys spicata*, over hummock grassland of *Triodia angusta* (Burrup form) and *T. epactia* (Burrup form).

FLATS ASSOCIATED WITH KING BAY

AaTa — High shrubland (10-30%) to open scrub (30-70%; 2m) of *Acacia ampliceps*, *A. ampliceps x bivenosa* over dense hummock grassland of *Triodia angusta* (Burrup form).

Ta — Closed hummock grassland (70-100%) of *Triodia angusta* (Burrup form).

SAMPHIRE FLATS ASSOCIATED WITH KING BAY

HdMsSv — Dwarf shrubland (10-30%; <0.5m) of *Hemichroa diandra*, *Muellerolimon salicorniaceum*, *Halosarcia halocnemoides* over open low tussock grassland (10-30%) of *Sporobolus virginicus*.

D — Previously disturbed.

R — Rockpile, no vegetation.

P — Pebbles along edge of King Bay <2% *Muellerolimon salicorniaceum.*

Astron environmental

Auth: VL | Date: 03/03

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KING BAY EASTERN LEASE AREA INDUSTRIAL ESTATE

VEGETATION MAP

Figure **2**