Annexure E

Draft recommendations from the Fauna Survey

Annexure to EPA Assessment No. 1403

Lot 4 Underwood Avenue, Shenton Park Response to Public Submissions 2007

HABITAT PREFERENCES AND IMPLICATION FOR REHABILITATION OF THE CONSERVATION AREA

Introduction

The Conservation Area is centrally located with respect to the three lot subdivision and is in the south-west part of the vegetated portion of Lot 4.

The vegetation of the area is dominated by a *Eucalyptus/Banksia/Allocasuarina* Low Woodland to Open Woodland which can be divided into six vegetation associations consisting of a Jarrah (*Eucalyptus marginata*)/Banksia/Sheoak (*Allocasuarina fraseriana*) Low Woodland, *Banksia attenuata/B. menziesii* Low Woodland, a *B.Prionotes* Closed Scrub, Jarrah and Tuart (Eucalyptus gomphocephala) Open Woodland, *Eucalyptus decipiens* Low Woodland and a Jarrah Woodland.

The eastern region of the Conservation Area is in Very Good condition. The central region of the Conservation Area has been significantly modified by partial clearing in the past, the installation of tracks and firebreaks and the establishment of animal pens associated with the University's Agriculture faculty in the southern part of the area. Some native trees have been retained in the animal pen area and a number of exotics have been planted including Flame Trees (*Erythrina indica*).

To the west of the ridge there are four populations of the Priority 4 species, *Jacksonia sericea.* In addition, a small population of the mallee *Eucalyptus decipiens* occurs on the lower slopes of the area. Eucalyptus decipiens is considered uncommon in the Perth Metropolitan Region, usually occurring in very small stands on shallow sand over limestone. A small pocket of *B.Prionotes* Closed Scrub occurs in the Banksia Low Woodland. This stand has not been affected by the impacts of fire and is in very good condition compared to the stands located at the northern boundary of the development site.

The 12ha Conservation Area consists of approximately 10ha Good to Very Good condition vegetation and 2ha Degraded condition which mostly comprises the current animal pen area. Vegetation clearing and weed invasion are the dominant disturbance factors influencing the condition of the vegetation. Dominant weeds include Veldt Grass (*Ehrharta calycina, E. longifolia*), Blowfly Grass (*Briza maxima*), Lupin (*Lupinus sp.*), and Gladiolus (*Gladiolus caryophyllaceus*).

The University is committed to rehabilitating the Degraded area to at least a Good condition and other weedy sections to a Very Good condition.

A total of 149 species of vascular plants have been recorded from the vegetated portion of Lot 4. Based on the variety of vegetation types retained in the Conservation Area and the general high quality of the bushland it can be expected that a significant proportion of the species recorded on Lot 4 occur in the Conservation Area.

Of the total species recorded on Lot 4, 112 are native to the site and 37 are introduced species not native to the area (includes native Australian species which are garden escapes).

The habitat types in the vegetated portion of the Conservation Area are representative of the rest of the Shenton Bushland area. As a result of the mixed habitat types present in the area, it is expected most habitat requirements for successful fauna survival will be met by the 12.0ha Conservation Area.

Enhancement of Fauna Habitat in Conservation Area

The Conservation Area contains native vegetation in a range of conditions from Very Good to Degraded. The EPA has agreed that the 12.0ha Conservation Area represents a suitable area for conserving the site's

core environmental attributes provided that rehabilitation of the Degraded sections is completed before clearing begins (EPA, 2003).

There are a few strategies that can be used to enhance the fauna habitat in the rehabilitated area. These strategies will increase the rate and success of colonisation of terrestrial vertebrates into the rehabilitated area.

Leaf litter and topsoil are critical habitat requirements for most reptiles and indirectly, most birds at the site. Most reptiles present on site are fossorial (e.g. *Lerista sp.*, *Simoselaps sp.*) living in the leaf litter and top couple of centimetres of topsoil. In addition to providing a habitat for the reptiles, invertebrates which make up most the prey items of the reptiles and birds of the site, also live in the leaf litter. If topsoil and leaf litter habitats are not created in the rehabilitated site, the species of reptiles and birds that are dependant on the leaf litter will not survive.

It is recommended that before clearing takes place, leaf litter and topsoil are transported into the rehabilitated area.

Another strategy for enhancing the fauna habitat in the Conservation Area is to bring in hollow logs and other decaying plant material. Hollow logs provide habitat for terrestrial and arboreal reptiles (e.g. *Pogona minor*) while decaying plant material provide habitat for fossorial reptiles and provide habitat for invertebrates (e.g. termites). The amount of decaying material should resemble the levels currently found in the undisturbed areas. Ideally logs and decaying material should be collected and transported by hand instead of larger machinery. Bulldozers easily crush hollows making the logs unsuitable as habitat, and pulp-up decaying material.

Where direct seeding and planting of tube-stock and vegetation is to occur, only species that are already commonly found within the Conservation Area and adjacent areas should be used. It is inappropriate to use different species (seeds or plants) from other habitats, even if they appear to be better colonisers.

The aim of the rehabilitation in the degraded zones within the Conservation Area should be to resemble the adjacent undisturbed areas. The more closely it resembles the adjacent areas the more effective the Conservation Area will be as habitat for terrestrial vertebrates. It is anticipated that it could take 12 months for the leaf litter and decaying matter to settle enabling invertebrates to colonise, before it is suitable for translocation of vertebrates.

Considerations Prior to Development of Site

Considerations

Prior to development, the Conservation Area should be rehabilitated to the satisfaction of the EPA, and terrestrial vertebrates translocated from adjacent areas. This is a multistage process. The aim of the translocation of reptiles is to 'spike' the population and speed up the rehabilitation process for the area.

The main criteria that needs to be assessed before any trapping or relocation is scheduled is measuring whether the rehabilitated portion of the Conservation Area sufficiently resembles the adjacent areas. If the site does not resemble the adjacent areas it is unreasonable to expect successful colonisation of reptiles. As part of this assessment, the level of leaf litter, number of fauna habitat logs, level of decaying material and composition of understorey and ground vegetation need to be measured. It is unreasonable to expect overstorey species to resemble the adjacent bushland in the short term, however, these species must show progress towards resembling adjacent areas before they are considered suitable.

Timing of Vegetation Clearing and Translocation of Fauna

The timing of the clearing and translocation of reptiles into the conservation area is important.

Reptiles are most active in Bold Park during November and December each year (How, 1998). However, the assemblage of reptiles that are present at different times across these warmer months varies. For example, some species are most commonly caught during early spring when they are actively searching for mates and breeding (i.e. *Pogona minor*) but less frequently during late spring/early summer. Other species of reptile are more frequently caught in the hotter weather (i.e. December) compared to earlier in the year (October and November). It is therefore recommended that two trapping periods are used for capturing a representative assemblage of vertebrates from the site. The first trapping period should be in spring (early/mid November) and the second trapping period during the mid/late December when it is warmer.

It is also important to use a variety of trap types and adequate trapping effort to capture a representative assemblage. Pit-traps and funnel traps in association with drift fencing are recommended for trapping. These trap types are commonly used throughout Australia and are highly effective at capturing small terrestrial vertebrates. Small cage traps should also be used to capture larger reptiles (e.g. Tiliqua rugosa). Elliott traps are less effective for this site as there are very few small mammals present and they do not capture reptiles.

The amount of trapping effort necessary to capture most of the terrestrial vertebrates for a site varies across Western Australia, however it is easily measured using species accumulation curves. Initially the trapping return (captures per trap night) will be high and this will get lower with time due to removal of individuals. When the number of captures per trap night starts to plateau, an estimate of the trapping effort necessary to capture all individuals can be made. Based on my experience it is estimated that approximately 135 pit-traps and 135 funnel traps per 10ha is necessary to capture active trappable individuals over a 10 day period. At best we would only expect to remove 50% of all individuals present in the area. This protocol should be used for both trapping periods.

If possible, Bobtails (*Tiliqua rugosa*) should be moved as breeding pairs. This is easily achieved as pairs are commonly found during November each year. All fauna caught should be translocated into the rehabilitated area the same day as capture.

Clearing should occur soon after the second round of trapping to minimise the number of reptiles that can recolonise the area from adjacent areas.

Foxes should be controlled before relocating fauna to the Conservation Area.

Fencing

The rehabilitated area and conservation reserve should be fenced for the whole summer period during translocation of reptiles. Professor M. Bull from the University of Adelaide, who has over 20 years experience with Bobtails (*Tiliqua rugosa*), suggests that moving these reptiles will break pair bonds and they will just try to return to the point of capture, even if the original habitat has been cleared. The fence should be left installed over summer whilst the reptiles are adjusting to the new habitat and removed during the following winter period when the reptiles are inactive. A fence constructed using aluminium flywire approximately 400mm high would be sufficient to prevent reptiles from returning to the point of capture. Some supplementary feeding of reptiles and monitoring of the fence will be needed during the summer period while the reptiles adjust.

Future monitoring and management

There is a paucity of data on the success of 'spiking' a rehabilitated area using translocated reptiles and it is unknown how successful the procedure will be. The opportunity for further monitoring is very important and something that The University of Western Australia should further investigate. Monitoring of the rehabilitated site and surrounding Conservation Area over a period of time (ideally 3–5 successive summers) would provide invaluable information about the success of vertebrate translocations and success of the Conservation Area as a remnant site for fauna conservation. Dr Graham Thompson from

the Centre for Ecosystem Management, Edith Cowan University is interested in this research and is willing to assist Coffey Environments in planning and monitoring this research.

In addition to basic monitoring and reporting, a newly developed 'rehabilitation index' (Thompson, et al. 2007) would be used to quantify the success of the rehabilitation in the degraded portion of the Conservation Area. The rehabilitation index compares the reptile assemblage in the 'rehabilitated' areas with the adjacent 'undisturbed' areas. It quantifies the success of the rehabilitation and can be used to predict how long it will take to reach a sustainable level. The rehabilitation index has been used previously in the Goldfields region of WA and in Papua New Guinea to measure rehabilitation success. Again Dr Thompson from Centre for Ecosystem Management, Edith Cowan University is interested in pursuing this research.

Summary of considerations and timing prior to development

The timing of the rehabilitation, clearing and translocation of vertebrates is important for a successful outcome. Below is a summary of the timing sequence for successful translocation of vertebrates (particularly reptiles).

- **Collection of leaf litter and topsoil.** Leaf litter and topsoil should only be collected from areas that are planned for clearing. The specific locations for collecting topsoil and leaf little should be chosen to minimise impact on fauna trapping locations. The topsoil and leaf litter should then be spread throughout the degraded portion of the Conservation Area.
- **Collection of logs, decaying organic material.** Materials can be collected immediately after the collection of leaf litter and topsoil. These materials should then be spread throughout the degraded area at the same densities as the undisturbed areas.
- **Seeding.** Seedlings and supplementary seeding should occur simultaneously with collection of logs and decaying material. This is best done in May/June when soil moisture levels are highest to promote germination of viable seed. The rehabilitated area should be left in situ for a minimum of 12 months and possibly up to 2 years to allow organic matter and seedlings to integrate into the soil.
- **Preventing access.** All access gates should be locked and open access points closed off to prevent public accessing the bushland. If gates are left open to the public there is high possibility that trapping sites will be tampered-with and the results will be compromised.
- **Fencing conservation area.** The Conservation Area should be fenced with 400mm high aluminium fly-wire to prevent translocated animals from moving back to areas where they were caught. This should remain installed until the following winter when translocated animals are less active.
- **Vertebrate trapping.** Trapping grids should be established and fauna trapped for two 10 day periods during November and December. A gap of at least 10-14 days is recommended between trapping periods to allow for variation in fauna activity levels and weather patterns (i.e. wet and windy conditions are not ideal for trapping).
- **Translocation.** Translocation should be done on the same day as capture.
- **Monitoring.** Temporary fencing and translocated fauna should be monitored throughout the summer. This can be done every couple of days and supplementary feeding may be needed for some of the species (e.g. Tiliqua rugosa).

Monitoring should be conducted within the rehabilitated area for 3-5 years. After the first 2 years it may be possible to only monitor biannually. The monitoring of translocated terrestrial reptiles using the rehabilitation index will provide information about the success of Centre for Ecosystem Management,

Edith Cowan University is interested in the on-going monitoring of reptile assemblages in the conservation area.