Environmental

Services

Targeted Green and Golden Bell Frog Fauna Assessment

Lot 15 DP 1002772
Sealark Road
Hare Bay
Shoalhaven

April 2005

Our Reference: 5114

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Prepared April 2005

for

Hare Bay Development Consortium

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1. INTRODUCTION

1.1 Background

This report has been prepared by Bushfire and Environmental Services (BES) for the Hare Bay Development Consortium to document the outcome of targeted Green and Golden Bell Frog surveys at Lot 15 DP 1002772 Sealark Road, Hare Bay (hereafter referred to as Lot 15) and assess the effects on flora and fauna of the proposal to divert stormwater drainage.

Lot 15 comprises approximately 6.46 ha of freehold land situated at the eastern edge of Callala Bay village. The location of Lot 15 is shown in Figure 1 (Appendix A).

BES undertook a Preliminary Flora and Fauna Investigation of Lot 15 in February 2005 (BES 2005) and identified the presence of potential Green and Golden Bell Frog habitat in two artificial drains on Lot 15 and in the drainage reserve on the adjoining land to the south of Lot 15, and the presence of the endangered ecological community *Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions* in the east of Lot 15.

The Hare Bay Development Consortium proposes to modify these drainage structures and BES was commissioned to survey the areas to be affected for the presence of the Green and Golden Bell Frog and assess the potential impacts of the proposal on the species and on the endangered ecological community.

This report is the outcome of targeted Green and Golden Bell Frog surveys undertaken by BES on Lot 15 and the adjoining land to the south in March 2005.

1.2 The Study Area

The study area for the purposes of this report comprises the artificial drainage structures on Lot 15 and the drainage reserve on the adjoining land to the south as shown in Figure 2 (Appendix A).

Lot 15 is bounded by residential development in the west, vacant freehold land zoned for urban uses and a drainage reserve in the south, Wowly Creek in the east and Jervis Bay National Park in the north. The south-western portion of Lot 15 is separated from the remainder of the property by Monarch Place, which services a recently-constructed residential development to the south of Lot 15.

The locality for the purposes of this report is an area of 10 km x 10 km centred on Lot 15.

1.3 The Proposal

The proposal comprises the construction of kerb and guttering from Monarch Place to the north-west corner of Lot 15 and a new sediment basin in the south-west of Lot 15. Drainage from the

urban area in the west will be diverted to the new sediment basin via two new pits, with water discharging to the drainage reserve to the south of Lot 15 via a spillway.

The proposal will divert the water entering the drainage swales from the west, but will not affect water reaching parts of these swales as a result of rainfall events and tidal influence from the east.

The proposal is shown in Figure 3 (Appendix A).

1.4 Aim and Objectives

The aim of this investigation was to assess the ecological impact of the proposal on the Green and Golden Bell Frog and *Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions* within the study area.

The objectives of this investigation were:

a) to identify and describe the Green and Golden Bell Frog habitat present in the study area;

b) to survey this area and ascertain the presence of Green and Golden Bell Frogs;

c) to assess the effects of the proposal on the Green and Golden Bell Frog and *Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions* pursuant to Section 5A of the *NSW Environmental Planning and Assessment Act 1979* as required by the *NSW Threatened Species Conservation Act 1995*;

d) to determine whether the proposal involves an action that has, will have, or is likely to have, a significant impact on a matter of national environmental significance under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*;

e) to make recommendations regarding any environmental management and impact mitigation/amelioration measures, which can be implemented to limit the effects of the proposal on Green and Golden Bell Frogs, their habitat, and other environmental features as necessary.

2. METHODOLOGY

2.1 General

Targeted Green and Golden Bell Frog surveys of the study area were undertaken on 17 and 24 March 2005 by BES.

A review of relevant information was undertaken prior to the commencement of field studies, which involved:

a) reviewing available literature including the preliminary flora and fauna report for Lot 15 (BES 2005), other relevant fauna studies, legislation, environmental planning

instruments, topographic maps, aerial photographs and draft plans pertaining to the proposal; and

b) searching the Atlas of NSW Wildlife for records of the Green and Golden Bell Frog in the locality.

The data gathered during the field studies and from the review of literature was analysed and interpreted in accordance with the provisions of legislation and planning controls pertaining to fauna.

2.2 Fauna Survey Methods

Field investigations for fauna were conducted in the study area by BES on 17 and 24 March 2005 in the locations shown in Figure 2 (Appendix A).

Opportunistic Nocturnal Surveys

Opportunistic fauna surveys involved observations of animal activity, habitat surveys and searches for indirect evidence of fauna.

Nocturnal mammal searches were conducted in areas of potential habitat across the study area, with emphasis on searches for scats, tracks, burrows, diggings and scratchings. Specific bird, reptile and amphibian searches were conducted across the study area involving both visual and aural detection of species.

Specific searches were conducted for habitats or resources of relevance for those threatened fauna species known from the general region, or species, which might be anticipated to occur given the vegetation communities and habitats present. Opportunistic records of all fauna species observed were maintained throughout the survey period, and an inventory was compiled of all species recorded during the current investigations.

Nocturnal Spotlighting and Call Playback Surveys

Spotlighting was undertaken along a number of traverses throughout the study area. A Narva Colt 100 W hand-held spotlight with Faunatech battery pack was used in attempts to illuminate mammals, birds and amphibians.

Call playback techniques were used to survey for amphibians. The calls of the Green and Golden Bell Frog were broadcast through a Toa megaphone adjacent to emergent vegetation in the drainage structures and the adjoining drainage reserve in the study area. Calls were broadcast for a period of five (5) minutes followed by a listening period of fifteen (15) minutes and spotlighting for a further twenty minutes.

Limitations

The results of fauna surveys can be optimised by conducting investigations over a long period to compensate for the effect of unfavourable weather, seasonal changes and climatic variation.

In general, the longer the survey the more species will be detected. Results can also be improved by using a wide range of techniques, since some species are more likely to be detected by a particular method. Such techniques include scat analysis, small-cage trapping, pitfall trapping, hair tubing and harp trapping.

However, surveys are subject to constraints that determine the amount of time allocated, the methods used and the timing of the work. Thus, the results should be viewed in the light of these limitations. The fauna detected in current survey work are a guide to the native fauna present, but are by no means a definitive list of the species occurring in the study area.

Nevertheless, the techniques used in this investigation are considered adequate to gather the data necessary for the assessment of the effects of the proposal on Green and Golden Bell Frogs.

Nomenclature

The nomenclature in this report is based on the Mammals of Australia (Strahan 1995), Australian Bats (Churchill 1998), The Taxonomy and Species of Birds of Australia and its Territories (Christidis & Boles 1994) and Reptiles and Amphibians of Australia (Cogger 1996).

Survey Conditions

Survey conditions throughout the survey period are detailed in Table 1.

Table 1: Fauna survey conditions.

DATE	TEMPERATURE	WIND	CLOUD	MOON	HUMIDITY	RAIN
17 March 2005	18 ^{0}C	Moderate	8/8	obscured	87 %	Earlier in the day
24 March 2005	12 ^{0}C	Nil	0/8	full	73 %	Previous day

Survey Effort

The fauna survey effort employed a total of 4 person-hours as documented in Table 2.

Table 2: Fauna survey effort employed over the study area.

DATE	METHOD	EFFORT	TARGET SPECIES
17 March 2005	Nocturnal spotlighting and call playback	1 person-hour	Green and Golden Bell Frog
	Opportunistic nocturnal survey	1 person-hour	All fauna species
24 March 2005	Nocturnal spotlighting and call playback	1 person-hour	Green and Golden Bell Frog
	Opportunistic nocturnal survey	1 person-hour	All fauna species
TOTAL FAUNA SURVEY EFFORT		**4 PERSON HOURS**	

3. THE EXISTING ENVIRONMENT

3.1 Topography, Geology, and Soils

The study area lies at an altitude of approximately 0-10 m Australian Height Datum (AHD) and is generally flat to gently-sloping land with an overall aspect to the south. A tidal tributary of Wowly Creek is situated in the north-east of Lot 15. This tributary is not part of Lot 15. Two open drains flow through the south-western part of Lot 15. These drains carry stormwater from the urban area in the west and appear to flow into the southern part of the tidal tributary of Wowly Creek.

The drainage reserve to the south of Lot 15 comprises an open pond with minimal emergent vegetation. The pond receives water from urban development and is surrounded by regenerating native vegetation.

The study area appears to be underlain by Quaternary Alluvium, beach sand and dune sand adjacent to Wowly Creek in the east, with Permian Wandrawandian Siltstone of the Shoalhaven Group underlying the remainder of the study area (Nowra – Jervis Bay Geological Map unpublished). These have weathered to form poorly-drained clayey soils over the majority of Lot 15, and well-drained sandy soils adjacent to Wowly Creek in the east.

3.2 Disturbances

Generally the study area shows very high levels of disturbance except to the east of the tidal tributary of Wowly Creek.

The area around the artificial drains has been slashed such that the majority of plants are regenerating individuals less then 0.3 m in height. The overburden sourced from the excavation of the land to form the drains has been deposited on the northern side to form a berm. This berm is covered with introduced grasses. Land adjacent to these drains showed evidence of weed infestations and garden escapes.

Slashing of native vegetation has also occurred to the south of these drains where the substrate was waterlogged during the inspection. Some regrowth scrub occurs in the south to the east of an open drainage pond on the adjoining drainage reserve. This pond appears to lie in a drainage reserve that receives water from the urban development in the south.

3.3 Vegetation

The study area supports a number of vegetation communities in various states of disturbance as listed below:

a) Disturbed woodland dominated by Hard-leaved Scribbly Gum *Eucalyptus sclerophylla* in the south-west;

b) Slashed heath dominated by regenerating Finger Hakea *Hakea dactyloides*, *Melaleuca thymifolia*, Paperbark Tea-tree *Leptospermum trinervium*, Wiry Panic *Entolasia stricta*, Weeping Meadow Grass *Microlaena stipoides* and Scale Rush *Lepyrodia scariosa* in the north and to the south of the open drains;

c) Reeds in the open drains dominated by Cumbungi *Typha orientalis*; and

d) Open forest vegetation dominated by Bangalay *Eucalyptus botryoides*, with Swamp Oak *Casuarina glauca* lining the banks of Wowly Creek and its tidal tributary.

The locations of these vegetation communities are shown in Figure 4 (Appendix A).

The vegetation in the study area has been mapped by Kevin Mills and Associates (1996) as cleared with a large area of Paperbark Shrubland dominated by *Melaleuca ericifolia* across the study area, and Bangalay Forest in the east. The preliminary investigation by BES (2005) confirmed the presence of Bangalay Forest in the east, but the Paperbark Shrubland appears to be restricted to the riparian areas associated with the watercourses in the east.

3.4 Fauna Habitats

The fauna habitats present in the study area are those generally associated with disturbed woodland/grassland, open drains with emergent vegetation, and open ponds.

The study area contains foraging resources in the form of a few flowering heathland shrubs and groundcovers and some scattered flowering eucalypts. Most of the understorey and groundcover plants have been reduced to prostrate or regenerating growth forms by repeated slashing. These areas appear to have been browsed by macropods and introduced rabbits.

Shelter for terrestrial fauna species provided by understorey and groundcover vegetation is limited as a result of slashing.

The open drains and the open pond contained water during the survey period. The water in the drains and pond was likely to be fresh. The open drains could provide suitable habitat for amphibians, with shelter, foraging resources and basking resources available. These drains do not appear to provide dispersal routes for amphibians as they are piped underneath the urban area to the west. The open pond also provides suitable habitat for amphibians, but no basking habitat. Two species of frog were heard calling during the survey period. Rock habitats were not observed in the study area.

The study area is connected to areas of proximate habitats along the banks of Wowly Creek. These adjoining areas of habitat are reserved as part of Jervis Bay National Park.

3.5 Fauna Species

Targeted fauna surveys and opportunistic observations during the survey period resulted in the detection of four faunal species inhabiting the study area, all species were native. No threatened species were detected during the survey period.

Two (2) mammals and two (2) amphibians were detected and these are listed in Table 3.

Table 3: Fauna species identified during this study (*denotes introduced species).

CATEGORY	COMMON NAME	SCIENTIFIC NAME	DETECTION METHOD
Mammals	Swamp Wallaby	*Wallabia bicolor*	Direct observation
	Eastern Grey Kangaroo	*Macropus giganteus*	Direct observation
Amphibians	Brown Toadlet	*Pseudophryne bibronii*	Call recognition
	Common Eastern Froglet	*Crinia signifiera*	Call recognition

4. CONSERVATION SIGNIFICANCE

The *NSW Threatened Species Conservation Act 1995* (*TSC Act*) and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) provide for the listing of threatened flora and fauna species. The *EPBC Act* also provides for the listing of migratory species. The *NSW Fisheries Management Act 1994* (*FM Act*) provides for the listing of threatened fish species and marine vegetation.

The *TSC Act* classifies threatened flora and fauna species as Endangered (Schedule 1, Part 1), Vulnerable (Schedule 2), or Presumed Extinct (Schedule 1, Part 4). Records of these species may be obtained by searching the Atlas of NSW Wildlife.

This database was searched on 14 February 2004 for records of the Green and Golden Bell Frog within an area of 10 km x 10 km centred on the study area.

The *FM Act* classifies threatened fish and marine vegetation as Endangered, Vulnerable, or Presumed Extinct. An indication of the species likely to be encountered in a locality may be obtained by reviewing the recommendations for threatened species listed on the schedules of the *FM Act*.

4.1 Green and Golden Bell Frog

The Atlas of NSW Wildlife indicates that the Green and Golden Bell Frog has been recorded three kilometres to the west and six kilometres to the north-west of the study area. These locations do not appear to have any direct habitat connectivity with the study area and appear to be associated with large wetlands.

The open drains in the study area contain unshaded emergent vegetation in the form of Cumbungi, a habitat which is known to be favoured by the Green and Golden Bell Frog. The

species may shelter, forage and bask within the open drains, and may also inhabit the open pond in the south. The lack of emergent vegetation in the open pond limits its suitability as habitat for the Green and Golden Bell Frog.

Targeted surveys during optimal survey conditions failed to detect the species in these habitats. The habitats lie amongst disturbed land and receive water from urbanised catchments. The open drains are densely vegetated but they do not provide habitat connectivity as they connect Wowly Creek to the underground drains in the urban area of Callala Bay. The variety of rock, open water and foraging substrates characteristic of areas inhabited by the species are not provided by study area. Better quality habitat with superior habitat connectivity is likely to be present in Jervis Bay National Park to the north and north-east, and in wetlands to the west where the species has been recorded.

The study area does not appear to be inhabited by the species and provides sub-optimal habitat at best.

The proposal will involve modifications to the sub-optimal Green and Golden Bell Frog habitats in the study area. The effects of the proposal on the Green and Golden Bell Frog will be assessed in a subsequent section of this report.

4.2 Threatened Fish

No threatened fish species are expected to occur in the habitats found in the study area. No further consideration is given to threatened fish in this report.

4.3 Endangered Ecological Communities

The open forest adjacent to Wowly Creek and its tidal tributary in the east of the study area was identified by BES (2005) as exhibiting the characteristics of the endangered ecological community *Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions*. The precise locations of the boundaries of this community were not identified, but it generally occurs within 10-20 m of the banks of these watercourses and associated swales.

The proposal will divert water from the urban area in the west that currently reaches the tributary of Wowly Creek via the existing open drains on Lot 15, to a new sediment basin in the south-west of Lot 15. The effects of the proposal on *Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions* will be assessed in a subsequent section of this report.

5. IMPACT ASSESSMENT

5.1 Impacts on Vegetation

The proposal will only impact vegetation associated with the artificial open drains and the scattered trees and shrubs in the Disturbed Woodland/Grassland in the south-west of Lot 15. None of the open forest vegetation in the east or the slashed heathland vegetation in the north and east will be affected.

Direct disturbances are only anticipated in the south-west of Lot 15 and will be excluded from within 15 m of the edge of the identified *Swamp sclerophyll forest* that occurs within 20 m of the tributary of Wowly Creek (BES 2005), leaving vegetation intact for a distance of 35 m from the banks of the tributary.

The potential drying out of disturbed vegetation in the open drains and the loss of about 180 m^2 of Disturbed Woodland/Grassland in the south-west is considered negligible in the context of the extensive areas of vegetated wetlands and woodlands in the locality.

5.2 Impacts on Fauna Habitat

The study area comprises two artificial open drains and an artificial open pond that could provide suitable habitat for a range of amphibians. The characteristics of these habitats in the study area suggest that they provide sub-optimal habitat for the Green and Golden Bell Frog, which was not detected during targeted surveys on two separate nights under optimal survey conditions.

Extensive wetlands occur in the Callala area and on the floodplains of the Shoalhaven River to the north, which provide superior habitat for amphibians.

The proposal would result in modifications to about 395 m^2 of sub-optimal Green and Golden Bell Frog habitat (248 m^2 in the open drains and 147 m^2 in the open pond). The drains would receive less water as a result of water being diverted by the proposal to a new sediment pond. The existing open pond in the south would receive more water via the spillway associated with the new sediment basin.

The modification of these habitats is considered negligible in the context of the extensive areas of suitable amphibian habitat remaining in the locality.

The proposal will also involve disturbances to about 180 m^2 of disturbed woodland/grassland. This vegetation provides limited foraging resources and no breeding resources. The loss of these habitats is considered negligible in the context of the extensive areas of woodland and forest remaining in the locality.

5.3 Effects on Threatened Species (Eight-Part Test)

An assessment of the effects of the proposal on threatened species, populations and ecological communities likely to occur in habitats similar to those available in the study area, may be carried out by applying the eight factors from Section 5A of the amended *NSW Environmental Planning And Assessment Act 1979*, to each identified threatened species, population and ecological community.

This Eight-Part-Test-Of-Significance is presented below for the Endangered Green and Golden Bell Frog and the endangered ecological community *Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions*. No threatened flora species or endangered populations occur in the study area.

In the analysis below, "possible occurrence" indicates that no records exist for this species or community within the areas to be affected by the proposal, whilst "known occurrence" indicates that the species is known to occur within the areas to be affected by the proposal.

Part a)

In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

Schedule 1 Endangered Species

Fauna

Green and Golden Bell Frog *Litoria aurea* (possible occurrence)

The Green and Golden Bell Frog is distributed in eastern and south-eastern NSW, usually at low altitudes from east of Grafton, to the Narooma region. The species inhabits vegetated coastal wetlands and floodplains in the Shoalhaven, and is known from wetlands which merge into Swamp Mahogany *Eucalyptus robusta* woodland (Daly, 1996). It is often found under debris on low, oft-flooded river flats and is associated with ephemeral wetlands and coastal swampy heath (Ehmann, 1997). The species can be found on emergent wetland vegetation and seems to prefer still water or very slow flowing sites. The water quality may be turbid and the species appears to have some tolerance to salinity (Ehmann, 1997). The tadpole feeds on unicellular organisms that are generally most abundant in recently established water bodies, which suggests that the species seeks out such water bodies for breeding in spring and summer (Tanton, 1995). Individuals have been recorded travelling long distances in search of such water bodies.

The two artificial open drains and the artificial open pond provide sub-optimal habitat for the species. Targeted surveys for the species, failed to detect its presence in the study area despite optimal survey conditions. The nearest records are 3 km and 6 km to the west and north-west of the study area respectively.

The lifecycle and habitat of the Green and Golden Bell Frog could be significantly disrupted if:

- large areas of wetland vegetation are removed or disturbed;
- ephemeral ponds that provide known breeding habitat for the species are disturbed by an altered hydrological regime on the site;
- construction activities, vegetation clearing, creek crossings and agricultural activities lead to long-term sedimentation of creeks and wetland areas;
- construction activities and the associated vegetation clearing alter the flow regime of waterways, especially by accelerating water flow;
- increased nutrient levels cause algal blooms or pollution of creeks;
- large areas of riparian vegetation and creek banks are disturbed.

The proposal would result in modifications to about 395 m^2 of sub-optimal Green and Golden Bell Frog habitat (248 m^2 in the open drains and 147 m^2 in the open pond). The drains would receive less water as a result of water being diverted by the proposal to a new sediment pond. The existing open pond in the south would receive more water via the spillway associated with the new sediment basin. These areas comprise a small part of the expected home range of the Green and Golden Bell Frog

These modifications would not affect any known populations of the species. The habitats are sub-optimal and superior habitat occurs elsewhere in the locality. The areas to be affected comprise highly modified environments at the interface with existing developed areas. These sites are degraded by weed infestation, turbidity and other pollutants associated with runoff from the surrounding urban area.

The loss of vegetation and habitats will not sever habitat connections for the species as these actions will occur on the interface between heavily disturbed areas and more natural areas in the east associated with Wowly Creek and its tributary.

The species was not detected in the study area despite targeted surveys under optimum conditions. It is unlikely to inhabit the study area given the disturbances present and the isolation of the habitats present from proximate wetlands and floodplains in the west.

The proposal is unlikely to disrupt the life cycle of the Green and Golden Bell Frog such that a viable local population of the species would be likely to be placed at risk of extinction.

Part b)

In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

No endangered populations listed in *Schedule 1 Part 2* of the *Threatened Species Conservation Act 1995*, are found in the Shoalhaven Local Government Area.

Part c)

In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.

Green and Golden Bell Frog

About 395 m^2 of sub-optimal Green and Golden Bell Frog habitat will be modified by the proposal. The habitat does not provide connectivity to other areas of habitat for the species. Targeted surveys failed to detect the species in the study area despite optimal survey conditions. The study area does not provide known habitat for the species.

The study area lies in the Sydney Basin Bioregion, which contains vast areas of vegetation and habitats. The area to be disturbed is insignificant in terms of the extent of habitat available for the Green and Golden Bell Frog in the bioregion.

The proposal will not modify or remove a significant area of known Green and Golden Bell Frog habitat in the regional context.

Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions (known occurrence)

The proposal will not disturb any of the vegetation identified as *Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions* (BES 2005). A vegetated buffer with a minimum width of 15 m will be retained between the areas to be affected and the endangered ecological community in the east of the study area.

Appropriate best-practice sediment control measures will ensure that the vegetation downstream is not adversely affected by the proposal. Although the proposal will divert urban runoff away from the open drains, this change to the drainage regime is unlikely to affect the *Swamp sclerophyll forest* in the east. The hydrology of the vegetation in the east is more likely to be influenced by the drainage conditions associated with the tidal movements in Wowly Creek.

The contribution of the urban runoff to the hydrology of the locations where the *Swamp sclerophyll forest* occurs appears to be very small.

The study area lies in the Sydney Basin Bioregion, which contains vast areas of vegetation and habitats.

The proposal will not remove or modify a significant area of known *Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions*.

Part d)

Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

Green and Golden Bell Frog

About 395 m^2 of sub-optimal Green and Golden Bell Frog habitat will be modified by the proposal. The habitat does not provide connectivity to other areas of habitat for the species. Targeted surveys failed to detect the species in the study area despite optimal survey conditions. The study area does not provide known habitat for the species.

The proposal will not isolate any areas of known Green and Golden Bell Frog habitat.

Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions (known occurrence)

The proposal will not disturb any of the vegetation identified as *Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions* (BES 2005). A vegetated buffer with a minimum width of 15 m will be retained between the areas to be affected and the endangered ecological community in the east of the study area.

The proposal lies within a highly disturbed landscape adjacent to the urban area in the west. The *Swamp sclerophyll forest* occurs in the east of Lot 15.

The proposal will not isolate any areas of *Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions*.

Part e)

Whether critical habitat will be affected.

No critical habitat has been declared in the Shoalhaven Local Government Area under the *NSW Threatened Species Conservation Act 1995*.

Part f)

Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or similar protected areas) in the region.

It is not known whether the Green and Golden Bell Frog or *Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions* are adequately represented in conservation reserves. The significant habitat components in the study area generally relate to wetlands, and swamp forests which occur extensively in nearby National Parks and Nature Reserves in the locality such as Jervis Bay National Park, Brundee Nature Reserve, Corramy Nature Reserve, and Booderee National Park.

Part g)

Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.

The proposal is not listed as a key threatening process but it is likely to exacerbate the key threatening process *Clearing of native vegetation*, and may exacerbate the key threatening process *Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands*

The extent of clearing for the proposal is approximately 180 m^2, and this is a small area of vegetation in the context of the vegetated areas in the locality and on the remainder of Lot 15. The areas of swamp forest vegetation in the east will not be disturbed by the proposal and will continue to offer habitat opportunities for species affected by this key threatening process.

The proposal will result in the diversion of urban runoff from two artificial open drains into a new sediment basin. The influence of this urban runoff on the hydrology of the swamp forest vegetation in the east is likely to be minor. The swamp forest vegetation is growing in association with Wowly Creek and its tributary and is affected by tidal flushing, which provides the greatest hydrological input. The proposal will not significantly alter the hydrology of the areas in the east as the urban runoff is likely to be a very small component of this hydrology.

Part h)

Whether any threatened species, population or ecological community is at the limit of its known distribution.

The Green and Golden Bell Frog and *Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions* are not at their known limits of distribution at Callala Bay.

Eight-part Test Conclusion

The proposal is unlikely to have a significant effect on threatened species, populations or ecological communities or their habitats pursuant to Section 5A of the *NSW Environmental Planning and Assessment Act 1979* because it:

- will not remove known den, roost or nest trees;
- will not directly disturb known populations or core areas of habitat;
- will not remove extensive areas of foraging resources;
- will not significantly alter drainage regimes; and
- will not isolate areas of known habitat.

A Species Impact Statement is not required for the proposal.

5.4 Commonwealth EPBC Act 1999

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) contains provisions to protect Commonwealth Land and matters of national environmental significance (NES) listed by the Act, including World Heritage properties, Ramsar wetlands, threatened species, migratory species, nuclear actions and the Commonwealth marine environment.

Under this Act a person may require assessment and/or approval from the Commonwealth Environment Minister if they are undertaking an action that has, will have, or is likely to have, a significant impact on a matter of national environmental significance.

Administrative guidelines have been produced to assist proponents in determining whether an action should be referred to the Commonwealth Environment Minister for a decision on whether approval is required.

The proposal involves the clearing and/or modification of indigenous vegetation, and construction works, which may constitute an action defined by the *EPBC Act*.

The study area provides suitable habitat for the following matters of National Environmental Significance listed on the schedules of the *EPBC Act*:

- the Vulnerable Species Green and Golden Bell Frog.

There are no Commonwealth Endangered Species, World Heritage Properties, Wetlands of National Importance, Commonwealth Marine Areas, or Commonwealth Land to be affected by the proposal.

Commonwealth Vulnerable Species

The study area is unlikely to contain any important populations the Green and Golden Bell Frog necessary for the species' long-term survival and recovery. The species was not detected there despite targeted surveys focusing on the areas to be disturbed. The Green and Golden Bell Frog was not found basking and was not seen during spotlighting after dark. No calls were heard and no animals responded to broadcasts of pre-recorded calls of the species.

The area to be affected by the proposal would not contain key source populations of this species. Nor would it be likely to contain any potential populations likely to be necessary for maintaining genetic diversity, or near the limit of the species' range.

Thus, with respect to Commonwealth Vulnerable Species, the proposal is unlikely to:

- lead to a long-term decrease in the size of an important population of a species; or,
- reduce the area of occupancy of an important population; or,
- fragment an existing important population into two or more populations; or,

- adversely affect habitat critical to the survival of the species; or,
- disrupt the breeding cycle of an important population; or,
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or,
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat; or,
- interfere substantially with the recovery of the species.

The proposal is unlikely to have a significant impact on Commonwealth Vulnerable Species listed by the *EPBC Act* that may occur in the study area.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

This report describes the biological environment of the parts of Lot 15 DP 1002772 Sealark Road, Hare Bay to be affected by a proposal for the collection and disposal of stormwater, and assesses the potential effects of the proposal on threatened species, endangered populations, ecological communities or their habitats.

One endangered ecological community, *Swamp sclerophyll forest in the North Coast, Sydney Basin and South East Corner Bioregions*, listed on Schedule 1 Part 3 of the *NSW Threatened Species Conservation Act 1995* was recorded in the study area.

No threatened species or endangered populations listed on the schedules of the *NSW Threatened Species Conservation Act 1995*, the *NSW Fisheries Management Act 1994*, or the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* were detected in the study area.

Following the application of the eight factors from Section 5A of the *NSW Environmental Planning and Assessment Act 1979*, as required by the *NSW Threatened Species Conservation Act 1995* and the *NSW Fisheries Management Act 1994* it is concluded that the proposal is unlikely to have a significant effect on threatened species or their habitats. A Species Impact Statement is not required for the proposal.

Following consideration of the administrative guidelines for determining significance under the *Commonwealth Environment Protection & Biodiversity Conservation Act 1999*, it is concluded that the proposal is unlikely to have a significant impact on matters of National Environmental Significance, and a referral to the Commonwealth Environment Minister is not necessary.

A number of impact mitigation and amelioration strategies have been recommended that should be adopted for the proposal and these are set out in the section below. These strategies

mitigate the effects of the proposal on threatened species or their habitats and minimise the impacts of the proposal on the flora and fauna values of the study area in general.

6.2 Recommendations for Impact Mitigation and Amelioration

The following recommendations for impact mitigation and amelioration should be required as modifications to the proposal and/or imposed as conditions of consent.

Vegetation and Habitat Management

1. Vegetation in the open drains on Lot 15 should not be disturbed for a distance of at least 35 m form the western bank of the tributary of Wowly Creek.

2. Workers involved in the construction of the proposal should be advised of the need to avoid disturbances to vegetation in the east as per recommendation 1 above.

Sediment Controls

3. Appropriate sediment control measures should be established before the commencement of work on the proposal and retained in place until all bare areas have been revegetated.

Dimitri Young

Manager

Environmental Services Division

NPWS Scientific Licence Number: S10596
Animal Care and Ethics Approval from NSW Agriculture
Animal Research Authority from NSW Agriculture

7. BIBLIOGRAPHY

BES (Bushfire and Environmental Services) 2005, *Preliminary Flora and Fauna Investigation, Lot 15 DP 1002772 Sealark Road Callala Bay*, unpublished report for Hare Bay Development Consortium.

Carolin, R. and Tindale, M. 1994, *Flora of the Sydney Region*, Griffin Press, South Australia.

Clark, S., deLacey, C. & Chamberlain, S. 2003, *Using environmental variables and multivariate analysis to define potential habitat for the Leafless Tongue Orchid (Cryptostylis hunteriana) in the Shoalhaven Local Government Area, NSW*, unpublished paper.

Cogger, H.G. 1996, *Reptiles and Amphibians of Australia*, Reed Books, Sydney

Commonwealth of Australia, *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*.

Commonwealth of Australia, *Commonwealth Environment Protection and Biodiversity Conservation Act Protected Matter Search Tool*.

Daly, G. & Murphy, M. 1996, *Fauna Audit: Selected Lands Lower Shoalhaven Catchment Shoalhaven City,* Lower Shoalhaven Total Catchment Management Committee, Nowra.

Ehmann, H. 1997 (ed) *Threatened Frogs of NSW: Habitats, Status and Conservation*, Frog and Tadpole Study Group, Sydney.

Gaia Research Pty Ltd, 2001, *Species Impact Statement Extension of Vincentia Golf Course Vincentia*, unpublished report.

Gilmore, A. and Parnaby, H. 1994. *Vertebrate fauna of conservation concern in north-east NSW forests*. North East Forests Biodiversity Study Report No. 3e. Unpublished report to NSW National Parks and Wildlife Service.

Klippel, K. 1992, *Wildlife Data Search: Threatened Animal Species of NSW*, Breakout Press, Sydney.

McDowell, R. (ed) 1996, *Freshwater Fishes of South-Eastern Australia*, Reed Books Sydney.

NSW Government 1987, *Environmental Planning and Assessment Act 1979*, Government Printer, Sydney, as amended.

NSW Government 1994, *Fisheries Management Act 1994*, Government Printer, Sydney, as amended.

NSW Government 1995, *Threatened Species Conservation Act 1995,* Government Printer, Sydney.

NSW National Parks and Wildlife Service 1996, Co*nsideration of the potential impact of the proposed development at Long-Bow Point on threatened fauna*, unpublished report, Threatened Species Unit, Southern Zone.

NSW National Parks and Wildlife Service 2000, *Threatened Fauna of the Shoalhaven,* NSW National Parks and Wildlife Service, Sydney.

NSW National Parks and Wildlife Service 2003, *Atlas of NSW Wildlife and Rare or Threatened Plants Database*.

Smith, A.P. and van der Lee, G. 1992. *Guidelines for Assessing the Significance of Logging and Clearing on Endangered Forest Fauna on Protected Land in NSW*. Edition 1 – General Guidelines. Department of Conservation and Land Management (unpublished report).

Specht R.L. 1970, Vegetation, in Leeper G.W. (ed), *The Australian Environment*, CSIRO Australia.

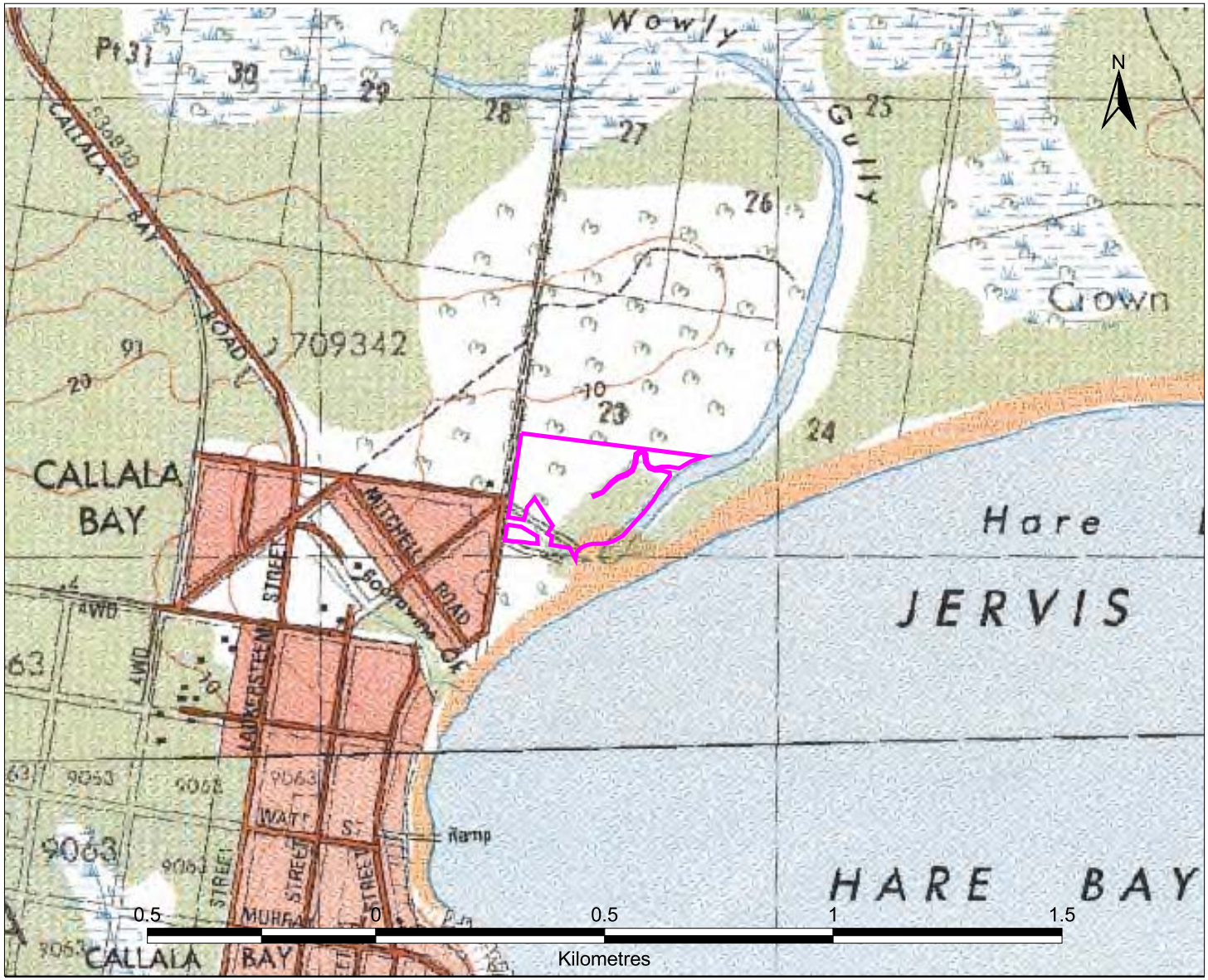
Strahan, R. 1995 *The Australian Museum Complete Book Of Australian Mammals*, Cornstalk Publishing, Sydney.

Tanton, M.T 1995, *Queanbeyan and Badja Management Areas Environmental Impact Statement: Fauna Impact Statement*, State Forests of NSW.

Triggs, B. 1997, *Tracks, Scats and Other Traces - A Field Guide to Australian Mammals*, Oxford University Press, Melbourne.

APPENDIX A: FIGURES

Figure 1: Location of Lot 15 DP 1002772 Sealark Road, Hare Bay



Lot 15 DP 1002772
Sealark Road, Hare Bay

Base topographic map
© Land and Property Information

Figure 2: Study Area and Location of Fauna Surveys

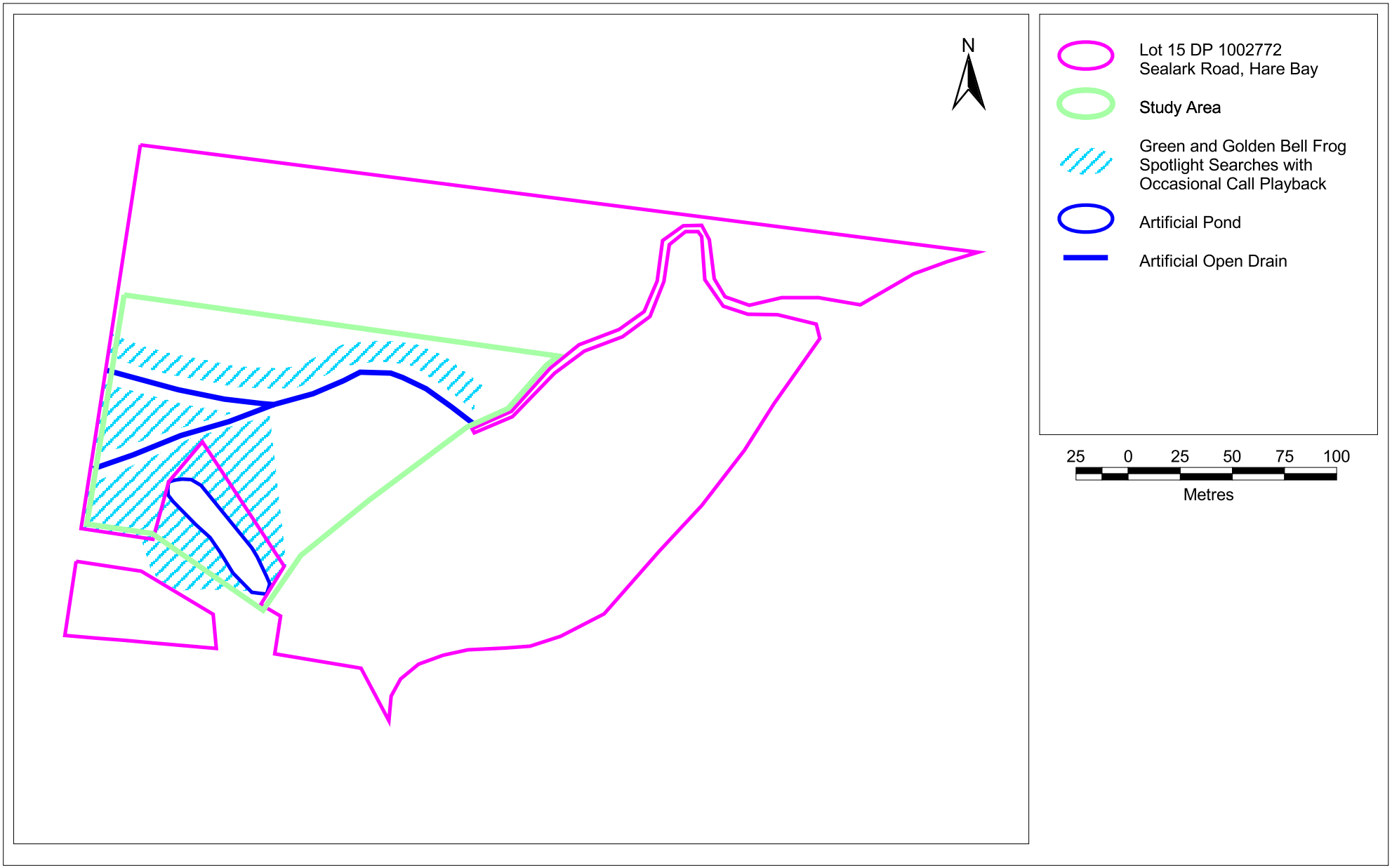


Figure 3: The Proposal

Figure 4: Vegetation