Plan of Management for the Queensland Blossom bat *Syconycteris australis* on the Koala Beach Residential Estate

Prepared in accordance with conditions relating to the NSW National Parks and Wildlife Service Licence No. TS0092.

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on behalf of
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1. INTRODUCTION

The Queensland Blossom bat *Syconycteris australis* is one of the smallest members of the suborder Megachiroptera, weighing approximately 19 gms and having a body length of approximately 60mm (Law & Spencer, 1995). The species is distributed along the east coast of Australia as far south as Taree – Forster in New South Wales and is also found in New Guinea. Habitat requirements for *S. australis* in the southern part of its range include areas of coastal heath for the purpose of foraging, combined with rainforest or wet sclerophyll forest for roosting purposes. *S. australis*, although found to eat various fruits in the north of its range, tends to be entirely nectivorous within the southern part of its range, including NSW and parts of southern Queensland.

S. australis is currently listed in Schedule 2 of the *Threatened Species Protection Act 1995* as "Vulnerable". The species was previously listed on Schedule 12 of the *National Parks and Wildlife Act, 1974* as "Vulnerable and Rare". The Scientific Committee's reason for listing was...

> *Population and distribution suspected to be reduced;*
> *threatening processes severe; ecological specialist.*

2. BACKGROUND TO THE PLAN OF MANAGEMENT

2.1 Development proposal for Koala Beach

Koala Beach (formerly known as "Searanch") is located in the Tweed Shire in far north-eastern NSW, approximately 20 km south of the NSW – QLD border. The site is situated just west of the Tweed Coast Road, between the townships of Hastings Point and Pottsville, and is bounded to the north and north-west by Christies Creek and the Round Mountain Road. The total area of the holding is 365.03 ha, including approximately 200 ha of largely forested terrain. The site contains a variety of habitat types, including dry and wet sclerophyll forests, swamp sclerophyll forest, Swamp Oak/Paperbark forests, rainforest remnants, wetlands and pasture.

The proposal for the Koala Beach residential subdivision involves development of between 80 and 100 ha of mostly cleared land which is currently zoned 2(c) - Urban Expansion Zone in accordance with *Tweed Local Environment Plan 1987 (Amendment No.56)*.

In accordance with Section 92B(2)(a) of the *National Parks and Wildlife Act, 1974*, a Fauna Impact Statement (FIS) was prepared for the Koala Beach site by the Australian Koala Foundation (Phillips, 1995) and submitted to the NSW National Parks and Wildlife Service in January, 1995.

2.2 FIS results

The Koala Beach site falls into an area which is considered to be of considerable biogeographic importance: "the area is correspondingly high in species richness and contributes significantly to the high biodiversity values of north-eastern NSW" (Phillips, 1995). The results of the FIS concluded that over three hundred species of native animals where known or otherwise considered likely to occur in the area (Phillips, 1995). Forty of those were listed on Schedule 12 of the *National Parks and Wildlife Act, 1974 No. 80* at that time.

One of the species found to be utilising the Koala Beach site was the Queensland Blossom bat *Syconycteris australis*, a species subsequently listed on Schedule 2 of the *Threatened Species Conservation Act, 1995* as "Vulnerable".

2.3 Decision report, Section 120 licence and conditions

On the 5th of October, 1995, Licence number TS0092 was granted to the Ray Group Pty Ltd by the Director-General of the NSW National Parks and Wildlife Service. The licence covered a 63 ha area of the proposed development. However, the licence allowed for the commencement of work on Stage 1 only. To this end, development works may not proceed on Stage 2 or on subsequent stages until written approval is granted by the Manager, Northern Directorate, NPWS. Licence TS0092 was issued for a five year period under the proviso that a number of conditions, detailed in the licence, must be met by the developers as the development proceeds.

Syconycteris australis was one of the Schedule 12 species listed on the general licence. Conditions of the general licence pertaining to the Queensland blossom bat included the following:

1. Those areas on the Koala Beach site deemed by the FIS to be significant habitat for the Queensland Blossom bat must be retained.

2. A management plan for the Queensland Blossom bat on the Koala Beach site must be completed within six months of the operation date of the general licence*. When completed, the plan of management must be submitted for written approval to the Manager, Northern Directorate, NPWS before Stage 2 can proceed. "This plan shall propose recommendations regarding the management of the significant habitat area and shall be available for public inspection on request".

* **Note:** While an initial draft of the current management plan was submitted in June, 1996, it was not immediately approved by NPWS and suggested amendments to the plan were not made until November 2000. Development of Stage 1 was completed in the interim. The current revised plan now precedes the development of Stages 2, 3 & 4.

3. BIOLOGY AND ECOLOGY OF *Syconycteris australis*

The Queensland Blossom bat, *Syconycteris australis* is one of the smallest members of the Megachiroptera. Weighing approximately 19 gm, with a body length of ~60 mm and a forearm length of ~42 mm (Law & Spencer, 1995), the species has a fox-like head with large eyes and small rounded ears. The fur is very soft and reddish brown to fawn in colour, with the underbelly being slightly paler than that of the head and back (Cronin, 1991). Similar to other specialist blossom feeders, the teeth are pointed and slender and the tongue is extremely long with a brush-like tip adapted for collecting nectar from blossoms (Richards 1983; Fenton 1983).

S. australis is one of the two extant members of the genus *Syconycteris* (Nowak & Paradiso, 1983). In the southern parts of its range, *S. australis* survives on a diet of nectar and pollen which it collects from coastal heath flowers such as *Banksia, Callistemon* and *Melaleuca* (Richards, 1983). Flowering *Eucalyptus* and *Corymbia* spp. are an additional food source. Fruit may also make up part of the diet in tropical areas (Spencer & Flick, 1995). Pollen is not collected from flowers but is groomed from the fur and wings after feeding bouts; scales in the surface of the hairs appear to be designed for this purpose (Fenton, 1983; Law, 1992). *S. australis* is considered to be an important mammalian pollinator for some native plant species (Law & Spencer, 1995).

S. australis roosts amongst the foliage of rainforest tree species, usually in the canopy where humidity is high and air temperatures are relatively constant (Law, 1993). However, the species

have also been found roosting closer to the ground, in low stunted heathlands (Phillips, unpub. data) and within the leaves of banana trees (Coburn, unpub. data). The combination of both roosting habitat and adequate foraging habitat within commuting distance of the roost site are essential for the existence of this species within any given area. Considering the immense reduction in lowland rainforest habitat over the last 200 years, the vulnerability of the blossom bat as a species is not surprising. Although locally abundant in a number of areas, an awareness of remaining significant habitat is essential in order to ensure its protection for the long term viability of the species. Further, *S. australis* is known to show high fidelity to feeding sites both within and between subsequent flowering seasons (Law unpub. data), emphasising the importance of localised feeding sites and the dependence of this species on them.

Little is known of the social habits of this species. *S. australis* is generally presumed to be solitary (Bartholomew *et al* 1964). However, it has not been confirmed whether this is the case year-round. The underlying reasons for yearly movements and changes in population densities are also unknown, as are the importance of various locations for social interaction such as mating. Based on studies of other plant resource dependent bat species (eg: Eby, 1991; Parry-Jones and Augee, 1992; Markus, 2000), seasonal movements are likely to occur in direct response to food resource availability.

Research has suggested that *S. australis* may employ what is known as a 'resource-defence breeding system (Law unpub. data). This involves male defence of food resources in order to have greater access to females. The high correlation of both male and female *S. australis* with food resource availability, the displacement of juveniles by adults from feeding areas and the highly aggressive nature of these bats all provide support for this type of breeding system, although further study is required to confirm this. In light of this, the importance of localised food resources is further enhanced as an essential part of the lifecycle, most especially in areas where human population pressures are increasing.

4. *Syconycteris australis* ON THE KOALA BEACH SITE

4.1 Trapping results for the site and the identification of significant habitat

Census of *S. australis* on the Koala Beach site was primarily undertaken using mist nets. A total of 3,745 net metre/hours were accumulated from six sites during the survey period (Phillips *et al*, 1995). A total of 23 individual Blossom bats were caught. The majority (74%) of these captures occurred during the August sample period and thus coincided with the peak flowering period of *B. integrifolia* in that year. The rate of capture declined from 1 Blossum-bat/99.5m/hr during August to 1 Blossum-bat/276m/hr during the September sampling period, and no blossom bats were caught during the December sampling period when the *B. integrifolia* had ceased to flower altogether. The trapping effort during this third sample period was subsequently reduced. Over half (52%) of the individuals captured were caught at site M3 (see Figure 1) where *B. integrifolia* occurs at highest concentrations on the Koala Beach site. In combination with the evidence of temporal aggregation obtained by radio-tracking (see Section 4.4), these factors led to the identification and mapping of this site as significant habitat in the FIS (Phillips, 1995). This M3 site has been classified as the significant habitat area for the purposes of this POM.

The obvious seasonal bias of blossom bat usage of the Koala Beach site is almost certainly a consequence of seasonal changes in blossom food resources. Seasonal changes in population densities of *S. australis* are known to occur in other areas across the southern part of its range (Law, 1993). Trapping success of this species is frequently low during the summer months and increases markedly during winter (Law, 1993; Coburn, 1995) when plant resources such as *B. integrifolia* flower in often concentrated patches.

The whereabouts of blossom bat populations during the warmer months of the year is not known. However, two hypotheses may be put forward to explain the seasonal change in blossom bat densities. Firstly, animals may be moving to other areas in order to exploit alternate food resources during the warmer months of the year. Secondly, summer food resources may be more thinly spread, forcing the bats to live at lower densities during this part of the year. During the cooler months, bats may congregate at high quality sites to best exploit this food resource and/or to facilitate social and sexual interaction.

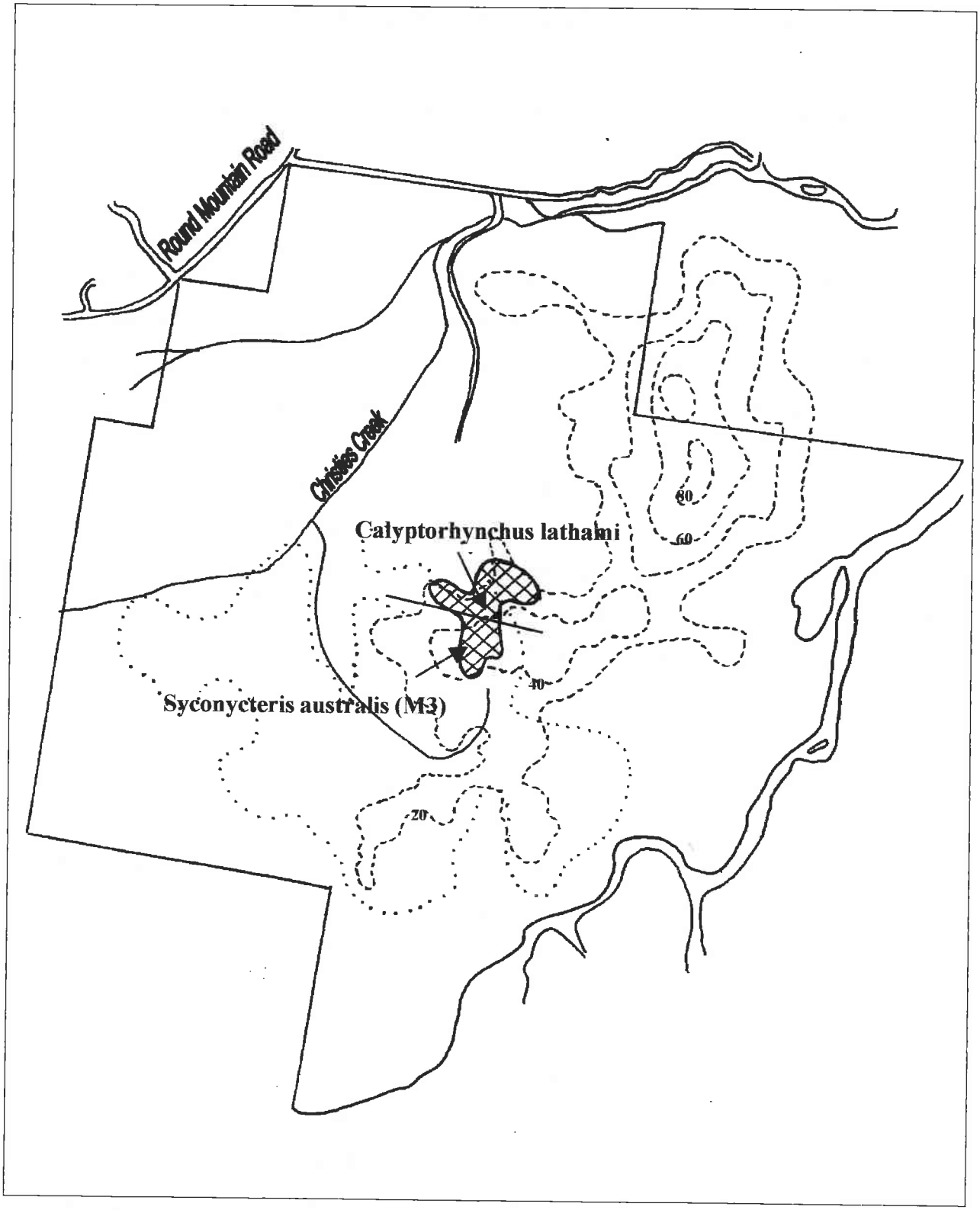

Figure 1. Map of the Koala Beach development site showing the area of combined significant habitat for *Syconycteris australis* (Queensland Blossom bat)/ *Calyptorhynchus lathami* (Glossy Black cockatoo). Dotted line = approximate development boundary for all stages of the development.

4.2 Radio-tracking

As a component of the fauna survey (Phillips *et al* 1995), a short-term radio-tracking program of *S. australis* was implemented in order to investigate and monitor the movements and roosting preferences of a representative sample of the larger population utilising the Koala Beach site. Four blossom bats (three male, one female), caught on 26 September 1995, had Model LT1 transmitters (weight 650 mg) secured to their backs. Nocturnal movements and locations of daytime roosts were monitored using an AW Model Directional Antenna and Regal 2000 Receiver, at intervals over the next ten days (the life of the transmitter).

4.3 Roost site location

Individual 151.624 was located roosting only 300m from the original point of capture, in an isolated *Syzygium oleosum* growing in the understorey of a Swamp Oak community. This bat returned to this roost site again the following day (28 September 1995), but was not located during any subsequent daytime searches, despite the fact that it continued to return to the site to feed (see Sec. 4.2.2 below).

The roost site of individual 151.603 was also located on the 27 September 1995, approximately 2.5 km north-west of the capture site, in a banana plantation. This bat was found roosting in this same area on all subsequent daytime searches (28 &29 September, 2 & 3 October), however, the animal more frequently roosted in the adjoining moist forest as opposed to the banana plantation itself.

The roost site of individual 151.664 was not detected until 29 September 1995 whereupon it was located roosting in moist forest at Taggert's Hill approximately 5.5 km from the original point of capture. Subsequent searches (2 & 3 October) found this bat to be roosting within the same area.

No signal from the transmitter attached to individual 151.684 was detected following this animal's release.

Although these results indicate that the Koala Beach site does not appear to have a resident population of *S. australis*, some individuals may make use of some parts of the site for roosting. Further radio-tracking data, especially during the winter months, would be required in order to

confirm whether or not parts of the Koala beach site were in fact used regularly as roosting sites for this species. More significantly however, the substantial commuting distances recorded for these bats while foraging at Koala Beach indicate that it is likely to contain a locally and regionally significant food resource for the species.

4.4 Nocturnal movements

Nocturnal monitoring of blossom bat movements was carried out every two hours from dusk to 2400h on 27th & 28th of October and 2nd & 3rd of October. Irregular, weak signals from all three individuals occurred between 2000h and 2200h. However, strong signals from all three individuals occurred between 2200h and 2400h on each night, indicating that all three of these bats were located at least in the immediate vicinity of site M3 during these hours.

The 'time-tabled' nocturnal movements of *S. australis* to Koala Beach site M3 are difficult to explain given our limited knowledge of the behaviour of this species. Clearly individuals are making use of other food resources in the area before coming to the M3 site. The fact that all three tracked individuals chose to return to the site during the same time period on all four monitored occasions, despite the fact that at least two of them had been captured elsewhere on the site, indicated a high fidelity to the food source of *B. integrifolia* and to established foraging patterns. A maintenance of regular foraging patterns has also been observed in other megachiroptera, ie. in flying foxes (eg: Markus, 2000).

5. PLAN OF MANAGEMENT

5.1 Objectives

Conditions of the General Licence issued by the Director-General of the National Parks and Wildlife Service have directed that all of the area identified in the FIS as significant habitat (ie. the M3 site) for the Queensland Blossom bat should be retained. However, the FIS recommendation that **all** *Banksias* with a DBH greater than 125mm on the remaining development site should be retained and incorporated into the subdivision design was rejected by the NPWS for the following reasons:

- The close proximity of feed trees to residential areas may increase mortality on local populations of this species through cat predation and impact with cars. (Note: at the time of revision of this plan (November 2000), cat ownership on the site continues to be prohibited and therefore does not pose a threat populations of *S. australis*).

- Lighting and noise associated with residential housing may deter the Queensland blossom bat from foraging close to such areas, (Glen Hoye, pers. comm.)

- The implementation of such a measure may be logistically difficult given that there are existing constraints on the subdivision layout.

During the preparation of the development consent issued by Tweed Shire Council, it was instead decided that stems above 125mm should only be retained 'where possible', ie. where these did not interfere with the subdivisional layout and where increased mortality due to proximity to cars were not considered to be a likely outcome.

The main objective for the management of *S. australis* on the Koala Beach site is to facilitate the continued use of the site by the species for the purposes of both roosting and foraging.

In order to achieve this, the following objectives are proposed:

1. To maintain and enhance the available resources for this species within and outside of the identified significant habitat to ensure that the regional importance of the site as a food resource is not lost as a result of development.

2. To monitor the *S. australis* population on the Koala Beach site at intervals throughout the development period to assess whether the primary objective, ie. that the site continues to be used by this species, has been achieved.

3. To collect baseline information about the blossom bat population using the Koala Beach site, ie. approximate numbers, sex ratios, demographics, distribution of roost sites etc. for future comparative purposes.

5.2 Habitat management on-site

Table 1 (Appendix A) provides a summary of the following information.

5.2.1 Management of the significant habitat area

This area of land consists of a mixture of both large and small (regenerating) *Banksia integrifolia* and was identified by the FIS to be an area of high use by the Queensland Blossom bat. This site is considered to contain a significant local and regional food resource for the species and it is critical that the habitat area not be damaged through over-use, weed infestation, fire (an issue which must also be considered for the safety of nearby residents) or inappropriate maintenance regimes. Thus the successful maintenance and enhancement of this area as a resource for *S. australis* in the developing urban environment will need to involve both active management and community interest and support.

Weed management

In order to ensure that weed infestation does not degrade the quality of the site, an annual weed control program should be put in place. Removal of weeds before they become a problem will reduce fire hazard and help to ensure the natural regeneration of *Banksia integrifolia* on the site. Weed control may be best achieved through community involvement in conjunction with Tweed Shire Council and the Koala Beach Management Committee (KBMC) and should occur under the auspices of the rehabilitation plan for the Koala Beach site. An initial weed removal effort of one day per six months is recommended, and this effort should be adjusted as required. The installment of a gate on the roadway prior to the site is proposed to prevent the active spread of weeds through the dumping of garden prunings and other waste, as was detected during a site inspection in October 2000. It is suggested that keys to the gate be held by the site manager and council officers.

Community involvement and education

In order to enhance local community awareness of the relative importance of this area of significant habitat for the Queensland Blossom bat and other species, it is considered that the site should be available for community use on a restricted basis. Where possible, pedestrian movement should be limited to the existing paths and fire-trails bordering the site. Motor vehicle access by members of the public should be prohibited. Interpretive signs should be provided so that the community can

appreciate the reasons for the site's conservation value and can be further encouraged to maintain those values. Interested residents may also be encouraged to participate in long-term monitoring programs for the site (see 5.2.2).

Fire management

The reduction of fire hazard is required for the purposes of minimising the risk of wildfire and subsequent damage to the site and to nearby urban areas and other vegetation. However, to prevent damage to regenerating vegetation from control burns, careful manual removal of fuel loads using whipper-snippers and mowers is recommended. People involved with the management of fuel loads should be carefully instructed beforehand about the sensitivities of the area.

Site enhancement

Between the period of initial monitoring in 1994 and October 2000, the site was the subject of successful natural regeneration and the number of young stems of *B. integrifolia* had increased markedly. At that point, inappropriate management (ie. slashing) of the site caused substantial damage to the primary area of regeneration, removing around 50% of the total mature stems and regrowth in the slashed area. It is hoped that this POM will contribute to preventing such accidental habitat destruction in conjunction with the Koala Beach development in the future and that this be ensured by the project manager. To compensate for the recent damage outlined above, the M3 site should be targeted for replanting with *B. integrifolia* during the first year of operation of the POM.

The regeneration of *B. integrifolia* should be actively encouraged by weed control as detailed above, while management other than prescribed weed and fire hazard reduction should be minimal and supported by limited human use of the site. Movement through the area should be restricted to existing pathways. Re-evaluation of the site quality and regeneration progress will need to occur on an annual basis, leaving open the option of further plantings of *B. integrifolia* if necessary.

Once decisive boundaries to the site have been determined, it may be appropriate to plant *B. integrifolia* seedlings towards the site boundary in order to maximise the entire site area while clearly delineating boundaries. In addition, the planting of other plant species throughout the Koala Beach site should also be encouraged to provide a reliable food supply for blossom bats throughout the year. Suggested tree species to plant include Silky oak (*Grevillea robusta*), Black bean (*Castanospermum australe*), Swamp mahogany (*Eucalyptus robusta*), Red bloodwood (*Corymbia*

gummifera), Pink bloodwood (*C. intermedia*) and the bottlebrushes *Callistemon salignus and C. pachiphyllus*.

5.2.2 Other *Banksia integrifolia* on-site

Notwithstanding inconsistencies between the recommendations of the FIS and the conditions imposed by Licence TS0092, the importance of retaining those Banksias with a potentially significant flower resource that occur outside of the significant habitat area should not be discounted lightly. Although it has been speculated that Blossom bats will be deterred by lighting, noise and activity of an urban development, it is a contention that remains unconfirmed and should not be used to devalue the presence of isolated Banksias in gardens and public spaces. If further monitoring of *S. australis* on the Koala Beach site confirms that bats are making use of food resources within the urban environment, then the retention of these larger trees and the potential food (ie. nectar) they provide will represent a significant on-site resource for the species.

To assess the use of developed parts of the Koala Beach site by *S. australis* in the short term it is proposed that three currently retained large *Banksia integrifolia* in the development be sampled during the first of the trapping programs. This sampling should ideally continue, subject to landholder's permission, throughout the duration of the monitoring program so that presence/absence of blossom bats at these isolated trees and their utilisation of the resource within the context of an urban subdivision may be ascertained as the development continues and resident numbers rise. Interested residents should be encouraged and trained to assist with basic monitoring (see 5.3) to minimise costs and to encourage a long-term interest in the welfare and conservation of the species.

5.2.3 Enhancement of the Koala Beach Site – General considerations

Residents of Koala Beach should be encouraged to plant local native tree species known to provide food resources for *S. australis*. Further, these tree species should also be included in replanting of public land by the developers and/or council. *Banksia integrifolia* is recognised as being of particular significance to the Blossom bat. However, other local native tree species which may provide food resources for this, as well as other, wildlife species include *Melaleuca*, *Callistemon*, *Eucalyptus/Corymbia* and other species of *Banksia*.

5.2.4 Further areas for consideration

Apart from the identified significant habitat and the retention of individual *Banksia integrifolia* specimens, a number of other areas potentially significant to the Blossom bat occur on the koala Beach site. Pockets of rainforest and moist forest on the Koala Beach site also provide potential roosting sites for *S. australis*. During survey work for the FIS, five individuals were captured adjacent to a small pocket of rainforest located in a gully occurring in the north-east section of the site. A similar pocket of rainforest is also found in a nearby gully. These areas are considered likely to provide important on-site roosting opportunities for *S. australis*, especially during the winter months, and should therefore be protected and buffered from any proposed development.

5.3 Marking, monitoring and performance indicators

The continued presence of a species in question in an artificially managed landscape is a vital measure of the success of any plan of management devised for that species.

To assess the continuing presence of *S. australis* at Koala Beach, a monitoring program should be undertaken to investigate the impacts of habitat management and urban development and the adequacy and efficacy of protecting resources considered significant for the welfare of these bats. A marking system would serve to establish baseline information regarding the size of the population or number of animals using the site at any one time, and ongoing monitoring would establish the extent of impact of the development on numbers of bats as well as providing an indication of the success and/or need for reassessment of ameliorative measures.

5.3.1 Capture and marking of the population

Capture of blossom bats on-site will be undertaken using mist nets, a method proven to be successful for the census of this species. The sex, weight, forearm length and reproductive status of each captured individual will be recorded before marking (see below) and release at the point of capture. Sampling should occur on an annual basis for at least three years and should focus on the peak *Banksia integrifolia* flowering period. This will occur in winter/early spring and may need to be adjusted according to yearly changes in *Banksia* flowering seasons. A minimum of 1000 metre/hours over a minimum of three nights will be employed during each sampling period. This

requirement is set as the approximate minimum effort required to capture ten individuals, as calculated from the results of the FIS. *S. australis* has been shown to establish the location of nets and learn quickly to avoid them (Coburn 1995). Nets should therefore be moved on a daily basis in order to maximise capture and recapture. Capture and marking of bats would need to be undertaken by the holder of a current Scientific Investigation Licence issued by the National Parks and Wildlife Service with the appropriate authorisations for the use of mistnets to trap *S. australis* on the site. This work could potentially also involve the participation of volunteers under the supervision of the licenced researcher.

Blossom bats captured during the monitoring period should be individually identifiable. While the use of PIT (Passive Implantable Transponder) tags would be the preferred method of long-term marking, implantation of tags requires the initial expense of the tags, a scanning device and the employ of an expert to perform the tagging procedure. An alternative, short term method of marking would involve the painting of the thumb claws of captured bats with coloured nail polish to identify individual. This would facilitate assessment of return visits by the same individuals during annual monitoring periods whilst preventing the duplication of recordings. This method is inexpensive and relatively non-invasive but it does not provide a mechanism for the measurement of population changes and ongoing use by identified individuals beyond each sampling period.

5.3.2 Monitoring

As mentioned above, sampling should occur annually for at least three years. The first two samples should focus on the significant habitat site to identify and mark the maximum number of individuals likely to be using the site in any one season. Subsequent samples should also target other parts of the Koala Beach site and adjacent areas in order to establish the location of alternative foraging sites. As mentioned in section 5.2.2, subject to the land-owners permission sampling should also occur around specific large *Banksia* located within the urban area. This will help to establish whether the blossom bats are continuing to use these food resources regardless of the proximity of housing developments and associated disturbance.

5.3.3 Performance indicators

The relative success of the management plan will be estimated using a number of performance indicators, detailed as follows:

- Successful maintenance and regeneration of *B. integrifolia* stands within and beyond the area of significant habitat.
- Maintenance of the area of significant habitat in its current undeveloped state.
- Comparison of the number of captures of *S. australis* per metre/hour between years.

These measures will establish whether the blossom bats are continuing to use the site and the likely size of the population utilising the site from year to year.

5.3.4 Reporting

An annual report detailing the results of the monitoring program and the status of performance indicators should be prepared and forwarded to the following:

NSW National Parks & Wildlife Service
RDC Pty Ltd
Koala Beach Management Committee

5.3.5 Duration of the management plan

This management plan will come into force pending approval from NPWS and will remain operative for five years hence. The Management Plan will be updated and/or reviewed on an annual basis in order to reflect the information obtained during the monitoring program.

5.4 Actions required to implement the management plan

YEAR I (2000/01):

Action

(i) Consolidate/survey and mark boundaries of significant habitat area ..... RDC

(ii) Initiate weed control program ..... KBMC

(iii) Commence Blossom bat capture and monitoring program ..... RDC/KBMC

(iv) Develop access strategy for consideration by KBMC/NPWS ..... RDC

(v) Develop interpretive strategy for significant habitat area ..... RDC

(vi) Collate data and prepare report ..... RDC

YEAR II (2001/02)

Action

(i) Implement access & interpretive strategy ..... RDC

(ii) Resample Blossom bat population ..... AKF/KBKMC

(iii) Maintain weed control program ..... KBKMC

(iv) Collate data, prepare report, review plan ..... AKF

YEAR III (2002/03)

Action

(i) Resample/monitor Blossom bat population ..... RDC/KBMC

(ii) Maintain weed control program ..... KBMC

(iii) Collate data, prepare report, review plan ..... RDC

YEAR IV (2003/04)

Action

(i) Resample Blossom bat population ..... RDC/KBMC

(ii) Maintain weed control program ..... KBMC

(iii) Collate data, prepare report, review plan ..... RDC

YEAR V (2004/05)

Action

(i) Resample/monitor Blossom bat population.....RDC/KBMC

(ii) Maintain weed control program.....KBMC

(iii) Collate data, prepare report, review plan.....RDC

(iv) Prepare revised Plan of Management .....RDC

5.5 Costs of implementing the management plan

The costs of implementing the management plan over the five year period will require a budget which has been estimated at between $8-10,000. Many of the activities proposed (and their associated costs) should be absorbed into the costings and duties associated with the appointment of a suitably qualified on-site ranger.

Year 1

Preparation of access/interpretive strategy, sample/mark/monitor bat population, collate data and prepare report.....$1650 – 1950

Year 2

Implement access/interpretive strategy, sample/mark/monitor bat population, collate data and prepare report.....$1800 – 2500

Year 3

sample/ mark/ monitor bat population, collate data and prepare report .....$1700 – 1850

Year 4

sample/ monitor bat population, collate data and prepare report.....$1700 – 1850

Year 5

sample/ monitor bat population, collate data and prepare report, revise management plan

.....$1700 – 1850

Total Cost.....$8550 – 10000

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APPENDIX A

Table 1. Summary of management actions for the Queensland blossom bat (*Syconycteris australis*) on the Koala Beach development site.

Management Objective	Management Actions	Responsibility	Performance Indicator
1. Facilitation of the continued presence of *S. australis* on-site	• see management actions outlined below		• continued presence of *S. australis* at Koala Beach as indicated by capture success
2. Documentation of the details of *S. australis* on site	a. map the area of significant habitat, the location of the QBB records and identified feed trees and roost areas on a detailed plan	RDC	• production of map defining significant habitat boundary, showing QBB records, feed trees, any identified roost areas
	b. assess continued presence of population on an annual basis through monitoring program as detailed in POM		• map/records updated annually
	c. prepare annual report on the monitoring program		• monitoring reported annually
3. Management of the area of significant habitat	**a. Fire management**	RDC + TSC	• significant habitat not burnt and fuel loads removed manually in accordance with the POM as required
	• assess fire risk		
	• manage fuel loads		
	• undertake appropriate and effective fire control		
	b. General site management	RDC	• stands of *B. integrifolia* regenerating and not declining in size and number of stems
	• monitor regeneration of *Banksia integrifolia* on-site; record status annually (ie. one day per year or more)		
	• plant additional Banksias in accordance with the rehabilitation plan for the Koala Beach site		• 50 *B. integrifolia* planted in significant habitat annually for three years
	c. Weed control	RDC	
	• identify significant weed control issues, eg: dumping of garden prunings and other wastes		• Weeds inspected twice yearly and removed as necessary
	• undertake appropriate management, ie. removal of weeds, prevention of introduction by residents		• Weeds successfully contained
	d. Community involvement and education	RDC	• assistance of residents with monitoring; no interference by residents with significant
	• develop and maintain an appropriate system of public access, ie. gate and existing tracks		

	• provide appropriate interpretive materials		habitat
4. Wider site management	a. identify new areas of significant habitat and develop management strategies for these areas	RDC	
	• identify importance of isolated individual *B. integrifolia* throughout the site and manage accordingly		• important isolated individuals maintained and used by bats
	b. Enhancement and rehabilitation plantings of appropriate food trees for the species (see 5.2.1) -	RDC	
	• as per the rehabilitation plan for the site	RDC	• recorded increase of appropriate native plants on the development site
	• as part of the landscape plantings on-site	RDC	
	• encourage resident plantings of appropriate native plants in private gardens	RDC	