

# **ENVIRONMENTAL MANAGEMENT PLAN**

## Fauna Relocation and Habitat Plan

**Voyager Quarry Relocation, The Lakes WA.**

*Prepared for*

**BGC (Australia) Pty Ltd**

18 Mount Street  
Perth WA 6000

October 2018

MINISTERIAL CONDITIONS: RELOCATION OF VOYAGER QUARRY

The logo for URS, consisting of the letters 'URS' in a bold, blue, sans-serif font.

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**Attachment 2: Useful contacts**

## 1.1 Legal framework

The proposal for the relocation of the Voyager Quarry was assessed under Part IV of the *Environmental Protection Act 1986* (see below). In addition to Ministerial approval of the proposal (Statement 706), the proponent will need to comply with a range of statutory requirements. Legislation that relates to the aspects of Condition 706:M8 is outlined in Table 1 below.

The proposal, which was initially described within the proponent's Public Environmental Review (PER) (URS 2003), was referred to the EPA on 19 December 2001 by the Commissioner for Soil and Land Conservation.

The proposed relocation of the quarry is to an area of land (Lot 14, Figure 1) owned by the proponent. In December 2001, the EPA determined the level of assessment for the proposal at PER, and this level of assessment was subject to a two week appeals process. A number of appeals against the level of assessment were considered by the Minister for the Environment and dismissed on 1 May 2002. The subsequent PER document released for public review for a period of eight weeks from 6 January 2003, closing on 3 March 2003. An extension was then provided to allow for further public submissions until April 2003. Following a review of the submissions, the proponent modified its proposal and incorporated details of additional monitoring work and data within its Response to Submissions (URS 2004).

The proposal was approved by the Minister for the Environment with the signing of Ministerial Statement 706 on 16 December 2005. Relevant to this management plan is Condition 8 reproduced below.

8-1 *Prior to clearing of vegetation or excavation of soil or rock in any area, whichever is the sooner, the proponent shall prepare a Fauna Relocation and Habitat Plan in consultation with the Department of Conservation and Land Management, to the requirements of the Minister for the Environment.*

*This Plan shall detail actions to relocate fauna to a place which reasonably approximates their existing habitat, and shall address relocation of the following fauna species:*

- *Brush-tailed Phascogale (Phascogale tapoatafa);*
- *Western Brush Wallaby (Macropus irma);*
- *Carpet Python (Morelia spilota imbricata);*
- *Dell's Skink (Ctenotus delli);*
- *Echidna (Tachyglossus aculeatus);*
- *Chuditch (Dasyurus geoffroii);*
- *Possums of any species; and*
- *Western Grey Kangaroo (Macropus fuliginosus).*

*This plan shall also address the salvage and relocation of tree hollows and habitat logs to provide habitats for fauna species.*

Table 1. Statutory, policy and other guideline requirements

Aspect	Title	Applicability
Commonwealth Legislation	<i>Environment Protection and Biodiversity Conservation Act (1999)</i>	The EPBC Act provides for: identification and listing of Threatened Species and Threatened Ecological Communities; development of Recovery Plans for listed species and ecological communities; recognition of Key Threatening Processes; and where appropriate reducing these processes through Threat Abatement Plans.
State Legislation	<i>Environmental Protection Act 1986</i>	Ministerial Statement 706 for the Voyager Quarry Relocation was issued under Part IV of the Act.
	<i>Wildlife Conservation Act 1950</i>	All WA native fauna species are protected under the Act. Fauna species that are considered rare, threatened with extinction or have high conservation value are specially protected under the Act.
	<i>Wildlife Conservation (Specially Protected Fauna) Notice 1998</i>	<p><u>Schedule 1</u> taxa are fauna that are rare or likely to become extinct and are declared to be fauna in need of special protection.</p> <p><u>Schedule 2</u> taxa are fauna that are presumed to be extinct and are declared to be fauna in need of special protection.</p> <p><u>Schedule 3</u> taxa are birds which are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction which are declared to be fauna in need of special protection.</p> <p><u>Schedule 4</u> taxa are fauna that are in need of special protection.</p>
	Priority Listed Fauna	<p><u>Priority 1:</u> Taxa with few, poorly known populations on threatened lands. These are known from few specimens or sight records from one or a few localities on lands not managed for conservation. Needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.</p> <p><u>Priority 2:</u> Taxa with few, poorly known populations on conservation lands, or taxa with several, poorly known populations not on conservation lands.</p> <p>These are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation. Needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.</p> <p><u>Priority 3:</u> Taxa with several, poorly known populations, some on conservation land. These are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. Needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.</p> <p><u>Priority 4:</u> Taxa in need of monitoring. Considered to have been adequately surveyed or for which sufficient knowledge is available and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. Are usually represented on conservation lands - are declining significantly but are not yet threatened.</p>
Department of Environment & Conservation (DEC)	Draft Guideline: <i>Preparing Environmental Management Plans</i>	This document has been prepared in compliance with the draft document.

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- 8-2 *The proponent shall implement the Fauna Relocation and Habitat Plan, required by condition 8-1, to the requirements of the Minister for the Environment on advice of the Department of Conservation and Land Management.*
- 8.3 *The proponent shall make the Fauna Relocation and Habitat Plan, required by condition 8-1, publicly available.*

Other conditions that relate to Ministerial Condition 706:M8 include:

- 5-1 *The proponent shall prepare an audit program and submit compliance reports to the Department of Environment which address:*
1. *the status of implementation of the proposal as defined in schedule 1 of this statement;*
  2. *evidence of compliance with the conditions and commitments; and*
  3. *the performance of the environmental management plans and programs.*
- 5-2 *The proponent shall prepare a performance review program and submit annual performance review reports to the Department of Environment which address:*
1. *the major environmental issues associated with the project; the environmental objectives for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those objectives;*
  2. *the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology;*
  3. *significant improvements gained in environmental management, including the use of external peer reviews; and*
  4. *the proposed environmental objectives for the operations, including improvements in technology and management processes.*
- M7.2 *The proponent shall fence the perimeter of Lot 11 and Lot 14 Horton Road, and the perimeter of the operational boundary shown on Figure 3 (this document, Fig.1), to the requirements of the Minister for the Environment on advice of the Department of Conservation and Land Management.*
- M19.1 *Prior to the finalisation of plans, strategies and programmes required by conditions 8-1, 9-3, 10-1, 12-1, 13-1, 15-1, 16-1 and 18-1, the proponent shall make reasonable endeavours to establish a Community Liaison Group to the requirements of the Minister for the Environment.*

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## 1.2 Aspect of the environment to be protected

The environmental factor assessed by the EPA relevant to this management plan is “Vertebrate Fauna”. Note that invertebrate fauna are separately addressed in the document *Interim Trapdoor-spider Management Plan*.

Information provided in the PER (URS 2003) and in response to submissions (URS 2004) shows that the proposal will remove habitat for a faunal assemblage likely to be found in Lots 11 and 14 (Figure 1). An overview of species recorded within the project area includes:

- Herpetofuana: 12 species;
- Avifauna: 36 species;
- Native mammals: six species; and
- Introduced mammal: two species.

The following information is from (Biota 2004).

Survey works undertaken in 2003 within the project area recorded eight species of mammal including six native and two introduced taxa. The native species comprised the Echidna (*Tachyglossus aculeatus*), Mardo or Yellow-footed Antechinus (*Antechinus flavipes*), Chuditch (*Dasyurus geoffroii*), Western Grey Kangaroo (*Macropus fuliginosus*), Western Brush Wallaby (*Macropus irma*) and Common Brushtail Possum (*Trichosurus vulpecula*). The two introduced species included the Rabbit (*Oryctolagus cuniculus*) and Red Fox (*Vulpes vulpes*).

Although no Phascogale were seen during the survey, two specimens (both road kills) have recently been lodged with the WA Museum from the locality. The single Western Brush Wallaby noted during the survey was a road kill close to the entrance of the quarry. Details are given in the original report (Biota 2003).

## 1.3 Threatened fauna that could or have been identified within the Voyager project area.

The legal status (Scheduled and Priority Listed Species) of the species listed below is given in Table 1.

### **EPBC Act 1999 and WA Wildlife Conservation Act 1950**

The species listed below under the EPBC Act 1999 are known or expected to occur within the general site location. These are:

- Carnaby’s Black Cockatoo, *Calyptorhynchus latirostri* (which is listed as Endangered under the EPBC Act and as Threatened [Schedule 1] under the State *Wildlife Conservation Act 1950*).

- Baudin's Black Cockatoo, *Calyptorhynchus baudinii* (which is listed as Vulnerable under the EPBC Act and as Threatened [Schedule 1] under the State *Wildlife Conservation Act 1950*). This species appears to be generally scarce in the Voyager Quarry area. Recorded in small parties at Gidgegannup, Chidlow, The Lakes area, Mt. Helena, Flynn Road and the northern end of Yarra Road. Mainly reported in family parties (male, female and juvenile or immature), occasionally in small flocks (up to 20), rarely larger flocks (up to 50), not recorded for the quarry site but small numbers had recently been feeding on the seeds of several large marri trees near north-eastern boundary of the site. As for Carnaby's Cockatoo, there are few suitable hollows available.
- The Chuditch, *Dasyurus geoffroii* (which is listed as Vulnerable under the EPBC Act and as Threatened [Schedule 1] under the State *Wildlife Conservation Act 1950*). A Chuditch release programme was undertaken by CALM in 1998 at several sites within the Mundaring area to the north and south of the Mundaring weir. Results based upon monitoring exercises recorded in 1999 showed that there were no records of Chuditch to the south, but there was a 14% capture peak recorded in the northern sites, dropping to between 4-8% over the course of the year (Orell & Morris 1994). Evidence of Chuditch was recorded from an Elliott trap within the development footprint (Biota 2003). No further details on Chuditch are available for this area.
- The Numbat (*Myrmecobius fasciatus*) (which is listed as Vulnerable under the EPBC Act and as Threatened [Schedule 1] under the *Wildlife Conservation Act 1950*). No records of Numbat were recorded for the survey area, however a Numbat release programme for the Mundaring area was undertaken in the Nochine Forest Block, between Pool road and Bericine road area in 1999. A radio-collar monitoring exercise was undertaken in 2000 with reasonable results, showing Numbat still to be present within the area. In September 2003, a search of the area was conducted in order to find scats and diggings indicative of use of the area by Numbat. As reported within the monitoring report no evidence of use of the area by Numbat were recorded at this time. This may be due to the following:
  - The numbat population released within the Mundaring area has moved into, and populated other areas that have as yet had no evidence recorded of Numbat; or
  - The Numbat population released within the Mundaring area has perished due to either lack of food availability, competition for habitat or predation.

The proposed quarry relocation area is considered by DEC to be within the expected expansion range for Numbat populations, based upon known Numbat ranges and the localised suitable habitat

- the Fork-tailed Swift (*Apus pacificus*) and the Rainbow Bee-eater (*Merops ornatus*), which are listed under the EPBC Act as they are protected under international agreements for migratory birds.
- Note that the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) is also a Schedule 1 species under the West Australian Wildlife Conservation Act, but does not appear on the EPBC listing. Research on this subspecies shows that suitable hollows within the breeding areas are at a premium, as most of the study sites have been previously logged or mined. They do not breed until at least four years of age and the breeding population is small. This species was not identified during the 2003 survey of the Voyager project area.

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### **Wildlife Conservation Act 1950 Schedule 4**

Species gazetted under Schedule 4 ('In Need of Special Protection') of the *Wildlife Conservation Act 1950* which could potentially occur within the Project Area include:

- Peregrine Falcon (*Falco peregrinus*): This species occurs throughout Australia in most habitats with a preference for cliff faces and timbered water courses. There is high probability of occurrence throughout the general Project Area as Peregrine Falcons are known to readily use ledges within quarried areas for roosting and possibly nesting. They are also able to forage widely for food and can coexist with human disturbance.
- Western Brush (or Black-Gloved) Wallaby (*Macropus irma*): Scats of this wallaby were observed in heath, Jarrah and Jarrah-Sheoak communities during field surveys. Hence, it is likely that this species occurs throughout the Project Area, particularly wherever dense vegetation is present.
- Western False Pipistrelle (*Falsistrellus mckenziei*): This species is more common further south. It is unlikely that this bat will occur in the Project Area as the area is outside the known distribution for this species. Extensive surveys conducted in the Darling Range by Alcoa and Worsley have not found this species and there are no historic records of this species in the Darling Range.
- Crested Shrike-tit (*Falcunculus frontatus*): Due to the limited areas of preferred Wandoo woodland habitat in the Project Area, there is only a moderate probability of this species occurring.
- Dell's Skink (*Ctenotos delli*): This skink occurs in the Darling Range from Darlington and Mundaring South nearly to Collie. It is patchily distributed in its geographic range and may occur within the Project Area.
- Carpet Python (*Morelia spilota imbricate*). This sub-species is broadly distributed across much of the southwest, but has been given its protected status due to the fact that it is not common anywhere in its range. Individuals would probably shelter amongst rock piles and in hollow branches and logs on site. None were recorded from the study site during the survey but the species is known to occur in the locality.

### **Wildlife Conservation Act 1950 Priority 3 Species**

The following vertebrate species listed as Priority 3 ('Taxa with several, poorly known populations, some on conservation lands') on DEC's Priority Fauna list may occur within the proposed Project Area:

- The Southern Death Adder, (*Acanthophis antarcticus*) could possibly be found within the project areas. This reptile is highly venomous and should not be handled except by an expert.
- Wambenger/Brush-tailed Phascogale (*Phascogale tapoatafa*). This species may be found in most forest types in the south-west of the State. Two specimens from the vicinity of the project area have been recently lodged with the Western Australian Museum. The first (a female M49940) was

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recorded from a road kill adjacent to the quarry (116.3522°E 31.8758°S) on the 20/12/01 and the second (a male M49941, also a road kill) from adjacent to the quarry (116.3194°E 31.8785°S) on the 07/01/02.

### **Other fauna**

The Honey Possum (*Tarsipes rostratus*) is another species that may occur in the Project Area, which could be considered locally significant in the Darling Range (Ninox 2002). The species was originally thought to occur only in the sandplain heaths of South-west coastal and sub-coastal Western Australia where it is relatively common. However, since 1981 small populations of the Honey Possum have been found in heath patches within the forested Darling Range. This species was also found to occur in some reserves in the wheatbelt during the late 1970s.

Introduced fauna species are also expected to occur in the Project Area. These include the Black Rat (*Rattus rattus*), House Mouse (*Mus musculus*), Red Fox (*Vulpes vulpes*), Feral Cat (*Felis catus*), Rabbit (*Oryctolagus cuniculus*) and the Kookaburra (*Dacelo novaeguineae*) (Ninox 2002).

Surveys and studies of the Voyager vertebrate fauna and habitat have been carried out to date. These include:

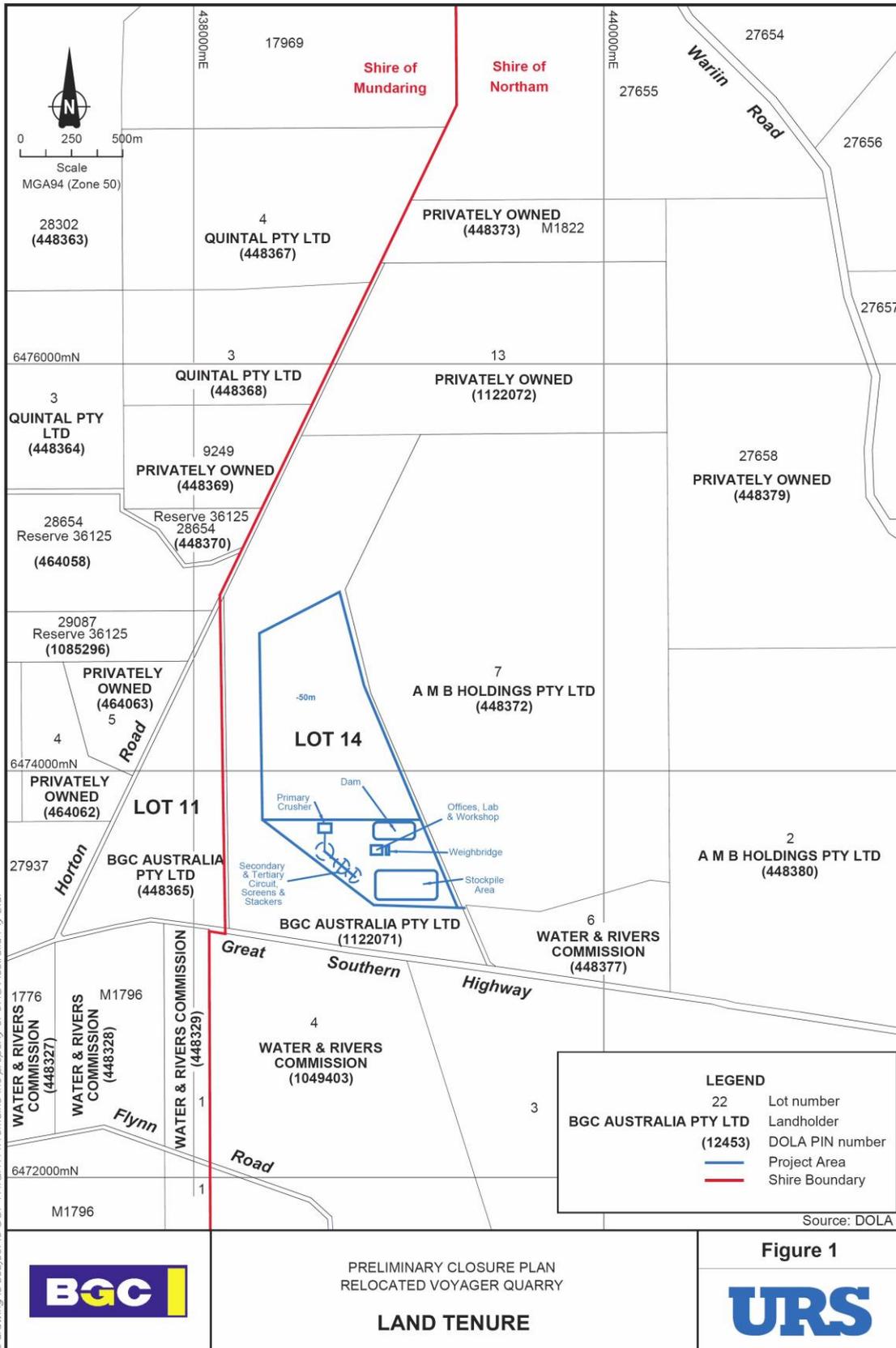
Biota and Johnstone R.E & C. (2003). Voyager Quarry extension –targeted fauna survey. Unpublished report for BGC Quarries, Perth.

Biota (2004). Voyager Quarry relocation Fauna Management Plan. Vol 2, Appendix G, URS (2004).

Johnstone, R.E & Kirkby, T. (2004). Survey of significant trees within proposed expansion area (Lots 11 & 14 of the Voyager Quarry site. In URS (2003) Vol 3 App. F.

Ninox Wildlife Consulting (2002). Vertebrate Fauna Habitat Assessment, Avon Loc 1881-Lots 11 & 14 Horton Road, The Lakes, Mundaring. Unpublished report for BGC Quarries, Perth.

Orell, P. and Morris, K. (1994) *Chuditch Recovery Plan*, Western Australia Wildlife Management Programme No. 13, DEC.



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PRELIMINARY CLOSURE PLAN  
RELOCATED VOYAGER QUARRY  
**LAND TENURE**

Figure 1



## 2.1 The project

BGC (Australia) Pty Ltd purchased Lots 11 and 14 (Avon Location 1881), The Lakes, Shire of Northam with the intention of using this land for relocating the existing quarry operations. The proposed location for the relocated quarry is on a portion of Lot 14 Horton Road (Figure 1).

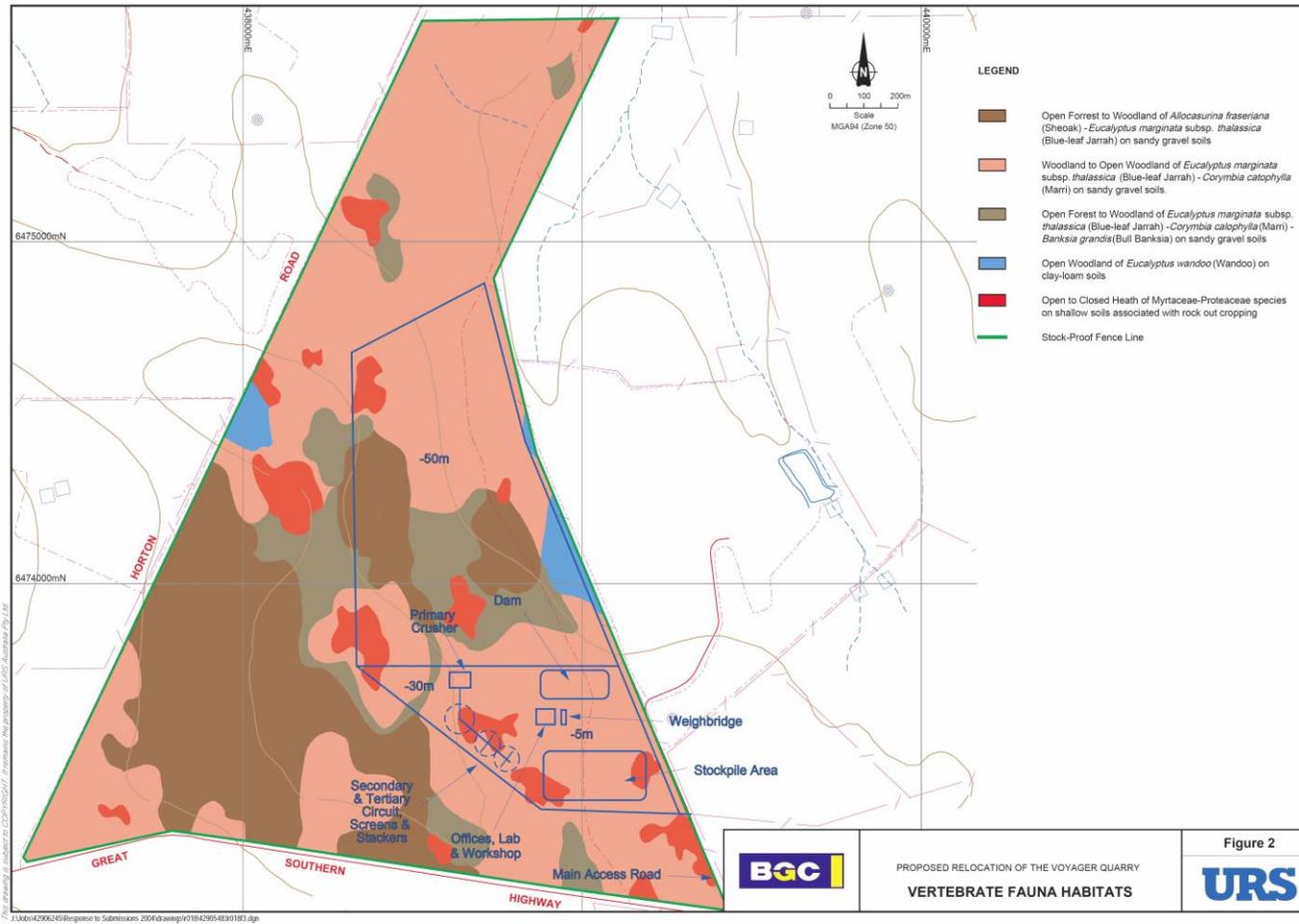
The proposal affects approximately 85 hectares of remnant vegetation, and involves the quarrying of a resource which is an extension of a Key Extraction Area designated in the Western Australian Planning Commission's Basic Raw Materials Planning Policy Statement. The proposed relocation of the quarry will remove habitat for an assemblage of native fauna including threatened/protected species (EPA 2005). Indicative stages for the quarry development are shown in EPA Bulletin 1169 Figure 3 (EPA 2005).

The existing quarry is coming to the end of its commercially winnable resource and in order to maintain supplies needs to expand or relocate. An extensive review of possible locations for the relocated quarry was undertaken by the proponent who determined that the nearest and most viable resource is situated on land located immediately to the west of the existing quarry. Development of the proposed quarry will entail excavation of up to 2 million tonnes of gravel and approximately 12 million tonnes of clay from the quarry footprint. This will allow for approximately 60 million tonnes of granite to be excavated from the site over an estimated 50-year period (Figure 3, EPA 2005). The proposal is to proceed in a staged process over the life of the quarry; Areas 1 and 2 (Figure 4) will be excavated first and will contain all operational requirements of the quarry including administration, processing and product stockpiling. When quarry operations have been moved to Areas 1 and 2 the quarry will be expanded by utilising Areas 3 to 6 sequentially over the next 50 or more years. Thus clearing and overburden removal will only occur five times in the life of the quarry.

## 2.2 Receiving environment

Based on a site inspection (Ninox 2002), the following fauna habitats (Figure 2) were defined within the study area; this being Lots 11 and 14 (Figures 1 and 2).

- Open Forest to Woodland of *Allocasuarina fraseriana* (Sheoak) – *Eucalyptus marginata* subsp. *thalassica* (Blue-leaf Jarrah) on sandy gravel soils.
- Woodland to Open Woodland of *Eucalyptus marginata* subsp. *thalassica* (Blue-leaf Jarrah) – *Corymbia calophylla* (Marri) on sandy gravel soils.
- Open Forest to Woodland of *Eucalyptus marginata* subsp. *thalassica* (Blue-leaf Jarrah) – *Corymbia calophylla* (Marri) – *Banksia grandis* (Bull Banksia) on sandy gravel and gravel soils.
- Open Woodland of *Eucalyptus wandoo* (Wandoo) on clay-loam soils.
- Open to Closed Heath of Myrtaceae-Proteaceae species on shallow soils associated with rock outcropping.



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There is some overlap of habitats, particularly in areas where elements of heath vegetation continued as an understorey through the forest and woodland. Most of the forest and woodlands of the study area have been heavily logged, with the resulting coppice regrowth judged to represent approximately 80-90% of the Jarrah trees present in the study area.

The project area (Figure 2) is dominated by the “Woodland to Open Woodland of Jarrah and Marri which accounts for some 60% of the area. The remaining 40% is comprised of the remaining habitats listed above.

Information included below is from (Ninox 2002).

Any of seventeen native mammals, eighty birds, nine frogs and thirty one reptile species that are found within the greater region could occur in the study area. However, not all of these would be expected to found within the project area - for example, the number of frogs and other animals that prefer dense riparian vegetation will be limited by the lack of wetland or creek line habitats in the study area and many of the other habitats common in the region are not locally represented.

While the study area contains some fauna habitats of local significance, there were no habitats of regional significance present. The heaths within the study area were judged to be locally significant to vertebrate fauna. They could provide suitable habitat for the Honey Possum and each heath patch is likely to be a preferred nesting area for a large range of birds. This high population of birds in the heaths is also likely to attract the Carpet Python to this habitat where they would form a major component of its diet.

The Jarrah - Marri habitats in the south and south-western portion of the study area, although separated by the Great Southern Highway and Horton Road, are linked to State Forest through native vegetation on private land. These roads will almost certainly form a barrier to the movement of very small terrestrial vertebrates, primarily reptiles and mammals, but are unlikely to inhibit the movement of most birds and larger vertebrates. A large proportion of the eastern boundary of the study area is adjacent to cleared land including the existing quarry. However, the habitats at the south-eastern corner of the study area are linked through private property to a water course and catchment protection reserves.

Placement of felled trees in woodpiles would also provide some refuge and shelter for a range of fauna species displaced from cleared areas. This aspect would be greatly enhanced if rehabilitation forms a corridor (ecological link) between remnant patches of native vegetation and is structured with trees and shrubs suitable for the soil and landscape position and contains some vegetation debris such as logs.

Some relatively large Marri and Wandoo trees were present and are probably the only habitat trees with suitable hollows for nesting or refuge by a large range of species. Mature Wandoo trees in particular contain large numbers of hollows of various sizes that suit a large range of animals, from the very small Western Pygmy-possum to the larger mammals such as the Common Brushtail Possum. A particularly wide range of bird species also nest in Wandoo hollows including parrots, wood swallows, martins and nocturnal birds

A search of the project area by Johnstone and Kirby(2004) identified a total of 163 trees with large hollows that were visually inspected and mapped. Of these a subset of 33 trees with hollows that appeared

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to be most appropriate for cockatoos or showed signs from ground of recent use etc. were climbed, checked, measured and mapped. Of the 33 trees climbed 3 were identified as having hollows that had evidence of use by cockatoos over the past 1 - 3 years. None of these 3 hollows are located within the project area. Figure 3, indicating the location of tree hollows, is from Johnstone and Kirby (2004)

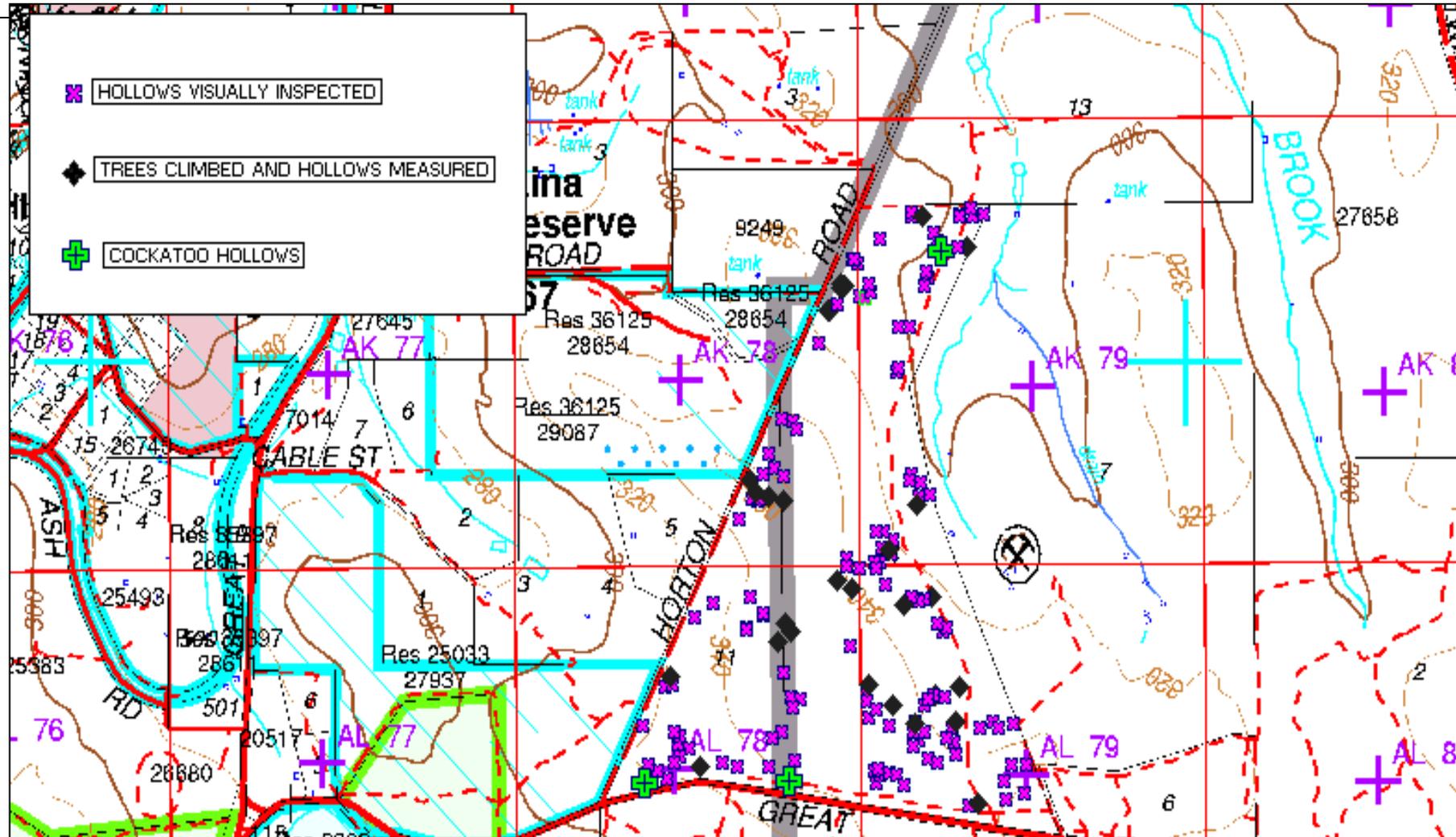


Figure 3. Tree Hollows within Lots 11 and 14 (From Johnstone and Kirkby 2004)

### 3.1 Potential environmental impacts of the project

The development of the quarry will ultimately require the clearing of 85 hectares of vegetation, and it is anticipated that the project's development will occur in five stages over the life of the quarry, with Areas 1 and 2 (Figure 4) being initially developed to provide room for the new below ground level facilities and infrastructure. Subsequent stages (Areas 3 to 6; Figure 4) will then be developed as the need to access further granite resources arises. The staged approach will also ensure that excavation of the topsoil and subsoil (gravel and clay) will only occur as a staged process during the proposed 50 or more year life of the quarry.

This proposal will permanently remove the existing habitats within the 85 ha project area. Section 2.2 outlines the habitats that will be lost and Section 1.1 lists potential vertebrate fauna assemblage utilising these habitats.

The potential impacts are an incremental loss in habitats and species associated with these habitats on the western margins of the Central Wheatbelt.

Direct impact is associated with the clearing of fauna habitat for quarry expansions which will occur in part of the study area (See Figures 1 and 4). The effects of direct impact on various fauna groups is described below.

*Birds:* Territorial birds will absorb the main impact of quarry expansions because of the total area and range of habitats, which will be cleared. Most impact will be directed towards small, territorial residents. Although birds are highly mobile compared with other vertebrate groups, the forced movement of territorial species into the adjacent territories of other individuals will cause a "ripple-effect" of conflict well beyond the initial area of impact. At this stage of disturbance to territorial boundaries, individuals are open to a greater level of predation, competition for food resources, shelter and breeding sites.

*Larger mammals:* Without relocation, larger mammals, such as kangaroos, wallabies and Chuditch, are able to move away from the area of primary impact. This movement inevitably increases competition in adjacent areas. Territorial competition eventually reaches a position of stability when conflicts are resolved. Some deaths may take place as displaced animals move across roads to find new habitat. Small territorial mammals, such as dunnarts, Honey Possums and Western Pygmy Possums are not as mobile, with the result that the proportion of local populations occurring in the area of direct impact, that is the quarry and other locations subject to clearing, will be eliminated.

*Amphibians and Reptiles:* The comments made above for mammals equally apply to amphibians and reptiles. Larger reptiles such as monitor lizards and snakes are capable of moving large distances away from disturbance or adapting to change conditions, but most small reptile and amphibian populations within the area of direct impact will be lost.

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## 3.2 Identification of specific impacts of the proposal

### ***Tree Hollows***

Although a large number of potential breeding/refuge hollows were identified, only three were identified that have been recently used by threatened Cockatoo species (*Calyptorhynchus baudinii* and *C. latirostris*); however, these cavities were found to be outside of the areas to be cleared (Johnstone & Kirkby 2004).

Bat crèches (Biota 2004) with non-flying Microchiropteran young could be found in tree hollows during the breeding season occurring in late spring through to early summer (pers comm. Mr N McKenzie, DEC Science Division, Woodvale).

The Brushtail Possum (*Trichosurus vulpecula*) uses tree hollows for diurnal refuge and for early care of young. The breeding season is also during the spring period (pers comm. Dr P de Tores, DEC Science Division, Dwellingup).

### ***Species-specific refuge***

If the project area includes the home range of species such as the Carpet Python (*Morelia spilota imbricate*) or Echidna (*Tachyglossus aculeatus*), specific refuges are likely to be destroyed.

Species listed under Condition 706:M8.1 include the macropod species (*Macropus irma*; *M. fuliginosus*), Brush-tailed Phascogale (*Phascogale tapoatafa*); Chuditch (*Dasyurus geoffroii*) and Dell's Skink (*Ctenotus delli*).

### ***Nesting birds***

Vegetation clearing would clearly disrupt avifauna breeding if undertaken during spring, a time when birds nesting and raising young (Biota 2004).

### ***Injured or orphaned fauna***

During clearing operations it is more likely that injured or orphaned fauna are likely to be discovered.

### ***Displaced fauna***

As the quarry project advances, first by clearing and then by overburden removal, fauna with home ranges overlapping the operations area could be subject to the following impacts:

- Larger animals displaced or panicked by clearing are could stray onto the highway located on the southern boundary of the area Lots 11 and 14 (Figure 1) presenting a risk both to fauna and motorists; and

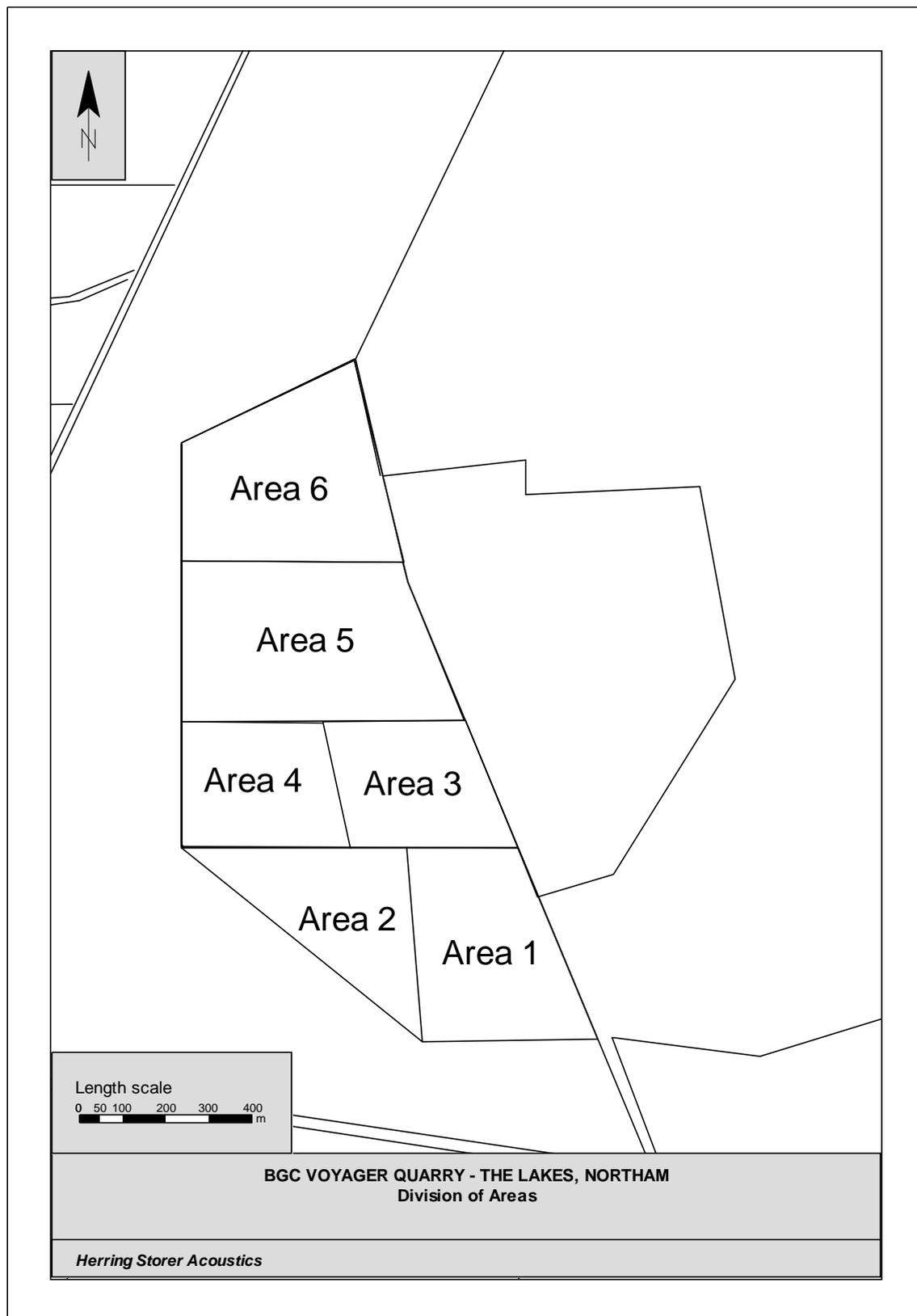
- 
- When clearing has been completed and overburden removal and resource extraction commences, fauna are likely to stray into the project area. Prior to earthmoving, fauna could come into contact with machinery and vehicles. After earthmoving and resource extraction has commenced, local fauna are at risk of falling into the operations pit proposed to be 3 to 5 m deep in Area 1 and 30 m deep in Area 2 and subsequent areas as the proposal progresses (Figure 4).

### ***Bush fire***

The risk of bushfire in adjacent uncleared bushland is increased with the presence of workers and machinery during clearing operations.

During the operational life of the quarry, fire risks to surrounding bushland are related to uncontrolled access to bushland areas and also the risk of fire spreading from an incident on the operational area.

Uncontrolled burning represents a risk to fauna at any time in the lifetime of the proposal.



**Figure 4:** Division of Areas within the proposed relocation proposal (from Herring Storer 2004); see also EPA, 2005: Figure 3.

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### 4.1 Principal environmental objectives

In accordance with the EPA's objectives for the formal assessment of the Voyager Quarry site proposal; this Management Plan provides strategies to:

- maintain the abundance, diversity, geographic distribution and productivity of vertebrate fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge; to maintain and enhance habitat for native fauna.

The Ministerial Statement 706 does not provide environmental objectives for Condition 706:M8.

Significant impacts on listed threatened fauna species appear unlikely due to the restricted area of impact of the proposal. Given this the EPA considered that the management requirements for fauna species potentially impacted upon could be addressed through the requirement for preparation and implementation by the proponent of a "Fauna Relocation and Habitat Plan" (EPA 2005).

This Management Plan includes two main strategies to achieve the EPA's objectives:

1. *Fauna relocation*: Strategies are provided to specifically ameliorate the impacts on those species listed in Condition 706M:8.1 through relocation and other species through specific management strategies.
2. *Habitat enhancement*: Strategies are provided to salvage elements of habitat in areas to be cleared for habitat enrichment in adjacent areas. Habitat protection and enrichment strategies are also provided such as placing woodpiles in bushland from cleared timber and implementing strategies to minimise fire risk.

### 5.1 Recent fauna relocation work in the region

A significant road realignment and reconstruction project through terrain and habitats similar to that of the project area has recently (August 2006) been completed for the Great Eastern Highway between Sawyer's Valley and The Lakes Roadhouse. A fauna trapping and relocation program was conducted by Ecologia (Ecologia 2004) on behalf of Main Roads Western Australia.

A total of 338 cage traps were employed as well as 44 hours spent in intensive searches for reptile species over the 13.2 km distance of the project area. A large number of Elliot traps (634) were employed for smaller species that captured a total of 23 Mardo (*Antechinus flavipes leucogaster*) and four introduced rodent species. (mice and rats). Reptile searches recovered a total of 23 animals including Skinks (mostly *Hemiergis initialis* and *Cryptoblepharis plagiocephalus*) and one Gould's Hooded Snake.

In the course of the trapping and relocation program two of the species listed in Ministerial Condition 706:M8.1 were captured; these being four Chuditch and three Brushtail Possum.

Animals captured were identified to species level, capture location recorded and were released before nightfall in nearby suitable habitat. One Chuditch was recaptured after being released 2.5 km distance in adjacent bushland. Specific searches in likely habitat for Dell's Skink and the Carpet Python did not result in any captures. Other species captured were also released into adjacent bushland.

The study concluded that in consideration of the large areas of adjacent State Forest and Water Catchment adjacent to the project area, the impact on local species was likely to be negligible.

Quenda were not recorded, nor were any of the other species listed in Condition 706:M8.1.

### 5.2 Strategies to minimise impacts on vertebrate fauna

**Note:** *The fauna trapping and relocation/release program will be conducted by contracted workers with experience in trapping and handling native fauna. The contractor must notify relevant DEC contacts to arrange a licence to take native fauna and to ensure DEC expertise is available for advice and animal holding facilities, if required, can be arranged to be available when the trapping program is to start. The key DEC contact for all fauna issues, including trapping and release protocols, is Dr Peter Mawson (Principal Zoologist, DEC Species and Communities Branch). Dr Mawson should be contacted prior to implementing any proposed fauna translocation program in order to gain the most recent advice regarding policy and requirements. Dr Mawson will liaise with other staff within DEC as required to provide advice to the proponent.*

This section provides strategies to manage the specific impacts identified in Section 3.2. These strategies take into account the objectives identified in Section 4.1.

The quarry is expected to have a fifty-year life span. Consequently, operations will proceed on an area by area basis, only clearing those areas that are required for the next phase of the proposal. This management

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plan therefore is required to be implemented prior to any expansion of the quarry project as operations move into Areas 1 and 2 and in later years into Areas 3 to 6 (Figure 4).

Ministerial Condition 706:M8 requires the development of satisfactory strategies to minimise the impacts that habitat removal will have on fauna likely to be found within the project area.

The methods required by this EMP to minimise adverse impacts on native fauna require an integration of:

- Minimising impacts on individual groups of animals or individual species (Section 5.3.2);
- Minimising impacts of dust on nearby properties due to vegetation and overburden removal (Condition 706:M12 and Section 5.2.2);
- Requirements for installing fencing to ensure minimum harm to native fauna (Section 5.4.1);
- Methods to be employed to remove vegetation and overburden (Section 5.4.2); and
- Trap and release methodologies to be integrated into a single activity over six nights (Sections 5.3.1 and 5.3.2).

### 5.2.1 Strategies

Arising from the possible impacts identified in Section 3.2, the protection strategies below are interwoven in a common objective to minimise dust impacts; minimise impacts on fauna likely to be found in the project area; and protect bushland habitats:

- Minimise impacts on nesting and breeding fauna;
- Minimise dust impacts on nearby residents (706:M12 – Dust Management and Remedial Action Plan);
- Individual strategies to translocate species in accordance with Ministerial Statement 706;
- Strategies to protect injured or orphaned fauna;
- Strategies to minimise harm to fauna with home ranges overlapping the project area;
- Strategies to enhance bushland areas remaining around the project area.; and
- A Bush Fire Management Plan

### 5.2.2 Overall

This section summarises the available options to minimise adverse impacts both on native fauna and nearby residents. The options for individual aspects of vegetation clearing are given consideration in Section 5.2.4 and are summarised in Table 2 below.

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It is important that the animal trapping program and vegetation clearing are conducted in such a way as to minimise the impacts on all fauna likely to be found within the project area as well as minimising the adverse amenity impacts of dust on nearby residents.

- *Fauna trapping and relocation*: between January and April inclusive to maximise the survival prospects for any relocated animals – whether to adjacent bushland or to more distant relocation areas.
- *Vegetation Clearing*: Nesting and breeding for bat and bird species: Avoid clearing during height of breeding season and spring time blossoming.
- *Dust impacts on nearby residents*: Only clear in wetter months of the year (Dust Monitoring and Remedial Action Plan - Condition 706:M12).

For the Chuditch, Phascogale and Possum species and possibly other species, the following options apply in order of preference:

- Trap and hold in captive breeding programs.
- Trap and release to DEC approved relocation area;
- Trap and release to adjacent bushland before nightfall on same day as capture.

### 5.3 Translocation strategies

This section describes relocation strategies for those species listed in Condition 706:M8.1; any other species captured should also be included in the translocation program. The DEC Perth Hills Mundaring District Office will be point of contact for liaison with DEC regarding trapping and release protocols. Fauna specialists, as provided in the contacts list in Appendix 2, should be contacted prior to the start of the capture program to ensure that the best outcome for captured animals is provided.

In consideration of the Ecologia trap and release program for Main Roads WA (Section 5.1 above) it is likely that both Chuditch and Brushtail Possum will be captured.

#### 5.3.1 Overall strategy:

*Displacement*: For certain species displacement as a consequence of clearing is the only viable strategy. Highly mobile species such as birds, macropods and larger reptiles will move away from disturbance as clearing advances. Macropods are large animals and as such, capture and release would be extremely stressful for these animals. A protocol for injured or orphaned young is provided in Section 5.1.4.

*Trapping*: When three sides of the project area and the southern boarder of Lots 11 and 14 have been fenced (for the Areas 1 and 2 relocation program), cage traps should be set overnight in an approximate 100m grid with the outer edge of the trapping-grid lying adjacent to the boundaries of the area to be cleared. Use of “universal bait” (rolled oats, peanut butter and sardines) is likely to be successful in luring

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animals to traps. Only personnel with experience in trapping and fauna handling and with adequate fauna handling equipment should be employed in the trapping exercise. Elliot traps used in conjunction with the cage traps will enhance the probability of capturing Phascogale and will most probably result in Mardo captures. The trap and search program will be conducted over six nights and days.

*Search Techniques:* For reptile species and also Echidna, specialised search techniques are required as per Section 5.3.2

*Holding and relocation:* Animals should be transferred from traps at first light to hessian bags and released before nightfall into suitable habitat or holding facility subject to DEC protocols. No animal shall be held for more than 24 hours between capture and release under any circumstances.

*Local Release:* Unless captured animals can be incorporated into an existing DEC relocation program, relocations to remote areas with similar habitat should not be attempted. In this case animals should be released to adjacent bushland before night fall (see “Strategies required by other management plans”). However, animals may be released in a more remote location subject to advice being received from DEC if recaptures occur.

- *Risk:* The carrying capacity of the locality may be exceeded for any given species with the reduction in habitat caused by clearing.
- *Benefit:* adjacent bushland would most likely include part of the home range of the captured animal thus improving the animal’s chances of ongoing survival. If at all possible, arrangements could be made to follow up releases into adjacent bushland with radio-tracking techniques.

*Remote Release:* If any of the captured animals can be incorporated into an existing DEC release program, then captured animals should be held and released according to DEC approved protocols.

*Captive Breeding Program:* This will take preference over any other strategy should a DEC captive breeding program be available at the time of the trapping program.

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### 5.3.2 Consideration of individual groups, species and issues

This section is summarised in Table 2 below.

#### ***Brush-tailed Phascogale (Phascogale tapoatafa)***

It is possible that Phascogale will be trapped; however, they are a difficult species to capture (pers com Dr Nicky Marlow, DEC Woodvale) and both Elliot and cage traps should be employed within the trapping grid using universal bait to increase the chance of capturing Phascogale. If Elliot traps are employed, it is very likely that Mardo (*Antechinus flavipes leucogaster*) will be captured and these should be included in any fauna translocation. Captured Phascogale would best be released along nearby creeklines.

#### ***Macropod species (Macropus irma and M fuliginosus)***

Large macropod species are not suitable for capture and release in this instance. These are highly mobile species that will move away from disturbance. The fence on southern boundary of Lots 11 and 14 (Section 5.4.1) will minimise the risk of these larger species straying onto the highway during clearing operations for Areas 1 and 2.

#### ***Chuditch (Dasyurus geoffroi)***

This species has been the subject of re-introduction and follow-up survival programs within the local region (Section 1.2) and would be suitable for relocation according to DEC protocols.

The most suitable time for relocating Chuditch, especially females, is between January and April. Translocating female Chuditch at other times of the year is likely to result in the death of dependant young or else place animals into established territories where they would be unlikely to survive. January to April is a time when the species are more mobile and are most likely to successfully establish in new surroundings (pers comm., Mr Keith Morris, DEC Woodvale). The preferred options for captured Chuditch are:

1. Incorporate into a CALM captive breeding program;
2. Release within the same day into a location recommended by DEC; or
3. Release into adjacent bushland before nightfall.

#### ***Peak breeding and nesting season***

Peak nesting/breeding time for bird species and Microchiropteran bats likely to be found in the local region including late August through spring. Clearing operations should therefore be planned to take place outside of these months unless approval is provided by DEC.

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### ***Echidna (Tachyglossus aculeatus)***

Although the Echidna leaves very obvious foraging trails, tracking the animal down is extremely time-consuming and is more often met with failure. The suggested methodology that has proven highly successful and is likely to provide rapid success is to use a trained gun dog, if a handler and dog can be acquired, to track the Echidna. The dog should be highly trained in tracking and be provided with Echidna scent.

Echidna have previously been captured in cage traps; in this eventuality, the animal should be retained within the cage trap with a hessian sack covering the cage. The animal should be released from the trap into adjacent bushland.

### ***Reptiles: Carpet Python (Morelia spilota imbricate) Dell's Skink (Ctenotus delli)***

These animals may best be located by searching through the most likely habitat locations. For Dell's Skink this would be in the vicinity of dead grass trees (*Xanthorrhoea* spp) and granite boulders (Ecologia 2004). Distinctive scats of the Carpet Python are likely to provide clues as to its nearby location under rocks or logs. General opportunistic search techniques include raking through bark and leaf litter and overturning logs and rocks should be employed.

### ***Strategies Required by other management plans.***

This Fauna Plan is to be implemented in conjunction with the Dust Monitoring and Remedial Action Plan required by Condition 706:M12.1.

The following passage is taken from the Dust Monitoring Plan (Section 5.2.1)

*Ideally, fauna trapping and relocation should be immediately followed by clearing and overburden removal to ensure that fauna that are relocated do not return to home ranges before clearing commences.*

*The Fauna Relocation Plan (Condition 706:M8) includes the following fauna options:*

- *Trap and release to adjacent bushland; or*
- *Trap and release into existing relocation plan; or*
- *Trap and hold in existing captive breeding programs.*

*Consequently where the fauna Trap and release to adjacent bushland applies, the following is to be instigated:*

- *If insufficient rainfall in April to allow clearing and overburden removal: proceed with trapping program in last half of April. Knock down vegetation in the week following the completion of the trapping program. Vegetation and overburden removal should only proceed after sufficient winter rainfall to prevent dust emissions.*

**Table 2. Summary of options for minimising adverse impacts due to vegetation clearing**

Consideration	Issue	Impact	Restraint
Nearby Residents	Clearing and overburden removal Condition 706:M12	Adverse impact of dust on amenity.	Only clear and remove overburden in wet months.
Microchiropteran bats	Peak breeding season	Removal of trees with crèche hollows	Avoid period from late August through to early summer
Avifauna	Peak breeding and feeding	Removal of nesting trees and blossom food source	Avoid period late August through Spring
Brush-tailed Phascogale	Breeding season; home range disruption.	Displacement during breeding season	Best to relocate between Jan and April inclusive
Chuditch	Established territories; Breeding season with young in hides.	Unlikely to survive when territories are established; loss of young in hides.	As above.
Possum species	Breeding season; home range disruption.	As above.	As above.
Macropod species	Home range disruption	Removal of part home range	Best to displace rather than capture.
Echidna	Slow-moving large animal	Removal of part home range	Best to capture and release to adjacent bushland
Carpet Python and Dell's Skink	Crepuscular species	Likely to be destroyed unless removed.	Capture and release to adjacent bushland
<b>Overall</b>	Minimise impacts on fauna by relocate Jan to April Minimise dust impacts by clearing only in Wet months	If insufficient rain by end of April: instigate capture program; knock down vegetation after capture program completed with vegetation removal and overburden removal only after rainfall.	

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### 5.4 Strategies to minimise impacts

#### 5.4.1 Fencing

**Objective:** To minimise the probability that fauna, with home ranges overlapping the project area, do not come to harm

Fencing may achieve more specific objectives.

1. Prevent fauna from returning to operational areas immediately after clearing/vegetation knock down
2. Prevent fauna (and people) from falling into the operational pit after overburden and quarrying operations commence
3. Minimise the risk of people crossing operational boundaries (see section below on “personnel movement) and disturbing habitat.
4. Protect bushland from stock or vehicle incursions.

Ministerial Condition 706:M7.2 has the following requirements.

*M7.2 The proponent shall fence the perimeter of Lot 11 and Lot 14 Horton Road, and the perimeter of the operational boundary shown on Figure 3 (this document Fig.2), to the requirements of the Minister for the Environment on advice of the Department of Conservation and Land Management.*

The following comply both with the Objectives 1 to 4 above and also the requirements of Condition M7.2.

- Active operational areas fenced to a height of 1.8 m using Cyclone Diamond Mesh fencing (or equivalent) and buried to a depth of 50 cm to satisfy Objectives 1, 2 and 3 by both preventing fauna from gaining access or falling into operational areas and also provide a safety barrier for people. Initially Areas 1 and 2 are to be fenced; as the quarry expands into Areas 3 to 6, these should be enclosed subject to the same requirement.
- The outside perimeter of Lots 11 and 14, as indicated in Figure 2, to be enclosed using DEC approved fencing,<sup>1</sup> which will satisfy Objective 4 above and also Condition M7.2. The southern boundary of Lots 11 and 14 must be completed prior to clearing Areas 1 and 2.

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<sup>1</sup> Stock-proof fence using 7-line ringlock (or equivalent), with steel strainers and star picket spacers (pers comm. S. de Haan, Perth Hills District)

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### 5.4.2 Procedure for fencing and vegetation clearing or knock-down

Note that subject to the requirements of fauna trapping and relocation, vegetation may either be

- Cleared, followed by overburden removal operations if there has been sufficient rainfall before the end of April; or
- knocked down and left in place for later removal and overburden operation if insufficient rainfall by mid-April.

The following procedure is to be observed in regard to the installation of fencing vegetation knock-down/clearing.

1. Fencing (as per 5.4.1) to be install on the southern boundaries of Lots 11 and 14.
2. Clear a line of vegetation of sufficient width to act as a firebreak and fence line around the boundary of the area to be cleared. The firebreak should be of sufficient width to allow passage of the largest vehicle on site likely to be employed in fire-break maintenance or fire-fighting.
3. Firebreaks should provide escape routes for fire crews and vehicles at both ends and not include a dead end which could trap a vehicle in the event of bush-fire encroachment.
4. The trunks of any trees removed from the fence line/firebreak should be used to create woodpiles in adjacent woodland for habitat enrichment.
5. A Cyclone diamond-mesh (or similar) fence to a minimum of 1.8 m height above ground level is to be installed on the edge of the firebreak as per (1.) above. A skirting should extend at least 50 cm below ground level to prevent fauna pushing through. Burying may not be possible where there is hard caprock. In this case the skirting should be bent outwards and secured with gravel and rock.
6. The boundary nearest to uncleared bushland is to be left open (not fenced) until vegetation clearing or knock-down has been completed.
7. Fauna trapping and relocation program to follow (as per Section 5.3.1) immediately after completion of fencing three sides of boundary.
8. Vegetation clearing or knock-down of the operational area is to take place in the week following the completion of the fauna trapping and relocation program. Clearing or knock-down to proceed methodically from cleared areas towards uncleared areas where the open end of the fence that has not yet been closed off. This will allow any fauna remaining to escape.
9. Install fencing on fourth/last side of boundary immediately after vegetation has been knocked down or cleared to prevent fauna from returning to the project area.

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### 5.4.3 Injured or orphaned fauna

**Objective:** To ensure that any injured fauna that may be found during habitat clearing are appropriately treated.

All staff of BGC and contractors involved with clearing activities on site should be briefed on the correct protocol to follow if injured or orphaned animals are found. Contact numbers and the appropriate course of action should be made available to all staff to access, including a contact list of wildlife carers and emergency animal rescue centres (see Useful Contacts Lists). Contractors or other site clearance staff should use the following protocol below, in the event of finding injured, orphaned or displaced animals:

#### ***Injured/Orphaned Fauna Protocol.***

The following protocol is to be used when injured or distressed fauna are located.

1. Animal found.
3. Identify animal, if possible (determine if potentially venomous).
4. Contact Environmental Officer or Quarry Manager.
5. If unable to stay with the animal, clearly mark its position so it is visible to all personnel that approach the site.
6. Follow handling and temporary holding instructions provided below.
7. If in any doubt about whether the animal is venomous, do not under any circumstances handle. Instead, monitor the location of the animal and await arrival of experienced wildlife officer or reptile handler.
8. BGC Environmental Officer or Quarry Manager to contact DEC or wildlife carers as appropriate with reference to Attachment 2 of this Management Plan.

### 5.4.4 Fauna handling and temporary holding

**Objective:** To minimise stress on any native fauna that require temporary storage, handling or relocation.

Native fauna, and mammals in particular, can be significantly affected by handling and relocation stress. The relocation of any native wildlife should only be undertaken with a Regulation 15 permit issued by DEC Parks and Conservation Division (allowing the taking and removal of native fauna species) and only by personnel experienced in the handling of native fauna and who are adequately resourced with fauna handling equipment.

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### ***Herpetofauna***

Reptiles can, in most cases, be transported within calico bags of varying size to suit the animal. Plastic carry boxes can also be used with some air holes, leaf litter and sand within them. The animals should always be placed within an area of shade in hot weather so that they do not overheat.

### ***Avifauna***

Nesting birds (and all avifauna) are protected by the *Wildlife Conservation Act 1950-1979* and should be left undisturbed until an appropriate course of action has been followed (Injured/Orphaned protocol above). Young birds found within a nest should only be removed if considered by a specialist to be abandoned or injured.

### ***Mammals***

For any mammals found at any time on site the best method of storage and transportation would be within hessian sacks. Mammals may become stressed and agitated in traps or hard containers, some times resulting in injury. Mammals transported in hessian sacks remain calmer due to the dark environment and if kept in the shade and on a soft, secure surface can be transported with relatively limited stress and injury.

## **5.5 Habitat enhancement & protection**

**Objective:** To enhance and protect the diversity of habitat of bushland in Lots 11 & 14 outside of operational areas.

Information below is from Biota (2004)

### **5.5.1 Nesting hollows**

The PER (URS 2003) canvassed the option of providing nesting boxes to compensate for loss of tree hollows. However, DEC Nature Conservation Division advice, arising from the stakeholder consultation, is that such practices are of questionable value due to the probability of such devices being used by feral birds and introduced honeybees (*Apis mellifera*)

Trees remaining within undisturbed areas of Lots 11 and 14 and identified as having “cockatoo nesting hollows” (Figure 3) should be clearly identified and tagged to ensure these are not removed for fencing or firebreak requirements. The trunk can be marked with surveyor’s tape or other clearly identifiable material and a weather proof tag be attached identifying the tree as being protected as a nesting site for threatened fauna.

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### 5.5.2 Woodpiles

The retention of cleared timber from the site area is an important measure in helping to maintain local fauna diversity. These log habitat piles should vary from collections of single seasoned and hollowed or hollowing/decomposing logs, such as tree trunks, and branches to collective piles of stacked timber. The log piles will form both instantaneous and future habitat for a diverse fauna, ranging from wood-decomposing invertebrates to reptiles, amphibians and the larger mammalian fauna. The location of these wood piles should aim to create a food source, shelter and linkage throughout the remaining site area, not proposed for clearance. The Numbat and the Chuditch, which is known to occur in the locality, would benefit from these features. Both of these species require hollow logs for refuge, and the Numbats exclusive food source is White Ants or termites, which can be found within decomposing wood. The presence of wood decomposing insects also creates a food source for other foraging mammals and reptiles.

### 5.5.3 Personnel movement

Fencing around operational areas with signed and gated-access to surrounding bushland is to ensure that vehicle and pedestrian traffic into adjacent bushland is restricted to those personnel who have valid reasons to be there. This will eliminate unauthorised vehicle tracking through bushland and reduce the probability of a fire that could be increased by unauthorised entry to bushland areas.

Adjacent bushland areas are to be declared out of bounds to all BGC employees and sub-contractors except those who have approval by the Quarry Manager to work within these areas. Such work is likely to encompass fire-break maintenance and/or fencing construction and repair or scientific work.

The Quarry Permitting System is to be modified to include a permit system to allow authorised entry to bushland areas outside of the operational areas. Permits will apply to both BGC employees, contractors and visitors.

Signs are to be erected all bushland access gate(s) notifying that only permit holders are to have access. The signs will include the words “*Access by Permit Only – see Quarry Manager*”

### 5.5.4 Bush-fire prevention

To minimise the risk of fire risk to bushland adjacent to the quarry operational areas, a Fire Management Plan (Attachment 1) is to be included in the Quarry Operations Procedures. The Fire Management Plan overlaps other requirements as it is dependant on the installation and maintenance of fencing and on the restriction on personnel movement (Section 5.5.3).

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The relevant standard for the assessment of this factor is the EPA objective (Section 4.1). Threatened fauna are protected by DEC under provisions of the Wildlife Conservation Act 1950. Threatened and migratory fauna are protected under the provisions of the Federal EPBC Act.

### ***Strategy to minimise impacts on nesting and breeding fauna***

Requirement: Vegetation clearing/knock-down operations to be conducted subject to requirements of Section 5.2.2.

Verification: DEC Audit Branch to be notified in advance of vegetation clearing or knock-down operations.

### ***Strategies to translocate certain species***

Requirement: Capture and release or translocation strategies to be implemented as outlined in Section 5.3.2.

Verification: DEC Mundaring District Office to be liaison for implementing translocation tasks. Animal releases as per DEC protocols.

### ***Strategies to protect injured or orphaned fauna***

Requirement: Implement required protocol.

Verification: DEC Mundaring District Office to be liaison for implementing protocol.

### ***Strategies to minimise harm to fauna with home ranges overlapping the project area***

Requirement: Install fencing and attach signs as required to bushland access gates as required by Management Plan.

Verification: DEC Audit Branch and Mundaring District Office to be advised when clearing and fencing have been completed.

### ***Strategies to enhance bushland areas remaining around the project area.***

Requirement: Protect cockatoo nesting trees, create woodpiles.

Verification: Annual reports to DEC Audit Branch; ongoing liaison with DEC Mundaring District Office.

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### *A Bush Fire Management Plan*

Requirement: The Fire Management Plan (Attachment 1) to be implemented as required

Verification: A pre-clearing inspection by DEC Audit officer if required.

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### 7.1 Monitoring

The following register is to be maintained:

- All fauna sited or captured during the relocation program;
- For the year following vegetation clearing, any mortalities to be recorded during surveys conducted after the completion of clearing. Any road mortalities within or on roads adjacent to Lots 11 and 14 should be recorded.

### 7.2 Ongoing monitoring

Ongoing monitoring will be limited to

- Ensuring that fencing, gate(s) and signs, as required by this document, are maintained in good order.
- A record is kept of Access Permits issued in regard to Bushland areas outside the operational area.
- Compliance with the requirements of the Fire Management Plan (Attachment 1).
- Compliance with the requirement to protect cockatoo nesting trees

In addition, monitoring is required to verify the success of this management plan. The Trap-door Spider management plan requires surveys of bushland outside of Areas 1 and 2. These surveys can include any record of dead or injured native fauna. A record should be kept of any road kills on roads adjacent to the quarry.

Information that verifies the requirements of this EMP are being maintained are to included in the Annual Performance Review Report to the Department of Environment and Conservation as required by Condition M5.2.

When completing the Annual Report, the Quarry Manager will indicate any remedial action that has been taken in regard to reports received following monthly inspections required by ongoing monitoring.

### 7.3 Contingencies

The Annual Performance Review Report will indicate

- If any breaches of Access Permitting for bushland areas has occurred and how these breaches have been dealt with.
- If any fire incidents have occurred and how these were dealt with.
- Records of animal fatalities/injuries recorded for Lots 11 and 14 to be taken into consideration when revising this management plan prior to extending the quarry into any of Areas 3 to 6.

### 8.1 Stakeholders contacted to date and advice

#### ***Department of Environment and Conservation***

##### **Overall Issues**

Mr N Caporn; DEC Kensington Office and Dr M Gerkaklis, Swan Region. General discussions regarding other DEC contacts and DEC policy. Mr Nick Woolfrey; Principle Co-ordinator, Development Approvals.

##### **DEC Fencing Requirements**

Mr S De Haan; Mr M Meinema, DEC Perth Hills District Office, Mundaring: External boundaries of Lots 11 and 14 to be fenced with link mesh as per Section 5.4.1.

##### **Echidna**

Mr N McKenzie; DEC Science Division, Woodvale: Echidna search technique as per Section 5.3.2

##### **Chuditch**

Mr Keith Morris; Science Division, Woodvale: Chuditch capture, handling and relocation requirements as per Section 5.3.2. Dr Peter Mawson, DEC Senior Zoologist: Trap and release requirement.

##### **Petrogale**

Dr Nicky Marlow; Science Division Woodvale: Petrogale capture and relocation requirements as per Section 5.3.2

### 8.2 Community liaison

Ministerial Condition M19.2 has been set in regard to communicating the outcomes of certain Ministerial conditions to a Community Liaison Group.

*M19.2 Prior to the finalisation of plans, strategies, and programmes required by Conditions 8.1, 9.3, 10.1, 12.1, 13.1, 15.1, 16.1 and 18.1, the proponent shall make reasonable endeavour to establish a Community Liaison Group to the requirements of the Minister for the Environment*

The outcome of this requirement will be provided in a separate communication to Department of Environment and Conservation.

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### 8.3 Ongoing liaison

Liaison with the DEC Audit Branch through Annual Reporting and the DEC Mundaring District Office for advice when required. The proponent is establishing a Community Liaison group in compliance with Condition 706:M19.2.

### 9.1 Auditing

The Quarry Manager and Environmental Officer will be required to ensure that all management actions as per Section 10 of this document are carried out.

The DEC Environmental Audit Branch has a policy of conducting audits from time to time to verify compliance by proponents with Ministerial Conditions

#### ***Pre-clearing audit***

- Perimeter fencing of southern boundary of Lots 11 and 14 should be completed prior to clearing to prevent fauna straying onto the highway during clearing.
- Trees with cockatoo nesting hollows (Figure 3) marked and tagged
- Permitting procedure and documents in place for access to bushland areas outside of operational areas
- Fire Management: Site plan relevant to existing stage of development; fire-fighting resources in place and serviceable; notification provided to local Volunteer Fire Brigades

#### ***Post-clearing audit***

- Operational areas fully fenced and access to adjacent bushland is gated and signed (*No entry without permit; No smoking in bushland*).
- Outside boundaries of Lots 11 and 14 to be fully fenced using stock-proof fencing as indicated in Figure 2.
- Fire breaks for Lots 11 and 14 as required by the Shire of Northam (Fire Management Plan).
- Fire Management Plan fully operational.

### 9.2 Review and revision

The life of the Voyager Quarry is expected to be over 50 years with a series of clearing operations to occur as indicated for Areas 1 through to 6 (See also EPA 2005, Figure 3) as the quarry advances by benching into new areas.

The experience gained during the first phase of the operations for Areas 1 and 2 will be documented and reported to the DEC Audit Branch in the first annual report as required by Condition 706:M5.2. Any fauna mortalities recorded during or after the relocation program will provide information relevant to reviewing this document. This information will be used to review and revise this Management Plan prior

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to clearing operations being approved prior to any additional clearing operations. Reporting. DEC Nature Conservation Division is to be consulted when revising this plan.

### 9.3 Reporting

Within three months of the completion of clearing, a report will be provided to the DEC providing an outline of compliance with this Management Plan. Thereafter, Annual Reports will be required every twelve months following completion of clearing in accordance with the approved Audit Programme (Condition 706:M5.1).

The experience gained during the first phase of the operations for Areas 1 and 2 will be documented and reported to the DEC Audit Branch in the first annual report.

# Key Management Actions

## SECTION 10

Issue	Management Action	When	Responsibility
Fauna trapping and relocation program.	To be conducted between January and April inclusive.	Between Jan and April inclusive.	Quarry Manager
Vegetation clearing.	Vegetation to be knocked down immediately after completion of the six-day fauna relocation program. Clearing if knocked down vegetation and overburden removal is subject to the Dust Management Plan required by Condition 706:M12.1	In the week following completion of the knock down.	Quarry Manager
Protect Displaced Fauna.	Install fending around project area. Install fencing on southern boundary of Lots 11 and 14 .	Before vegetation clearing or knock-down.	Quarry Manager Env Officer
Fauna Relocation/release.	Obtain Reg 17 Permit from DEC for fauna capture and release/relocation program. Contact key DEC scientific staff (see Contact List) to notify intention to start capture program and to organise DEC staff availability if advice needed.	Prior to fauna program	Fauna Contractor
	<ol style="list-style-type: none"> <li>1. Clear fence line along boundaries of area to be cleared (remove tree trunks to woodpiles in adjacent bushland).</li> <li>2. Install required fencing and gate access to bushland as required, leaving one side of the area to be cleared – that which is adjacent to bushland - open to allow any remaining fauna to escape.</li> <li>3. Proceed with targeted threatened fauna capture and release/relocation from quarry area immediately prior to vegetation clearing work commencing.</li> <li>3. Commence vegetation clearing/knock-down in the week following the completion of the fauna program. Clearing or knock-down is to proceed from cleared areas towards unfenced project-area boundary to allow fauna to escape.</li> <li>4. Install fencing on remaining open boundary of operational area immediately after clearing has been completed.</li> <li>5. All animal sightings, captures to be recorded.</li> </ol>	Fauna Relocation Program.	Quarry Manager Env Officer
	Liaison with DEC regarding the capture and/or relocation of any fauna from the project area (see Contacts List).	Discovery of fauna	Env Officer
Injured fauna	Be aware of the potential for injured or orphaned fauna to be found on or near the project area.	During clearing	All personnel
	Follow protocol in the event of locating injured or orphaned fauna.	At all times, esp. during clearing	All personnel Env Officer

# Key Management Actions

## SECTION 10

Issue	Management Action	When	Responsibility
Post clearing fauna mortality.	Consultants contracted to undertake Trap-door Spider surveys (EMP required by Condition 706:M9) to note any fauna mortalities in bushland areas and on roads adjacent to Lots 11 and 14. All animal mortalities to be recorded.	In post clearing surveys.	Wildlife Contractors. Env Officer
Habitat	Protect trees with cockatoo nesting hollows.	Prior to Clearing.	Env Officer
	Significant breeding resource trees (Fig 3) to be clearly marked to prevent clearing.	Prior to clearing.	Env Officer
	Re-establishment of log piles and other fauna habitat reconstruction as part of site rehabilitation works.	During clearing.	Env Officer
Personnel movement.	Modify Quarry permitting system for access to adjacent bushland in Lots 11 and 14.	When fencing ops area is complete.	Quarry Manager
	No access to bushland by personnel unless issued with Quarry permit.	When fencing ops area is complete.	Quarry Manager
	Gated access to adjacent bushland to be signed "no smoking in bushland areas" and "no entry without permit".	When fencing ops area is complete.	Environmental Officer
	All quarry personnel to receive induction regarding the importance of preserving habitats in undisturbed areas, including the Fire Management Plan, permitting system, Trap-door Spider habitat and potential for spreading die-back disease using contaminated vehicles.	Prior to clearing and for any new staff.	Environmental Officer
Fire Management Plan.	Observe requirements of Fire Management Plan.	Instigate Plan before clearing.	All personnel Quarry Manager
Revise and Review Management Plan.	All activities related to this Management Plan to be reviewed and documented and included in first annual report to DEC Audit Branch.	Ann Report one year after clearing.	Environmental Officer
Revised Mgt Plan.	Experience gained from clearing Areas 1 & 2 (1 <sup>st</sup> annual report) to be used to revise this Management Plan prior to any further clearing operations for quarry expansion. Each sequential quarry expansion to require an approved and revised Management Plan. Update and modify Management Plan as necessary to reflect improved practices, legislative changes.	Management Plan to be revised & approved before additional quarry expansions.	Env Officer, Quarry Manager

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- Biota (2004). Voyager Quarry relocation Fauna Management Plan. Vol 2, Appendix G, URS (2004).
- Department of Environment and Conservation (2006). Compliance Monitoring and Reporting Guidelines for Proponents: Preparing environmental management plans. Perth, WA.
- Ecologia (2004). Great Eastern Highway Reconstruction – Fauna Relocation. Prepared for MacMahon and Main Road WA Perth.
- Environmental Protection Authority (2005). Voyager Quarry, Avon Loc 1881, Lots 11 and 14 Horton Rd, The Lakes. BGC (Australia) Pty Ltd. Report and recommendations of the EPA. Perth, WA, Bull. 1169.
- Herring Storer (2004). Noise impact supplementary report. Relocation of the Voyager Granite Hard Rock Quarry, The Lakes, Western Australia. Vol 3, Appendix K, in URS (2004).
- Johnstone, R.E & Kirkby, T. (2004). Survey of significant trees within proposed expansion area (Lots 11 & 14 of the Voyager Quarry site. In URS (2003) Vol 3 App. F.
- Ninox Wildlife Consulting (2002). Vertebrate Fauna Habitat Assessment, Avon Loc 1881-Lots 11 & 14 Horton Road, The Lakes, Mundaring. Unpublished report for BGC Quarries, Perth.
- Orell, P. & Morris, K. (1994) Chuditch Recovery Plan, Western Australia Wildlife Management Programme No. 13, DEC.
- URS (2003). Land Clearing and Quarry Expansion, Avon Loc 1881, Lot 14 Horton Road, The Lakes. PER prepared on behalf of BGC (Australia) Pty Ltd. Perth, WA.
- URS (2004). Final Report: Response to Submissions. Proposed Relocation of the Voyager Quarry. Land Clearing and Quarry Expansion, Avon Loc 1881, Lot 14 Horton Road, The Lakes. Prepared on behalf of BGC (Australia) Pty Ltd. Perth, WA.

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URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of BGC (Australia) Pty Ltd and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal dated 10 August 2006.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared between 21 August and 24 October 2006 and is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

# Attachment 1

# VOYAGER FIRE MANAGEMENT PLAN

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## 1. Safe practices

- The only stored fuel on site will be diesel fuel which will be stored and banded according to the requirements of the Department of Consumer and Employment Protection (DoCEP).
- No fires are to be lit within operations areas at any time.
- Plant and vehicles to be used in clearing and fire-break maintenance to be fitted with appropriate fire-prevention equipment such as spark arresters and spark shields. Exhaust systems shall be shielded or positioned such that contact with vegetation is not possible. All plant working in bushland areas to carry appropriate fire extinguishers.
- Welding and grinding activities are to be carried out behind spark shields and away from bushland areas. Fire extinguishers shall be kept close at hand when such operations are being conducted
- See Victoria Country Fire Authority Advice for fire protection advice regarding vehicles and work practices:

<http://www.cfa.vic.gov.au/business/farms/farmfiresafe.htm>

## 2. Smoking restrictions

- For personnel authorised to enter bushland areas adjacent to operations areas, no smoking will be allowed in bushland areas.
- Signs located on access gates to bushland areas will carry the words  
“No Smoking in Bushland Areas”

## 3. Fire-Break maintenance

- Fire breaks for all uncleared land within Lots 11 and 14 are to be maintained in accordance with the requirements of the Shire of Northam. Firebreaks should be of sufficient width to take water trucks and other equipment as may be made available by the Quarry Manager. Fire breaks should not contain dead ends; they should open at both ends to local road or other fire breaks to allow escape options for fire crews.

## 4. Fire & Emergency Services Authority (FESA)

The nearest Bush Fire Brigades:

- Chidlow Volunteer Fire Service Brigade (Shire of Mundaring): **ph 9572 3016**
- Ink Pen Road Volunteer Fire Service Brigade (Shire of Northam): Brigade Captain **ph 9573 1093**

Brigades to be provided with keys for access gates with identifying tags.

Each year both of the above Brigades are to receive an updated plan of the existing quarry and proposed Voyager Relocated Quarry Operations Area indicating:

- Access roads, bushland access gate(s), and fire breaks within adjacent bushland
- High-volume water stand pipes
- Location of keys, if access gates are kept locked

# VOYAGER FIRE MANAGEMENT PLAN

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## 5. Fire fighting resources

The following resources are to be maintained as serviceable, on site at all times.

- High-volume stand pipes and associated feed pumps and protective bollards
- Water truck, pump and water cannon
- Plant equipment, as may be required, shall be made available if a fire occurs in uncleared areas of Lots 11 and 14 which are owned by BGC (Australia) Pty Ltd.
- The Quarry manager shall nominate persons responsible for verifying all of the fire fighting resources and safe practices as required above are in accordance with this plan.
- The staff crib-room notice board shall display a copy of the plan required by Paragraph 4 above and a copy of this Fire Management Plan.

## 6. Fuel management

Subject to the covenanting requirements of Schedule 1 of Ministerial Statement 706, fuel reduction strategies may be undertaken for land within Lots 11 and 14 remaining in BGC ownership. This may take the form of proscribed burning subject to advice from local Volunteer Fire Service Brigades. For further information see Planning for Bush Fire Protection which is available on the WA Planning Commission website:

<http://www.wapc.wa.gov.au/Publications/default.aspx>

## Attachment 2

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<b>Centre or individual</b>	<b>Expertise</b>	<b>Contact details</b>
<b>Wildlife caring issues</b>	Native fauna rehabilitation and care.	ph 9474 9055
<b>DEC key contact all fauna issues</b>	Dr Peter Mawson will liaise with relevant experts as required to provide advice	ph 9442 0300
<b>Armada Reptile Centre</b>	Volunteer Snake Catchers	ph 93996927
<b>Independent Carers</b>	Fauna rehabilitation	Advise through Kanyana