Your reference:
Our reference: 5186

St Georges Basin
NSW 2540
PO Box 106

Tel 02 4443 5555
Fax 02 4443 6655

ABN 97 597 607 196
www.b-es.com.au

8 June 2005

Hare Bay Development Consortium
Suite 106, 29-31 Solent Circuit
Norwest Business Park
BAULKHAM HILLS NSW 2153

Attention: Scott Lennon

Dear Scott,

Re: Results of tree hollow survey, Lot 15 DP 1102772 Sealark Road, Hare Bay

We have completed surveys of the above property for trees containing hollows, as per our fee proposal dated 23 April 2005. Figure 1 indicates the approximate locations of the survey transects. The survey identified 26 trees on the property which contained hollows, as shown in Figure 2. However, only three of these trees contained hollows capable of supporting nest sites of threatened owls or cockatoos (Figure 2). These three trees represent potential constraints to development if they are found to be used for nesting by threatened owls or cockatoos. This is due to their proximity to potentially developable land and the large buffer around known nest trees likely to be required by consent authorities.

It is recommended that the three trees in the study area with potential owl and cockatoo nesting hollows be assessed for their use by these species via further survey work, as per our fee proposal dated 23 April 2005. This nesting assessment will involve the stagwatching of tree hollows prior to and following dusk, spotlighting and call playback as needed by two consultants per night, for up to three nights over winter. Surveys will need to be separated by periods of at least two weeks.

Should you have any queries, please contact me at your convenience.

Yours sincerely,

David Coombes
Project Officer / Ecologist

Your reference:
Our reference: 5186

St Georges Basin
NSW 2540
PO Box 106

Tel 02 4443 5555
Fax 02 4443 6655

ABN 97 597 607 196
www.b-es.com.au

17 November 2005

Hare Bay Development Consortium
Suite 106, 29-31 Solent Circuit
Norwest Business Park
BAULKHAM HILLS NSW 2153

Attention: Giulio Sirolli

Dear Giulio,

Re: Results of *Prasophyllum affine* Jervis Bay Leak Orchid surveys, Lot 15 DP 1102772 Sealark Road, Hare Bay

We have completed surveys for the Jervis Bay Leak Orchid *Prasophyllum affine* on the Sealark Road, Hare Bay site. No individuals of this species were located despite thorough coverage of potential habitat during the known flowering period. The species is considered highly unlikely to occur on the property.

I will forward more detailed correspondence including the methods used and maps of the survey area upon completion of surveys for the second threatened orchid being targeted, *Cryptostylis hunteriana.*

I enclose an invoice for the completion of *P. affine* surveys. Should you have any queries, please contact me at your convenience.

Yours sincerely,

David Coombes
Project Officer / Ecologist

Your reference:
Our reference: 5186

St Georges Basin
NSW 2540
PO Box 106

Tel 02 4443 5555
Fax 02 4443 6655

ABN 97 597 607 196
www.b-es.com.au

24 November 2005

Hare Bay Development Consortium
Suite 106, 29-31 Solent Circuit
Norwest Business Park
BAULKHAM HILLS NSW 2153

Attention: Giulio Sirolli

Dear Giulio,

Re: Results of small mammal trapping, Lot 15 DP 1102772 Sealark Road, Hare Bay

We have completed trapping surveys for small mammals on the Sealark Road, Hare Bay site. No threatened species were located despite thorough coverage of potential habitat.

I will forward more detailed correspondence including the methods used and maps of the survey area upon completion of surveys for the second threatened orchid being targeted, *Cryptostylis hunteriana.*

I enclose an invoice for the completion of mammal surveys. Should you have any queries, please contact me at your convenience.

Yours sincerely,

Dr Milton Lewis
Project Officer / Ecologist

Your reference:
Our reference: 5186

1 September 2005

St Georges Basin
NSW 2540
PO Box 106

Tel 02 4443 5555
Fax 02 4443 6655

ABN 97 597 607 196
www.b-es.com.au

Hare Bay Development Consortium
Suite 106, 29-31 Solent Circuit
Norwest Business Park
BAULKHAM HILLS NSW 2153

Attention: Giulio Sirolli

Dear Giulio,

Re: Results of threatened owl and cockatoo nesting assessment,
Lot 15 DP 1102772 Sealark Road, Hare Bay

Summary

We have completed nesting assessments for threatened owls and cockatoos on the above property, as per our fee proposal dated 23 April 2005. The objectives of the survey were to assess whether any trees with hollows on Lot 15 were being utilised for nesting by the threatened Powerful Owl *Ninox strenua,* Masked Owl *Tyto novaehollandiae* and Glossy Black-cockatoo *Calyptorhynchus lathami.* Three tree hollows with the potential to be used by one or more of these species had previously been identified by BES and these trees were targeted for the nesting assessments. The timing of the nesting assessments aimed to coincide with the breeding period of all three bird species mentioned above. Several methods were used to detect the presence of the target species on Lot 15. None of these species, or evidence of these species, were detected during the survey period.

Methodology

The nesting assessment included the following methods:

- Searching for owl roosts and evidence of owl and cockatoo presence during the afternoon;
- Listening for calls of Glossy Black-cockatoos during late afternoon and listening for owl calls from dusk onwards;
- Stagwaching potential tree hollows at dusk; and
- Spotlighting searches for nocturnal birds and mammals following stagwatching.

The survey effort and conditions are shown in Table 1 below.

Table 1. Survey Effort and conditions.

Date	Survey Type	Survey Effort	Temperature (° Celsius.	Cloud Cover (/8)	Wind	Rain	Moon (/4)
18 July 2005	Diurnal searches	0.5 person hours	13 - 10	Nil	Nil	Nil	3/4
18 July 2005	Stagwatching	3 person hours	13 - 10	Nil	Nil	Nil	3/4
18 July 2005	Spotlighting	0.5 person hours	13 - 10	Nil	Nil	Nil	3/4
1 August 2005	Diurnal searches	0.5 person hours	14 - 12	Nil	Nil	Nil	0/4
1 August 2005	Stagwatching	3 person hours	14 - 12	Nil	Nil	Nil	0/4
1 August 2005	Spotlighting	0.5 person hours	14 - 12	Nil	Nil	Nil	0/4

Results

No owls or cockatoos were heard, observed or otherwise detected during the survey period. One Common Brush-tailed Possum *Trichosurus vulpecula* was observed occupying one of the targeted tree hollows and two Sugar Gliders *Petaurus breviceps* were observed during spotlighting.

Conclusions

The habitat appears to be sub-optimal for large owl nesting given the relatively low height of the trees and relatively small area of forest compared to that of surrounding areas. The habitat is marginally more suitable for Glossy Black-cockatoo nesting, although the scarcity of potential nesting hollows suggests that the site would not be favoured by the species. Given the lack of optimal breeding habitat and lack of any evidence of target species, it is considered unlikely that these species would use Lot 15 for breeding.

Should you have any queries, please contact me at your convenience.

Yours sincerely,

David Coombes
Project Officer / Ecologist

Your reference:
Our reference: 5186

St Georges Basin
NSW 2540
PO Box 106

Tel 02 4443 5555
Fax 02 4443 6655

ABN 97 597 607 196
www.b-es.com.au

10 January 2006

Hare Bay Development Consortium
Suite 106, 29-31 Solent Circuit
Norwest Business Park
BAULKHAM HILLS NSW 2153

Attention: Giulio Sirolli

Dear Giulio,

Re: Survey Methods, Lot 15 DP 1102772 Sealark Road, Hare Bay

Please find enclosed a detailed summary of the survey methods used on the Sealark Road, Hare Bay site for targeted searches of *Cryptostylis hunteriana*, *Prasophyllum affine*, Gang-gang Cockatoo and generalised small mammal trapping.

Field Methods

Field investigations for *Cryptostylis hunteriana*, *Prasophyllum affine*, Gang-gang Cockatoo and small mammals were conducted in the study area by BES on 14, 21, 22, 23, and 24 November 2005 and 1 December 2005 in the locations shown in Figure 1.

Trapping Surveys

Targeted surveys for terrestrial mammals were undertaken within the open forest vegetation on Lot 15. Thirty-five (35) small cage traps and thirty-five (35) Type A Elliott traps were set along 3 transects. Traps were spaced at 25 m intervals and were baited with a mixture of peanut butter, honey and rolled oats. Each trap was covered with plastic to protect captured animals from rain, and the Elliott traps were lined with cotton wool to provide insulation for trapped animals. Trapping transects were located with GPS and marked with numbered flagging tape.

The traps were left in place for 3 consecutive nights yielding a trapping effort of 105 small cage trap-nights and 105 Elliott trap-nights and checked each morning soon after sunrise. Captured animals were identified quickly and with minimal handling, prior to release.

Hair Funnel Surveys

Twenty (20) Faunatech Hair Funnels were placed on the ground along 2 transects (10 per transect) in the open forest vegetation of Lot 15. All hair funnels were baited with a mixture of peanut butter honey and rolled oats. All hair funnels were left in position for three consecutive nights between 21 and 24 November 2005. Hair samples from hair funnels were sent to Ms. Barbara Triggs for analysis.

Targeted Stag-watches for Gang-gang Cockatoo nesting activity

On 21 and 24 November 2005 areas containing hollow-bearing trees suitable for Gang-gang Cockatoo nesting were thoroughly searched and monitored over extended periods for the presence of nesting birds returning to hollows. These observation periods were in the afternoon commencing at 18:00h and concluded at 20:30h. During these periods groups of hollow-bearing trees were monitored while listening for the loud characteristic vocalisations that are typical of this species as it returns to the nest. The groups of trees monitored during these sessions were located within the eastern of Lot 15.

Targeted Flora Searches

Specific searches for plant species of conservation significance known from the locality were conducted using the Random Meander method, and by systematically walking along designated grid transects 5m apart targeting areas of potential or suitable habitat. *Cryptostylis hunteriana* and *Prasophyllum affine* was targeted in appropriate vegetation types within the eastern section of Lot 15 using the grid transect technique. On the morning and prior to the days of these targeted surveys, sites containing known populations of these species were checked to verify the flowering period. For both species of orchid significant numbers of individuals were found in flower at known sites.

Summary Conclusions

No individuals of *Cryptostylis hunteriana*, *Prasophyllum affine*, Gang-gang Cockatoo or threatened species of mammals were located on Lot 15 despite thorough coverage of potential habitat. It is considered highly unlikely that these species occur on the property.

Should you have any queries regarding our findings or further reporting, please contact me at your convenience.

Yours sincerely,

Dr Milton Lewis
Project Officer / Ecologist

Your reference:
Our reference: 5186

St Georges Basin
NSW 2540
PO Box 106

Tel 02 4443 5555
Fax 02 4443 6655

ABN 97 597 607 196
www.b-es.com.au

19 December 2005

Hare Bay Development Consortium
Suite 106, 29-31 Solent Circuit
Norwest Business Park
BAULKHAM HILLS NSW 2153

Attention: Giulio Sirolli

Dear Giulio,

Re: Results of *Cryptostlis hunteriana* Leafless Tongue Orchid surveys, Lot 15 DP 1102772 Sealark Road, Hare Bay

We have completed surveys for the Leafless Tongue Orchid *Cryptostylis hunteriana* on the Sealark Road, Hare Bay site. Targeted searches for *Cryptostylis hunteriana* and *Prasophyllum affine* were both conducted by systematically walking along designated grid transects 5m apart and targeting areas of potential or suitable habitat. Appropriate vegetation types were targeted within the eastern section of Lot 15 using the grid transects technique. On the morning and prior to the days of these targeted surveys, sites containing known populations of these species were checked to verify the flowering period. For both orchids significant numbers of individuals were found in flower at known sites.

No individuals of these species were located on Lot 15 despite thorough coverage of potential habitat during the known flowering period. The species is considered highly unlikely to occur on the property.

I enclose an invoice for the completion of *C. hunteriana* surveys. Should you have any queries regarding our findings or further reporting, please contact me at your convenience.

Yours sincerely,

Dr Milton Lewis
Project Officer / Ecologist

Your reference:
Our reference: 5186

St Georges Basin
NSW 2540
PO Box 106

Tel 02 4443 5555
Fax 02 4443 6655

ABN 97 597 607 196
www.b-es.com.au

1 December 2005

Hare Bay Development Consortium
Suite 106, 29-31 Solent Circuit
Norwest Business Park
Baulkham Hills NSW 2153

Attention: Giulio Sirolli

Dear Giulio,

Re: Results for the identification and location of endangered ecological community, Lot 15 DP 1102772 Sealark Road, Hare Bay

Summary

Survey to locate endangered ecological community (EEC) boundaries is complete. The location of the EEC is shown in Figure 1. The majority of the forested vegetation in the south-east of the study area is considered to be part of two endangered ecological communities (approximately 2.87 ha). *Swamp sclerophyll forest on coastal floodplains* EEC was originally identified in a preliminary fauna and flora report as being adjacent to riparian areas (BES February 2005).

In addition, *Bangalay sand forest* EEC has been identified on site as the forested vegetation between the inlet associated with Wowly Gully, and the *Swamp sclerophyll forest*. (Please note that *Bangalay sand forest* was only recently determined by the NSW Scientific Committee as an endangered ecological community in October 2005). These two vegetation communities provide constraints to the development of these parts of the study area and would need to be retained and managed for conservation along with a vegetated buffer to protect its integrity. The attached Figure 1 illustrates the location of the abovementioned constraints.

Methods

A traverse was undertaken on 30 November 2005 to identify and locate, with GPS, the boundary of EECs present within the study area. Additionally, the boundaries were marked with flagging tape to allow for any follow-up survey requirements. Orange tape indicates the boundary between the *Bangalay sand forest* and the *Swamp sclerophyll forest*, whilst pink tape indicates the western boundary of the *Swamp sclerophyll forest*.

EEC's were identified on the basis of:

- floristic composition;

- structural characteristics;
- topographic position;
- landform element;
- drainage characteristics; and
- substrate.

The NSW Scientific Committee final determinations for EECs provide a detailed description of these vegetation communities and their environmental attributes. Comparison of field data and the Scientific Committee's final determinations provided the criteria for EEC identification.

Results

Two EECs were identified within the study area. These are:

1. *Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions*; and
2. *Bangalay sand forest, Sydney Basin and South East Corner Bioregions*.

Figure 1 shows the locations of the *Bangalay sand forest* EEC and the *Swamp sclerophyll forest on coastal floodplains* EEC within the study area. Both EEC's occurred within the forested area in the south-east corner of the study area.

The *Swamp sclerophyll forest on coastal floodplains* is found adjacent to the artificial-natural drainage channel (on both the western and eastern sides) flowing into Wowly Gully. This vegetation community comprises approximately 1.09 ha. The forested area occurring on the low hind-dune between the *Swamp sclerophyll forest* and Wowly Gully is the *Bangalay sand forest*. This vegetation community comprises approximately 1.78 ha.

The characteristics that identified the vegetation as *Swamp sclerophyll forest on coastal floodplains* EEC included:

- Canopy dominated by Bangalay (*Eucalyptus botryoides*) with small occurrences of Swamp Oak (*Casuarina glauca)* along the drainage depressions and the artificial and natural drainage channel.
- Structural characteristics of the site being open forest with a dense shrubby understorey.
- Topographic position being a small alluvial flat and peripheral area of a floodplain associated with Wowly Gully, adjoining a coastal sand dune below 20 metres elevation.
- Drainage being poor with periodic inundation.
- Substrate being a loamy clay texture typical of alluvial flats.
- The community adjoining other floodplain communities.

The characteristics that identified the vegetation as *Bangalay sand forest* EEC included;

- Floristic composition dominated by Bangalay (*Eucalyptus botryoides*) in the canopy, Black She-oak (*Allocasuarina littoralis*) and Coast Banksia (*Banksia integrifolia*) in the understorey and Blady Grass (*Imperata cylindrica*) and Mat rush (*Lomandra longifolia*) in the ground layer. Other diagnostic species included *Banksia serrata, Breynia oblongifolia, Monotoca elliptica* and *Pittosporum undulatum*.
- Structural characteristics of the site being open forest with an open understorey.
- Topographic position being a slightly elevated hind-dune adjacent to Wowly Gully with elevation below 20 metres and located within 300 metres of the ocean.
- Drainage being high due to the podsol soil profile and elevated topographic position.
- Substrate being a podsol (sand) indicative of marine or aeolian origin.

Conclusions

The presence of two endangered ecological communities provides a constraint to the development of the eastern section of Lot 15. These communities would need to be retained and protected from development. In addition, the consent authority is likely to require a buffer (with a minimum width of approximately 20 m) along the western edge of the endangered ecological communities to minimise potential impacts associated with adjacent development and subsequent land use. Figure 1 indicates the location of the minimum suggested buffer. All vegetation within the buffer would also require retention.

Should you have any queries, please contact me at your convenience.

Yours sincerely,

Dimitri Young

Manager

Environmental Services Division