DRAFT ENVIRONMENTAL SITE MANAGEMENT STRATEGY

PROPOSED RESIDENTIAL DEVELOPMENT

LOT 22 DP 1070182
PACIFIC HIGHWAY
SANDY BEACH NORTH

OCTOBER 2008
(REF: 8108)

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PREFACE

This Draft Environmental Site Management Strategy (ESMS) has been prepared by *Conacher Environmental Group* on behalf of the applicants *Bluegrass Nominees Pty Ltd* to provide a range of ecological management strategies in protecting the long term environmental and ecological values of lands within the proposed development of Lot 22 DP 1070182 Pacific Highway Sandy Beach North. The subject site occupies an area of approximately 49 hectares and is situated within the Coffs Harbour City Local Government Area.

This report has been prepared to accompany an Environmental Assessment to be submitted as part of a development application for the subject site. The Environmental Assessment has been prepared in accordance with the Director Generals Environmental Assessment Requirements (DGEAR's). These DGEARs have been provided in accordance with Part 3A Major Infrastructure and Other Projects of the *Environmental Planning and Assessment Act* (1979).

This report has been prepared to provide ongoing management of the ecological features of the subject site during the pre-construction, construction and occupation phases of the proposal. The ESMS has been prepared to specifically address the following:

- Vegetation Management
- Bushfire Management
- Provision of Ecological Buffers
- Erosion and Sediment Control
- Stormwater Quality and Management
- Cultural Heritage Values and Management
- Community Education, Vigilance and Reporting
- Prohibited Use Identification and Management
- Native Fauna, Habitat and Feral Pest Management
- Access, Signage and Fencing
- Monitoring and Reporting Regime

This EMS uses the site and local area information collected across a large number of studies in recommending suitable environmental management objectives and actions in the long term protection of the environmental values of the area proposed to be developed.

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TABLE OF CONTENTS

PART A

INTRODUCTION AND BACKGROUND

A1 INTRODUCTION

This Draft Environmental Site Management Strategy (ESMS) has been completed to provide a range of ecological management strategies in protecting the long term environmental and ecological values of lands within the proposed development at Lot 22 DP 10701082 Pacific Highway Sandy Beach North and herein known as the subject site.

This report has been prepared to accompany an Environmental Assessment to be submitted as part of a development application for the subject site. The Environmental Assessment has been prepared in accordance with the Director Generals Environmental Assessment Requirements (DGEAR's). These DGEARs have been provided in accordance with Part 3A Major Infrastructure and Other Projects of the *Environmental Planning and Assessment Act* (1979).

Conacher Environmental Group has been engaged by *Bluegrass Nominees Pty Ltd* as proponents of the application for the development of the subject site to prepare this EMS.

The land subject to the provisions of this Draft ESMS consists of the land bound by Lot 22 DP 1070182 Pacific Highway North Sandy Beach. This consists of an area of approximately 49 hectares. A full description of the site characteristics is included within Section A8.

This Environmental Site Management Strategy has been prepared in draft format. This will be finalised subject to review by the relevant approval and referral authorities (NSW Department of Planning, NSW Department of Environment and Climate Change) as part of the Environmental Assessment review and approval process.

A2 PROPOSAL DETAILS

The subject site is bound to the west by the Pacific Highway, to the north by Double Crossing Creek, to the east by dune systems associated with Sandy Beach and to the south by residential development.

It is proposed to develop part of the subject site as a community title residential subdivision. This will incorporate a mixture of the following:

- Single residential dwellings;
- Medium density units;
- Future tourist/commercial precinct;
- Open Space areas;
- Environmental protection areas;
- Environmental buffers;
- Pedestrian walkways/cycleways;
- Asset protection zones;
- Water management facilities.

The proposal will incorporate a mixture of single residential dwellings, medium density units and an area for future development as a tourist / commercial precinct. The proposed development will consist of approximately 280 lots. Areas of open space / environmental protection will be retained between allotments and Hearnes Lake forming a buffer function between the lake and developable areas. This area will incorporate a perimeter emergency access way which will also function as a combined pedestrian / cycleway. Asset protection zones for bushfire protection purposes will be created around the allotments where appropriate in accordance with standard bushfire protection measures detailed within *'Planning for Bushfire Protection 2006.'*

As part of the proposed subdivision a comprehensive water quality management system incorporating stormwater detention ponds, roadside bio-swales and nutrient filter strips will be implemented. These measures will ensure treatment of water quality prior to stormwater runoff entering the nearby watercourses and coastal lagoons.

A key component of the design in maintaining the sites ecological values is the retention of areas within conservations zones. This includes the more ecologically sensitive lands and environments within Hearnes Lake and its nearshore areas. This also includes riparian areas associated with Hearnes Lake. These conservation areas will also act as a buffer in protecting these sensitive vegetation and habitat types within Hearnes Lake from the impacts of adjacent development. It is proposed that through vegetation and habitat management planning programs, including rehabilitation and restoration, that the ecological values of these conservation areas will be improved.

A3 PROCEDURES FOR THE PREPARATION OF THE MANAGEMENT STRATEGY

This EMS has been prepared using information prepared for the subject site and obtained from the following sources:

- Flora and Fauna Assessment Report (Conacher Travers 2005);
- Ecological Survey and Assessment Report (Conacher Travers 2007);
- Ecological Survey and Assessment Report (Conacher Environmental Group 2008);
- Bushfire Protection Assessment (Conacher Travers 2005);
- Bushfire Assessment Report (Conacher Environmental Group 2008);
- Koala Habitat Assessment (Conacher Travers 2007);
- Historic Land Use Ecological Assessment (Conacher Travers 2007);
- Aboriginal Heritage Assessment (Mary Dallas (2004);
- European Cultural Heritage Assessment (Dan Tuck 2007);
- Construction Management Plan (Patterson Britton 2007);
- Erosion and Sediment Control Plan (Patterson Britton 2007);

- Water Management Strategy (Patterson Britton 2007);

- Estuary Management Plan (WBM Oceanics 2005).

This Environmental Site Management Strategy details the strategies and measures to be implemented in protecting the natural values of the post development landscape of the subject site. In particular the Environmental Site Management Strategy provides information on the following:

- Vegetation Management;
- Bushfire Management;
- Provision of Ecological Buffers;
- Erosion and Sediment Control;
- Stormwater Quality and Management;
- Cultural Heritage Values and Management;
- Community Education, Vigilance and Reporting;
- Prohibited Use Identification and Management;
- Native Fauna, Habitat and Feral Pest Management;
- Access, Signage and Fencing;
- Monitoring and Reporting Regime.

Each of the above issues is addressed separately in Part B through the process outlined below:

i) Identification of objectives to be achieved for each issue;

ii) A statement of the proposed actions to be implemented to address each issue and the objectives provided.

A4 AREA TO WHICH THIS MANAGEMENT STRATEGY APPLIES

The area to which this Management Strategy applies is the area bound by the Concept Plan for the proposed development and known as Sandy Beach North. The area bound by the Masterplan is shown in Figure 1. This area consists of Lot 22 DP 1070182 Pacific Highway Sandy Beach North.

A5 LIFESPAN AND REVIEW OF THE MANAGEMENT STRATEGY

The EMS will be implemented for ten years following the date of sign-off of the plan by the Department of Planning. The plan will be reviewed at Year one, Year two and Year five to assess the adequacy of implementation of the management actions.

Those areas within the subject site that are proposed to be managed under Community Title will have the management actions provided in this EMS to be valid in perpetuity. However this will require a full review and amendment of the EMS at the ten year period. This process may require individual management plans to be prepared to accompany individual Development Applications as part of the development staging process.

A6 FORMAT OF THE MANAGEMENT STRATEGY

The overall Management Strategy is provided as a single document separated into several sections as outlined below.

PART A **Introduction and Background**
Outlines the purpose/objectives and procedures for preparing this Management Strategy.

PART B **Management Objectives and Proposed Actions**
This part identifies the various management objectives and Management Actions to achieve the objectives of the Management Strategy.

PART C **Implementation of Management Actions**
This part details how the Management Strategy will be implemented, who is responsible for implementing various actions and provides details on the monitoring and reporting for the life of this management strategy.

A7 ENVIRONMENTAL MANAGEMENT OBJECTIVES

The environmental management objectives for the areas covered within this Management Strategy are:

- ***Protection of the environmental and ecological values of the area***
- ***Minimisation of the impacts of development within adjacent land upon the retained vegetation and habitat areas during construction and occupation phases of the proposal***
- ***Maintenance of biodiversity and protection of native flora and fauna species and their habitats (including threatened species) within the area, particularly those more sensitive areas associated with Hearnes Lake***
- ***Promote natural regeneration of native vegetation within retained areas***
- ***Manage adverse ecological impacts of the development including vegetation removal, erosion and sediment control, hydrological changes and the potential impacts of construction and occupation***
- ***Increased awareness and promotion of a culture of protection of the environmental values of the area by the community***
- ***Long term monitoring of the area to determine changes (if any) to flora and fauna, particularly threatened species, and vegetation communities and recommend corrective actions if required.***

A8 SITE DESCRIPTION

Location

The subject site is located on the eastern side of the Pacific Highway approximately 3 kilometres south of the township of Woolgoolga and 20 kilometres north of Coffs Harbour. The land adjoins the northern boundary of the existing village of Sandy Beach and extends northward along the eastern side of the Pacific Highway to Double Creek Crossing and Hearnes Lake which forms the northern boundary of the property. This occupies an area of approximately 49 hectares.

The subject site is roughly rectangular in shape with a southern boundary of approximately 700 metres, a frontage to the Pacific Highway at the western boundary of approximately 1000 metres, an irregular frontage to Hearnes Lake along the northern and north-eastern boundary and to the dunes associated with Sandy Beach on the eastern boundary.

The site is bordered to the south by residential areas within the township of Sandy Beach to the west by the Pacific Highway, to the east by the coastline and to the north by a Caravan Park.

The site has an area of 49 hectares. The land is zoned part Residential 2A (low density), part Residential 2E (Residential Tourist), part 7A (Environmental Protection Habitat) and Catchments and part 7B (Environmental Protection/Scenic Buffer).

Landform Features

Topography and slopes

The site is generally flat with the existing surface elevation across the development site varying between 0.8m AHD near the Hearnes Lake shoreline to 6m AHD along the rear of the dunes on the eastern boundary of the site.

The southern area of the site is slightly steeper but only rises to an elevation of about 5.5m AHD. This area drains to two artificial open channels that flow in a northerly direction and discharge runoff to Hearnes Lake.

Drainage

Drainage from the site is by overland flow in to Hearnes Lake and into two artificial drainage channels in the south of the site that flow in to Hearnes Lake. Hearnes Lake is situated behind the coastal dunes of Hearnes Lake Beach and orientated approximately north-south. Hearnes Lake also receives flow from Double Crossing Creek at the northern end of the subject site.

Hearnes Lake is an Intermittently Closed and Open Lake or Lagoon (ICOLL) which is typically closed at the ocean entrance at the northern end of Hearnes Lake Beach. Lake water levels would rise during and following catchment rainfall, until such time as the build up of floodwaters led to the formation of a pilot channel through the mouth of the lake entrance. Lake water levels would then recede as floodwaters are discharged to the ocean.

Soils

The subject site is situated within the Coffs Harbour and Newport Creek Soil Landscapes.

The site consists of predominantly alluvial soil deposits with residual topsoils of 200-300mm overlying sand and sand with clays.

The site is considered to be within an area of high probability for Acid Sulphate Soils at depth approximately 1-3 metres.

Vegetation

No threatened flora species were observed within the subject site. Two endangered ecological communities Coastal Saltmarsh and Swamp Sclerophyll Forest on Coastal Floodplains were identified within the subject site.

The vegetation of the subject site consists of the following vegetation communities;

A Low Forest (*Banksia* dominated);
B Forest (*Eucalypt* dominated);
C Swamp Sclerophyll Forest;
B/C Eucalypt / Swamp Sclerophyll Transition Forest;
D Sandplain Forest (*Melaleuca / Corymbia* dominated);
E Wet Heath;
F Wallum Heath;
G Sedgeland*;*
H Disturbed Woodland;
I Sandplain Forest (*Melaleuca* / Mesophyllic sp. dominated);

The majority of the subject site has been significantly impacted by a history of agricultural activities and land use practices. These activities have led to significant changes in the floristic and structural characteristics of many of the sites vegetation communities, however, a number of the stands of remnant vegetation have also retained a relatively high degree of natural integrity.

In particular the Wallum/Wet Heaths and Sedgeland communities have largely retained their natural structural characteristics and exhibit relatively undisturbed floristic assemblages without significant incursion of exotic weed species. The extent and characteristics of these communities present within the subject site, with the exception of a small area of Wallum Heath within the southwest, are largely considered to be similar to those communities exiting prior to European arrival

It is considered that the Eucalypt Forest present within the subject sites western portion has undergone a slight reduction in its extent prior to European occupation on the site. However, the floristic and structural characteristics are considered to have been significantly altered. In particular, a noticeable thinning of the canopy trees has occurred within this community, either as a result of the agriculture grazing activities, or selective logging. Furthermore, it is also likely that this community has had its understorey shrub layer significantly thinned by a history of grazing and slashing. The moderate incursion of the exotic weed species *Chrysanthemoides monilifera* subsp. *monilifera* (Bitou Bush), *Baccharis hamimifolia* (Groundsel Bush) and

Paspalum dilatatum (Paspalum) have also further degraded the floristic integrity of this vegetation community.

The Swamp Forest communities have undergone the most significant reduction in extent of all of the natural vegetation communities within the site. The majority of this community was subject to the most intensified agricultural use over the period of European occupation, which has resulted in wide spread clearing, compaction and pasture improvement throughout. Despite this wide spread alteration and clearing a small number of remnants still remain around the southern portions of Hearnes Lake and the property. It is considered that while the remnant stands of this community within the subject site are likely to have been floristically and structurally simplified they still contain a number of the characteristic species likely to have been present prior to European occupation.

The Dry Coastal Heath community observed within the subject site is essentially a regrowth community resulting from the massive clearing and disturbance associated with the previous sand mining operation and access road construction. As would be expected this community contains a number of significant exotic weeds or species that are commonly associated with coastal restoration activities within its floristic assemblage. However, it does contain a number of characteristic native species regenerating throughout.

The Coastal Saltmarsh endangered ecological community on-site corresponds to the G – Sedgeland community as mapped within Figure 2.1 of the Ecological Survey and Assessment Report.

The Swamp Sclerophyll Forest on Coastal Floodplains endangered ecological community on-site corresponds to the C – Swamp Sclerophyll Forest community, and to a lesser extent to the B/C – Eucalypt/Swamp Sclerophyll Transition Forest as as mapped within Figure 2.1 of the Ecological Survey and Assessment Report.

Fauna

Surveys within the site and local area recorded a large number of fauna species. These fauna observations consisted of four amphibian species, three reptile species, 84 bird species and 14 mammal species.

During the fauna surveys of the site seven threatened fauna species were observed. These species were:

- Wallum Froglet (*Crinia tinnula*);
- Black-necked Stork (*Ephipiorhynchus asiaticis*);
- Osprey (*Pandion haliaetus*);
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*);
- Grey-headed Flying-fox (*Pteropus poliocephalus*);
- Eastern Freetail-bat (*Mormopterus norfolkensis*);
- Greater Broad-nosed Bat (*Scoteanax rueppellii*).

A number of exotic or domestic animal species were also observed within the site. These include the Rock Dove, Spotted Turtle-Dove, Horse, Cow, Cat and Dog.

Habitats

The subject site contains a range of fauna habitats associated with the Forest variants, Heath and Sedgeland vegetation communities. The majority of the subject site has a history of disturbance through clearing, grazing and slashing and as such the habitats are of decreased value for locally occurring fauna species.

The nectar, seed, fruit and flower producing tree and shrub species of the Forest variants provide suitable foraging habitat for a range of locally occurring bird, arboreal mammal and bat species. The shrub and groundlayers of sections of the Forest variants has been removed and is of decreased value for fauna due to a lack of foraging and shelter opportunities. The hollow bearing trees of the Forest variants provide suitable roost, den and breeding opportunities for a range of locally occurring bird, arboreal mammal and microchiropteran bat species.

The Heath Communities provide high levels of nectar feeding habitat for bird and mammal species within the various native shrubs. The less disturbed areas of Wet Heath provide shelter opportunities for a number of bird and terrestrial mammal species. This community is highly disturbed having suffered constant slashing, burning and grazing over a long period and was in a period of regrowth during the fauna survey.

The Wallum Heath and Sedgeland vegetation communities occur in low lying areas of the site and areas associated with habitats prone to periodic inundation and drying. These vegetation communities provide suitable habitat types for a range of amphibian species and limited habitat for small terrestrial mammal, wading bird and reptile species.

The aquatic habitats associated with Hearnes Lake provide suitable habitats for a range of aquatic and semi-aquatic fauna species. These aquatic habitats support a number of fish and wading bird species.

The movements of amphibians, reptiles, terrestrial mammals and arboreal mammals through the subject site from other areas of suitable habitat are restricted by the presence of the Pacific Highway to the west, the Tasman Sea to the east, residential development to the south, and the deep waters of Double Crossing Creek to the north. It is considered however that a thin line of connectivity exists along the coastal dunes within the lands zoned 6A Open Space Public Recreation at the eastern boundary of the site.

Conservation Reserves

Hearnes Lake is part of the Solitary Islands Marine Park. The Solitary Islands Marine Park stretches over 75 km from Muttonbird Island in the south to Sandon River and Plover Island in the north. The marine park incorporates estuaries to their tidal limits, foreshores to the mean high water mark and extends offshore to the 3 nautical miles state waters boundary.

SEPP 14 Wetlands

There are two areas of wetland mapped under State Environmental Planning Policy No.14 Coastal Wetlands within the locality. These areas occur to the north (SEPP 14 Wetland No. 316) and south (SEPP 14 Wetland No. 318) of the subject site, however are outside of the catchment of Hearnes Lake.

SEPP 26 Littoral Rainforest

There is one area of littoral rainforest mapped under State Environmental Planning Policy No. 26 Littoral Rainforest within the locality. This area is located to the north of the subject site and outside of the catchment of Hearnes Lake.

A9 COMMUNITY TITLE MANAGEMENT

The proposed development is to be administered under the provisions of Community Title. This approach allows for ongoing regulation of activities, including maintenance within the entire development area, within individual allotments, within bushfire protection areas, conservation areas and within common community association areas. This approach also provides substantial benefits in terms of regulating the impact of the development on the natural environment.

Land retained in shared ownership by the members of the Community Title Scheme is known as Association Property. It is commonly referred to as the Community Lot.

The Environmental Trust binds the Community Associations with any subsidiary schemes and each owner/occupier, mortgagee in possession and/or lessee of a Lot.

The Community Association may, on its behalf or on behalf of each subsidiary scheme, contract with third parties to:

(a) Provide management, operational, maintenance and other services in connection with Community Property;
(b) Provide transport services inside and outside the community scheme (to the owners or occupiers of lots);
(c) Provide a letting service to owners of Lots;
(d) Provide other services or amenities to community Property, Common Property and/or the owners and occupiers of Lots.

The Community Title system will allow for the detailed and individual maintenance of environmentally sensitive lands, which otherwise may require resources to be devoted by Council.

PART B

MANAGEMENT OBJECTIVES AND ACTIONS

The following section provides details on the objectives and actions of each broad management category. The responsibility and timing for each of the management actions is provided within Table 1 of Section C with each management action sub-heading corresponding with a similar action category within Table 1.

B1 VEGETATION MANAGEMENT

Objectives

- **Identify and protect vegetation to be retained within conservation areas**
- **Implement measures to reduce the extent of weed species within retained areas**
- **Retain significant vegetation types such as endangered ecological communities Coastal Saltmarsh and Swamp Sclerophyll Forest on Coastal Floodplains**
- **Improve the current bushland and biodiversity values of retained areas**
- **Promote community involvement in the vegetation management and improvement of bushland values**

Actions

i) Retention of vegetation within conservation areas

The large majority of the subject site has a history of disturbance including grazing, slashing, clearing and burning. The development proposes the removal of vegetation for the construction of residential dwellings and associated services.

The development proposes the retention of vegetation and habitats within conservation areas associated with Hearnes Lake and Open Space areas. A buffer of variable width will be retained around the shoreline of Hearnes Lake with the aim of protecting the ecological values within the lake. Vegetation and habitats will also be retained within Riparian zone and Open Space areas within the site. The retention and protection of Hearnes Lake and its shoreline areas along with the retention of other bushland and drainage areas within the site are likely to continue to provide habitats for locally occurring flora and fauna species. This will include the retention of suitable habitat areas within the site for those threatened fauna species observed within the site during surveys.

Areas of the site will be retained within conservation zones as corridors provisioning movement through the site in a north-south direction. The retained areas have been designed so as to act as a continuous vegetation and habitat area from the southern boundary of the site to Double Crossing Creek in the north of the site. The presence of Double Crossing Creek at the northern boundary of the site and residential areas within Sandy Beach at the southern boundary represent a potential barrier to north-south movement through the site.

Any fauna moving through the site between external vegetation and habitat areas are likely to use the dune vegetation at the eastern boundary of the site. This area is less disturbed and provides greater cover and is of higher quality for use as a corridor than the more disturbed vegetation and habitats within the subject site.

The subject site contains areas of the endangered ecological communities Coastal Saltmarsh and Swamp Sclerophyll Forest on Coastal Floodplains. These endangered ecological communities generally correspond with the Swamp Sclerophyll Forest and Eucalypt/Swamp Sclerophyll Transition Forest (Swamp Sclerophyll Forest on Coastal Floodplains) and Sedgeland (Coastal Saltmarsh) as identified and mapped on site by Conacher Travers. All of the Coastal Saltmarsh endangered ecological community will be retained as part of the proposal within the conservation areas associated with Hearnes Lake. Approximately 60-70% of the Swamp Sclerophyll Forest on Coastal Floodplains endangered ecological community will be retained and restored as part of the proposal and as part of site offset strategies.

ii) Preparation of Vegetation Management Plan

Conservation areas within the site are to be targeted for weed removal and rehabilitation with native, provenance specific species. The rehabilitation of these areas will ultimately improve and restore the vegetation and habitat values of those retained areas. A specific Vegetation Management Plan will be produced for conservation areas to drive the specific management actions in relation to vegetation management. The Vegetation Management Plan(s) will include information on:

- the use of provenance specific species in revegetation works
- lists of provenance specific species to be used for revegetation
- identification of key priority areas for works
- detailed weed removal and vegetation management/protection strategies
- inter-relationship of fuel and vegetation management, and;
- timetable for works and details of implementation, responsibility, timing and funding of specific vegetation management works, and;
- A detailed monitoring program.

iii) Implementation of weed removal programs

All weed control and vegetation management works will be co-ordinated by the developer of the land or the Community Association who will engage the relevant bush regeneration contractors to complete works as per the Vegetation Management Plan to be prepared for the site.

Species targeted for control include:

- *Solanum nigrum* Black Nightshade;
- *Solanum mauritianum* Wild Tobacco;
- *Lantana camara Lantana* (Noxious Weed);
- *Thunbergia alata Black-eyed Susan* (Environmental Weed);
- *Protosparagus aethiopicus* Asparagus Fern (Environmental Weed);
- *Protosparagus plumosus* Climbing Asparagus fern (Environmental Weed);
- *Ambrosia artemisiifolia* Annual Ragweed (Noxious Weed);
- *Ageratina adenophora* Crofton Weed (Noxious Weed);

- *Senecio madagascariensis* Fireweed (Noxious Weed);
- *Nephrolepis cordifolia* Fish-bone Fern (Environmental Weed);
- *Paspalum ciliatifolium* One-spiked Paspalum;
- *Paspalum dilatatum* Paspalum;
- *Paspaluam urvillei* Vasey Grass;
- *Sporobolus africanus* Parramatta Grass;
- *Ipomoea cairica* Coastal Morning Glory (Environmental Weed);
- *Passiflora suberosa* Apple Dumplings (Environmental Weed).

Where weeds are identified as occurring, appropriate weed control will be undertaken. Weed control can be carried out either through the careful and localised use of chemicals or through physical control methods as outlined below:

- *Physical control methods* involve using physical means such as hand removal and the use of hand tools to remove either specific or broad ranges of weeds. A common physical method for weed removal and subsequent natural revegetation is the Bradley Method. This method involves hand removal and is best for small areas. The use of machinery such as Bobcats, Backhoes, Slashers, etc is not recommended for weed removal due to the potential for large scale disturbance to result.

- *Chemical control methods* involve the use herbicides. These herbicides can be specific to a particular plant or more broad ranging types of chemicals. Problems with the use of herbicides include chemical residues affecting soils, herbicide runoff into waterbodies and the health and safety of the operator involved in the application of the herbicide. Advantages of herbicide use include the low time taken to spray weeds as opposed to physically removing them, especially for large infestations of weeds. Broad area spray application is considered inappropriate for this program. Herbicides will be applied by cut and paint or hand held application methods only. Suitable physical control methods are to be the preferred option.

Weed control in the reserve and corridor areas is to be carried out by professional bush regeneration contractors having TAFE qualifications in bushland regeneration (minimum Certificate 2) and under the supervision of a professional bush regenerator who is a member or is eligible for membership of the Australian Association of Bush Regenerators (AABR). Any individuals or groups undertaking weed removal or bush regeneration activities must currently possess or obtain a licence from the DEC.

iv) Rehabilitation of disturbed areas

In conjunction with weed removal programs, and as part of the Vegetation Management Plan, those disturbed areas identified for retention within the site will be targeted for rehabilitation. The Vegetation Management Plan will detail strategies for those areas to be rehabilitated including the use of provenance specific species, long term protection of rehabilitation areas and monitoring and maintenance of rehabilitation areas.

iv) Erection of signage delineating protection areas

Signs will be erected throughout the site delineating conservation areas and identifying vegetation protection areas and strategies. This will include information discouraging residents

from dumping lawn and garden waste that will have future impacts upon natural areas in terms of potential for weed infestation.

Signs, in conjunction with fencing, can also aid in restricting access to sensitive areas. Any signage erected should be done in accordance with relevant Council signage policies.

Further details on signage management actions are contained in Section B9.

v) Erection of fencing delineating conservation and protection areas

Fencing can be used to delineate vegetation and bushland protection areas, particularly those areas undergoing vegetation rehabilitation. Sensitive areas can also be fenced to restrict pedestrian and vehicular access.

Fencing will be open and unobtrusive and consist of either timber post and rail or wire and no rail construction. No barbed wire will be used.

Further details on fencing management actions are contained in Section B9.

vi) Monitoring of vegetation management areas

Full details of monitoring are included in Section B12.

vii) Encouragement of Landcare community initiatives

The encouragement and establishment of local community landcare groups will aid in the organisation and carrying out of weed removal and vegetation rehabilitation programs and will encourage partial ownership of the bushland values of the Sandy Beach North development by the community.

The establishment of site specific community landcare groups should be developed as an initiative between the developers of the land and the Community Association.

B2 BUSHFIRE MANAGEMENT

Objectives

- **Minimise the impacts of bushfire protection measures upon the ecological values of conservation areas**
- **Maximise tree and habitat protection within bushfire protection areas**
- **Ensure that bushfire protection measures are implemented to reduce the risk of bushfire from the conservation areas upon adjacent property**

Actions

i) Preparation of Bushfire Protection Assessment detailing the requirements of all bushfire protection measures

A Bushfire Assessment Report (*Conacher Environmental Group* 2008a) has been prepared for the site. This Bushfire Protection Assessment details the bushfire protection strategies required to protect developed areas within the subject site from the risk of bushfire within adjacent vegetation.

The Bushfire Protection Assessment provides information and recommendations in relation to the following:

- Asset protection zones;
- Building protection;
- Evacuation safety;
- Availability of fire fighting services;
- Access and egress for fire fighting;
- Water supplies;
- Communications.

ii) Identification of retained areas and Asset Protection Zone (APZ) boundaries prior to construction

Prior to construction commencing those areas to be retained as corridor and reserve and their adjacent APZ's should be delineated on site plans and survey marked in the field. This will minimise the risk of damage to vegetation contained within retained areas and APZ's during construction.

iii) Maximise tree protection in APZ's

A discontinuous tree canopy is required as part of the establishment of the Inner Protection Area of APZ's. It is considered that due to the relatively open nature of the vegetation communities present within that site that tree clearing required as part of the establishment of APZ's will be minimal, if required at all.

iv) Monitor bushfire risk within retained bushland areas

While all hazard reduction is to occur outside of conservation areas the vegetation and accumulation of fuel and consequent bushfire risk over time within the retained vegetation is to be monitored as a long term strategy. Full details of the requirements for monitoring are included within Section B12.

iv) Implementation of ongoing fire hazard reduction where considered necessary in accordance with vegetation management principles

This may require future APZ maintenance and ecological burn strategies to be implemented using a sector/mosaic burn plan based on best knowledge of appropriate regimes for the various vegetation communities present within the site. The results of monitoring will be used to plan for any subsequent fuel reduction operations carried out in conjunction with the RFS and other relevant statutory authorities such as the Department of Environment and Climate Change.

B3 PROVISION OF ENVIRONMENTAL BUFFERS

Objectives

- **Protect the values of retained vegetation and habitats within the site**
- **Protect the aquatic values and habitats of Hearnes Lake**
- **Reduce occurrence and severity of edge effects on retained vegetation**
- **Maximise use of Asset Protection Zones in acting as environmental buffers**
- **Maximise the opportunity for vegetation management and restoring vegetation in increasing the function of buffers**

i) Establish buffer areas as conservation zones between development areas and environments associated with Hearnes Lake

Areas surrounding the shoreline of Hearnes Lake will be retained as part of the concept development proposal. This includes the retention of areas of Sedgeland, Wallum Heath, Wet Heath, Sandplain Forest, Swamp Sclerophyll Forest, Low Forest (Banksia dominated), Forest (Eucalypt dominated) and Eucalypt/Swamp Sclerophyll Transition Forest.

The retention of these communities will provide a buffer of between 40 and 200 metres between the development edge and the shoreline of Hearnes Lake. The establishment and retention of these areas as buffers will aid in the provision of protection of Hearnes Lake from potential offsite and upslope impacts of adjacent development.

ii) Implement vegetation management strategies within buffer areas

Buffer areas will be targeted for vegetation management. The implementation of vegetation management actions within buffer areas will increase these areas ability to protect vegetation and habitats from the impacts of development. These actions will include:

- weed removal;
- replanting;
- erosion and sediment control;
- fencing;
- monitoring;
- ongoing maintenance.

iii) Restrict vehicle access to buffer areas

Access to buffer areas by vehicles will be restricted and prohibited, other than for vegetation management purposes and only by authorised/qualified personnel.

B4 EROSION AND SEDIMENT CONTROL

Objectives

- **Protect the soil properties of the area during the construction and occupation phases of the development**

- **Minimise risk of sedimentation of downstream aquatic and marine areas particularly within Hearnes Lake**

- **Maximise use for in-situ replacement and use of displaced topsoil**

Actions

i) Prepare suitable management plans for the site specific to site management and erosion and sediment control

Development within the site is adjacent to sensitive areas including Hearnes Lake and areas within Solitary Islands Marine Park. To minimise the impacts of downstream sedimentation to aquatic environments a Construction Management Plan (Patterson Britton 2007a) and Erosion and Sediment Control Plan (Patterson Britton 2007b) has been prepared as part of the Concept Plan.

The plans provide information on the following:

- works and disturbance associated with the proposed development;
- stockpile, storage and reuse strategies for topsoil;
- methods of protecting native vegetation outside the area to be developed, from disturbance;
- methods of clearing, reuse and removal of vegetation, including site rehabilitation/revegetation;
- methods of stormwater diversion;
- potential sediment loss from the site and sizing of sediment basins;
- the location and method or supplying infrastructure, waste-water systems and access driveway; and
- inspection, monitoring and maintenance requirements.

The plans have been prepared by a qualified Engineer and in accordance with best practice industry standards and relevant Council Erosion and Sediment Control Policy.

ii) Provide erosion and sediment control devices in accordance with best practice industry standards

The Erosion and Sediment Control Plan will detail measures for the installation, ongoing use monitoring and maintenance of erosion and sediment control devices during all construction and occupation phases of development.

iii) Implement suitable protection measures for storing of topsoil and on-site re-use

All topsoil stripped from the site will be stored and re-used on site. Topsoil and spoil shall be stockpiled in non-hazard areas and protected from surface run-off by diversion drains or similar. Stockpiles should be surrounded on down-stream sides by silt fencing and stockpiles shall be suitably compacted to inhibit erosion. Where the stockpiling period exceeds four (4) weeks, the stockpile shall be seeded to encourage vegetation growth and reduce further loss due to water/wind erosion.

iv) Restrict access to disturbed areas during construction

Access to disturbed areas during construction will be restricted, particularly following rainfall.

v) Rehabilitate disturbed areas immediately upon the cessation of construction activities

All disturbed areas will be rehabilitated according to actions detailed within the Erosion and Sediment Control Plan and Vegetation Management Plan immediately following the completion of site construction activities.

vi) Monitor erosion and sediment control devices and downstream and aquatic areas for evidence of soil loss and sedimentation

Regular inspections will be made to check the condition and effectiveness of erosion sediment control devices during construction. This will include monitoring downstream areas for signs of erosion or sedimentation periodically following rain events. Immediate repairs will be made to devices where inspections and monitoring indicate the need.

B5 STORMWATER QUALITY AND MANAGEMENT

Objectives

- **Incorporate Ecologically Sustainable Development and Water Sensitive Urban Design principles in the stormwater management process**
- **Protect the hydrology and aquatic habitat values of Hearnes Lake**
- **Minimise contaminant transport from stormwater**
- **Improve water use and re-use efficiency and reduce demand for imported mains water**
- **Provide suitable stormwater control devices that maximise habitat opportunities for flora and fauna**
- **Integrate stormwater management into the landscape creating multiple use areas that maximise ecological, visual and recreational amenity**
- **Locate and design stormwater structures within the development in accordance with the conservation and protection principles of this Management Strategy to minimise environmental impacts**

Actions

i) Prepare a Water Management Strategy for the site in accordance with best practice Ecologically Sustainable Development and Water Sensitive Urban Design principles

A water Management Strategy has been prepared for the site (Patterson Britton 2007c). The key elements of the Water Management Strategy include:

- the use of water conservation devices within each dwelling
- integration of stormwater storage within urban areas whenever possible
- maximised use of local native vegetation in treating stormwater, particularly vegetation
- rehabilitation and improvement of degraded sections of drainage lines
- incorporation of vegetated and lined biofiltration swales with road reserves to provide physical and biological treatment of runoff
- incorporation of water quality control ponds at key locations within the site to provide opportunities for physical chemical and biological treatment of runoff

ii) Use of constructed wetlands in the water storage and treatment process

The use of constructed wetlands in the water treatment and storage process will provide additional habitat for aquatic and semi-aquatic fauna species observed within the site. The correct design and use of shallow water wetlands will provide habitat for and aid in the conservation of the Wallum Froglet within the site. Similar constructed water treatment wetlands have been established at Corindi Beach north of the subject site and have been successful in supporting Wallum Froglet populations.

iii) Integrate landscape design initiatives into stormwater storage devices that maximise benefits to local aquatic and semi-aquatic flora and fauna species

Measures should include promotion of growth of native fringing vegetation, monitoring of water quality, weed removal and monitoring for presence of predatory *Gambusia holbrooki.* Design of detention and sedimentation structures will incorporate features to facilitate *Gambusia* eradication where possible. These measures may be addressed within individual habitat management plans for each proposed basin.

Design considerations should include

- Consideration given to the species present on-site in designing habitat features to maximise benefits to those species;
- Consideration of shallow water verses deep water basins within design criteria;
- Maximise diversity and complexity of habitat through planting of range of aquatic and fringing plant species;
- Variation in size and type of plants to maximise diversity;
- Addition of microhabitat features such as logs with cracks, rock packs;
- Use of sand banks;
- Inclusion of shallow water areas (<30 cm) near banks;
- Contingency for the ability to drain to decrease risk/control *Gambusia* and mosquito larval infestations.

iv) Use advice from qualified ecologists in implementing design initiatives for stormwater control structures

A qualified aquatic habitat ecologist should be engaged to provide expert advice on aquatic habitat features. This information should include use of local species lists in determining presence and implementing species specific design initiatives.

v) Prepare landscape and habitat design plans for constructed wetlands and detention ponds in maximising their ecological and recreational benefits

These measures may be addressed within individual habitat management plans for proposed stormwater control structures. The habitat management plans should include features on appropriate design to reduce the risk of infestation and easy eradication of *Gambusia* species and reduce risk of frog chytrid disease as detailed within the DEC's Hygiene Protocol for the Control of Disease in Frogs (NPWS 2001) and Threat Abatement Plan for predation by *Gambusia holbrooki* (NPWS 2003). Details should also be supplied on provision of suitable habitat for native aquatic bird species.

vi) Locate stormwater control structures to minimise impacts upon vegetation and habitats within the site

Considerations should include:

- Stormwater detention ponds should be located offline away from existing drainage channels;
- Currently cleared areas should be maximised in locating stormwater detention ponds;
- Stormwater detention ponds should be located so as to minimise damage to key habitat areas eg. undisturbed bushland, hollow bearing trees.

iv) Monitor flora and fauna within stormwater control structures

Full details of monitoring are included within Section B11 – Monitoring and Reporting Regime.

B6 CULTURAL HERITAGE VALUES AND MANAGEMENT

Objectives

- **Identify and protect the cultural heritage values of the local area**

- **Provide information to the community on the cultural heritage values of the site**

Actions

i) Identification and protection of sites of aboriginal significance

Two sites of aboriginal cultural heritage interest were identified within the site during surveys in 2004 (Dallas 2004). The first of these is at the southern boundary of the site. Further tests of this site have been recommended before any construction commences.

The second of these sites occurs at the southern end of Hearnes Lake and was identified as the remains of a camp site. This site is located within areas to be retained for conservation.

The Local Aboriginal Land Council and DECC will be notified of any instances of uncovering or discovery of potential aboriginal cultural sites during construction. Site contractors will be inducted on their responsibilities in this regard.

ii) Provision of information to community on importance of cultural heritage and its protection

Information supplied to the community as part of education programs will include information on the importance of cultural heritage and the protection of cultural heritage sites.

B7 COMMUNITY EDUCATION, VIGILANCE AND REPORTING

Objectives

- **Promote ownership and appropriate use of the natural areas within Sandy Beach North by the community**
- **Promote community vigilance in reporting prohibited use**
- **Promote community involvement in wildlife observation and protection**
- **Encourage local involvement in bushland rehabilitation schemes**
- **Provide information to the community on the environmental, cultural and recreational values of the area**

Actions

i) Provide informative pamphlet to residents at point of sale and update/supply regularly

A pamphlet will be supplied to residents at the point of sale to supply information in regards to the sites natural area values. The pamphlet will include information on:

- The area covered by the Sandy Beach North development and the conservation areas within;
- History of the area;
- Access points and any walking trails;
- Prohibited uses and reasons for restricted use;
- Location of any facilities or important ecological/cultural features;
- Accepted passive recreational uses of the area;
- Significant flora and fauna (particularly threatened species) and habitats;
- Significant features of Hearnes Lake;
- Practices to reduce the impacts of adjacent use upon Hearnes Lake (eg. Use of locally occurring garden species, limited use of fertilisers, controlling pets, weed management, fauna monitoring, habitat creation);
- Contact details with regard to reporting prohibited use, fauna injuries;
- Landcare/Bush regeneration details;
- Sources of further information (eg. Coffs Harbour City Council, DECC websites);
- Identification of those properties with any restrictions as to use (eg. Cat ownership).

ii) Provide interpretive signing around extent of retained conservation areas to inform community of values and appropriate use

Signage should include information on:

- Ownership and management of the land;
- Bushland values;
- Prohibited activities (eg: rubbish dumping, vehicular access, entry of cats, off lead dogs);
- Permitted activities;
- Contact/Reporting details;
- Penalties for misuse;
- Indicative map of natural areas within the subject site.

iii) Encourage community and resident ownership and involvement through use of Community Title initiatives

Residential areas of the site are to be administered under the provisions of Community Title. This approach allows for ongoing regulation of activities, including maintenance within the entire development area, within individual allotments, within bushfire protection areas, conservation areas and within common community association areas. This approach also provides substantial benefits in terms of regulating the impact of the development upon the natural environment into the future.

The Community Management Statement embodies the Legal Framework under which the Community Association operates defining its purpose, responsibilities, procedures and by-laws which regulate the association and its members. The Community Management Statement, by definition, places the burden of ongoing environmental management works upon the landholders thus ensuring the implementation of these works in perpetuity.

B8 PROHIBITED USE IDENTIFICATION AND MANAGEMENT

Objectives

- **Identify likely uses of the natural areas within the Sandy Beach North development that may have impacts upon ecological and environmental values**
- **Encourage appropriate uses of the natural areas within Sandy Beach North by the community**
- **Promote community awareness and vigilance of reporting of prohibited uses**
- **Implement mechanisms for penalties for mis-use of natural areas**

Actions

i) Erect prohibited use signage

The following should be identified as prohibited uses within the subject site. This will include those prohibited uses of the Solitary Islands Marine Park:

- Rubbish dumping;

- Vehicular (4WD and trail bike) access;
- Shooting;
- Use of personal watercraft (jet skis);
- Access by domestic animals (particularly off-leash dogs);
- Flora/fauna harm or removal;
- Horse riding;
- Dead wood removal.

ii) Create system or framework for the imposition of fines and penalties for any incidences of improper or prohibited use of natural areas

A legal framework whereby penalties, including fines, can be imposed for improper use of the site should be developed. Signs indicating prohibited uses and the penalties for these are to be placed throughout the subject site. This includes the issue of penalties for breaches of the *Marine Parks Act* (1997) and *Marine Parks Regulation* (1999) for land within the Solitary Islands Marine Park.

Information on prohibited uses is to be included in the pamphlet to be circulated to residents.

iii) Implement community education programs to encourage the appropriate low impact, passive use of reserve and corridor areas

Community education material (pamphlets/signage) should include information on appropriate use of the natural areas within the site. Passive use of the site should be encouraged with activities such as walking and fauna observation to have facilities provided for (eg. walking trails, boardwalks, viewing platforms). Those recreational activities likely to cause damage to ecologically sensitive areas should be prohibited (walking off set trails, trail biking, horse riding, unleashed dog walking, camping).

iv) Restrict access to conservation areas, particularly to vehicles, trail bikes and horses

The recreational opportunities and use of the site will be controlled by the provision of services and access to those services. Access to conservation areas and any facilities within those areas will be restricted to service vehicles and pedestrian traffic only.

Access to walking/service trails will be restricted by locked gates or bollards. Unauthorised vehicular access will not be permitted and identified as a prohibited use.

B9 NATIVE FAUNA, HABITAT AND FERAL PEST SPECIES MANAGEMENT

Objectives

- **Provide suitable strategies for the protection of native fauna species within the post development landscape**

- **Provide adequate protection and habitats for threatened species known from the area**

- **Provide compensatory habitat for native fauna**

- **Minimise human related impacts upon local native fauna**

- **Protect key den, nest, roost and foraging resources by establishing adequate bushland reserves**

- **Remove pest fauna species from the site**

- **Reduce the risk of damage to native flora and fauna resulting from the occurrence of pest species related to human occupation**

Actions

i) Provide compensatory habitat within retained areas, particularly nest and roost boxes

a. Nest Boxes

Relative low densities of hollow-bearing trees have been recorded within the subject site. These hollows ranged in size from small to medium (<5cm to 30cm) suitable for a number of hollow dependent fauna species observed during surveys. These include:

* Yellow-tailed Black-Cockatoo
* Rainbow Lorikeet
* Eastern Rosella
* Common Brushtail Possum
* Eastern Freetail-bat
* Eastern Broad-nosed Bat
* Galah
* Scaly-breasted Lorikeet
* Laughing Kookaburra
* Goulds Wattled bat
* Greater Broad-nosed Bat
* Eastern Forest Bat

As part of the Masterplanning process it is proposed to retain all hollow-bearing trees within the undeveloped areas of the site. However, in the interests of providing net gains in habitat nest and roost boxes are proposed to be erected within trees in those reserve and corridor areas to be retained by the development.

It is considered that 5-10 nest boxes per hectare of current suitable habitat to be cleared should be erected as compensatory habitat within the retained and protected conservation areas. This should consist of a mix of possum, microchiropteran bat, small and large parrot boxes.

The following specific management strategies are to be carried out in relation to nest boxes:

- All replacement nest boxes are to be secured to trees at a minimum height of four metres above ground level facing the east to north east direction. An experienced arbor is required to install the nest boxes. Nest boxes and re-erected limbs are not to be placed near locations where public access is planned along entrance points or tracks. All nest boxes and re-erected limbs will be inspected annually and any damaged, or in danger of falling, are to be repaired or replaced. The locations of each of the erected nest boxes or re-erected hollows will be mapped for later reference.

- A fauna ecologist (Project Ecologist) is to co-ordinate the construction and erection of nest boxes and locate appropriate trees and locations for installing the nest boxes. The locations of all nest boxes and re-erected hollows are to be included on plans provided

with annual progress reports. Each box is to be identified with a readable, weather resistant number (75mm) in size for identification and recording purposes.

- All nest boxes will be inspected regularly for the life of this plan. Any damaged or dangerous boxes should be replaced. Any boxes seen to contain exotic fauna (Indian Mynah, European Bees) will have fauna removed or the nest box replaced.

- The locations of all nest boxes will be fixed by GPS as part of ongoing monitoring strategies.

- All nest boxes will be constructed of a durable marine ply material and fixed to trees by qualified climbers using stainless steel bolts. Boxes will be hinged for ease of future monitoring.

The habitats within the reserve and corridor areas will be enhanced by the implementation of vegetation management strategies. The removal of weeds and rehabilitation of disturbed areas and community involvement has been discussed within Section B1.

ii) Supervise clearing works during construction

At this stage it is proposed to retain all identified hollow-bearing trees as part of the proposed development. However in the event that hollow-bearing trees do require removal contingency will be made for the safety of any fauna using hollows to be felled during clearing. The following measures will be used as considered appropriate:

- Identification and marking of hollow bearing trees required to be cleared;

- Inspection of tree hollows by qualified climber or by spotlight survey and appropriate bat detection methods immediately prior to clearing to determine if hollows are being utilised by tree dwelling fauna;
- Implementation of a trapping program prior to tree clearing to trap any mammal fauna within areas proposed for staged clearing. Any trapped animals should be released into appropriate areas on dusk;

- Inspection of hollow bearing trees marked for clearing. Trees should be felled in sections of approximately one-metre lengths. Inspections of hollow sections prior to felling should be undertaken to determine if fauna is present within hollows. Fauna occupying hollows should be carefully removed by an experienced and licensed fauna expert and relocated to another tree away from the area of clearing;

- Restriction of clearing hollow bearing trees during the breeding season for microchiropteran bats and Squirrel Glider (September-March);

- Implementation of hollow log salvage and re-erection program in order to retain roosting and nesting opportunities for hollow dependent fauna, including Owls, Squirrel Gliders and threatened bat species;

Two options are available for removing tree hollows or felling hollow bearing trees. These are:

i) Hollow bearing trees containing fauna, required to be cleared, is to be felled in sections of approximately one metre length with inspections of the hollow sections prior to felling undertaken to determine if fauna is present within the hollow. Fauna occupying hollows should be carefully removed by the Project Ecologist and relocated to adjoining corridor or reserve areas.

ii) Where machinery is required to fell hollow trees, the blade or bucket of the machinery will be tapped against the base of the tree to disturb any fauna present. The tree will then be felled as gently as possible. All hollow limbs will be inspected after felling for occupation by fauna. Any fauna will be removed and relocated to adjoining bushland.

Any felling of hollow bearing trees will be supervised by a qualified fauna ecologist (Project Ecologist).

All hollow limbs should be removed from those trees felled by a licensed contractor. These hollow limbs will be returned to the Project Ecologist for re-use at a later date.

iii) Provide information within community education material encouraging the provision of habitat for native fauna species within residential allotments

Information should be included within interpretive material on the importance of providing suitable landscape initiatives within residential areas for the provision of habitat for native species within urban areas.

iv) Implement suitable initiatives to control impacts of domestic pets upon local fauna

The following should be considered in minimising the risks posed to native wildlife of domestic animals:

- All domestic pets kept within fenced yards;
- Covenants restricting cat ownership;
- Curfews on cats;
- All dogs to be kept on leash when out of yards and in open space areas;
- Penalties for unrestrained animals.

v) Implement feral pest control programs

Suitable management strategies should be implemented for the control of feral animals. This should include engaging a licensed pest controller to carry out regular programs, when required, within the site, particularly those corridor and reserve areas.

vi) Monitor distribution and abundance within the site of threatened species, native fauna and pest species

Regular monitoring should be implemented to gather information on the occurrence of native fauna, particularly threatened species, and pest species within the site. Full details are provided within Section B11.

B10 ACCESS, SIGNAGE AND FENCING

Objectives

- **Protect the environmental values of natural areas throughout the Sandy Beach North development through appropriate signage and fencing**

- **Protect environmentally sensitive areas through restriction of access**

- **Increase community awareness of environmental values of natural areas through appropriate signage**

Actions

i) Erect interpretive signing around corridor and reserve areas providing community and residents with information on access restriction, appropriate use, prohibited use and environmental values

Interpretive signing should be erected around the boundaries and within reserve and corridor areas. This should include information on:

- Location of conservation areas (site plan);
- Appropriate uses;
- Prohibited uses;
- Natural features of the site (flora/fauna/habitats/wetlands etc);
- Recreational opportunities;
- Contact details – Solitary Islands Marine Park Authority, NSW DPI-Fisheries, Department of Environment and Climate Change, Coffs Harbour City Council;
- "No go" areas;
- Penalties for misuse.

ii) Erect fencing during construction to protect individual trees

Where trees are identified for retention and are in areas adjacent to construction areas tree protection fencing should be erected to eliminate risk of damage during construction. Fencing should be erected to adequately protect the root zone of trees from excavation or compaction damage.

Full details of tree protection will be included within the Vegetation Management Plan.

iii) Erect fencing during construction to protect reserve and corridor areas

Where corridor or reserve areas are adjacent to construction areas temporary fencing should be erected to indicate these no go areas. This should be supported by site contractor inductions notifying personnel of protection areas and restricted access to these.

Full details of protective fencing will be included within the Vegetation Management Plan.

iv) Erect fencing and bollards where appropriate to restrict access to environmentally sensitive areas

Permanent fencing and bollards should be erected to control access to environmentally sensitive areas such as the Hearnes Lake shoreline and other conservation zones. Fencing should also be erected to protect areas that are undergoing vegetation management to protect juvenile plants.

v) Monitor signage and fencing and repair/replace when necessary

The management program should include monitoring of condition of signs, fencing and bollards to allow for damaged structures to be relaced or repaired. Full details of monitoring are included within Section B12.

B11 MONITORING AND REPORTING REGIME

Objectives

- **Collect long term information on the environmental and ecological quality of natural areas and impacts of development within the Sandy Beach North development**

- **Collect long term information on impacts of the development upon reserve and corridor areas and make contingency for the implementation of appropriate rehabilitative and compensatory measures**

- **Collect long term information on the success of ameliorative measures introduced as part of this management strategy**

- **Collect information on the occurrence of threatened species, native fauna and condition of vegetation within reserve and corridor areas**

- **Provide regular meaningful reports to statutory authorities on the results of monitoring and other ongoing issues and make these available to the Community Association and other local interest groups**

Actions

The monitoring program will be designed to collect information over the long term on key environmental and ecological parameters to provide information on the long term environmental health of the conservation. These consist of the following:

- Water quality within Hearnes Lake;
- Threatened species;
  - Wallum Froglet
  - Black-necked Stork
  - Osprey
  - Glossy Black-Cockatoo
  - Grey-headed Flying-fox
  - Eastern Freetail-bat
  - Greater Broad-nosed Bat
- Native fauna;
- Native vegetation;

- Weeds;
- Rubbish;
- Nest boxes;
- Pest species.

i) Monitor water quality and hydrological conditions within Hearnes Lake

A site specific monitoring plan for Hearnes Lake will be prepared. The monitoring plan will detail methods for the monitoring of hydrological conditions and water quality within Hearnes Lake. This will include details on specific programs for the collection of information on:

* Salinity;
* pH;
* Dissolved solids;
* Suspended solids;
* Dissolved oxygen;
* Phosphorous (Total Phosphorous, Orthophosphate);
* Nitrogen (Total Nitrogen, Oxidised Nitrogen);
* Biological Oxygen demand;
* Ammonia.

i) Monitor occurrence and persistence of threatened species

Wallum Froglet

The Wallum Froglet has been recorded within a number of locations within the site. The monitoring program should be designed so as to detect the continued presence of this species within those suitable habitat areas retained within the site and within provided habitat areas (constructed wetlands). Surveys should be completed bi-annually and annually and consist of call detection and call playback, particularly during times of peak detection (ie after rain April-Nov).

Black-necked Stork and Osprey

This species has been observed foraging within Hearnes Lake on a number of occasions. The Osprey has been recorded nesting within the vicinity of the subject site. Monitoring programs should be designed so as to detect the continued presence of these species within the area. Bi-annual surveys should be carried out to detect the continued presence of this species within Hearnes Lake. Residents should also be encouraged to report on any sightings of these species.

Glossy Black-Cockatoo

Signs of the Glossy Black-Cockatoo foraging within the site were observed during site surveys. Monitoring of identified potential feed trees (Allocasuarina species) for signs of foraging should occur within the site. Surveys for this species should be carried out biannually and annually.

Grey-headed Flying-fox

The Grey-headed Flying-fox was observed on a single occasion during surveys within the subject site. This species is likely to forage seasonally and periodically on flowering tree species within the site. Monitoring programs should be designed so as to detect the continued presence of this species within the area. Surveys for this species should be carried out biannually and annually and consist of spotlighting and call detection.

Microchiropteran Bat Species (Greater Broad-nosed Bat and Eastern Freetail-bat)

Two threatened microchiropteran bat species have been recorded within the site during previous surveys. The area contains foraging, roosting and breeding habitat for these species. Monitoring programs should be designed so as to detect the continued presence of this species within the area. Surveys for these species should be carried out biannually and consist of Anabat echolocation recording.

iii) Monitor health and status of endangered ecological communities

The site contains the endangered ecological communities Coastal Saltmarsh and Swamp Sclerophyll Forest on Coastal Floodplains. These areas will be targeted for protection and restoration as part of site conservation strategies. The condition of this community and the impact of adjacent development should be monitored as part of this management plan. Field information should be collected bi-annually and annually on the condition of the vegetation, species diversity and composition and incursions of weeds. This should be compared against baseline data collected from standard survey points prior to commencement of any construction activities.

iv) Monitor abundance and diversity of native fauna species

The monitoring program should include collection of information on the diversity of fauna species within the site. Standard fauna survey methods targeting vertebrate groups (mammals, birds, reptiles, amphibians) should be completed seasonally and bi-annually to gather information on the diversity of fauna species within the site for year to year comparison and also comparison against baseline data.

v) Monitor condition of native vegetation and bushland including rehabilitation areas

The monitoring program will include monitoring the condition of vegetation within those areas undergoing vegetation management works within the site, particularly those areas undergoing rehabilitation. Monitoring should be carried out annually to assess the condition of rehabilitation areas and make contingency for additional rehabilitation and protection works if the results of monitoring indicate the need.

vi) Monitor occurrence and extent of weeds and rubbish

The extent of weeds within the retained areas should be monitored annually. Where weeds are observed to be increasing removal programs should be carried out. This could be implemented as part of community initiatives as discussed in Section B8.

Monitoring for incidences of rubbish dumping should be carried out regularly. Where build up of rubbish is observed removal programs should be carried out. This could also be implemented as part of community initiatives as discussed in Section B8.

vii) Monitor Use and Condition of Nest Boxes or Re-erected Hollows

Details for the erection of nest boxes and hollows are included within Section B9 e. Nest boxes and re-erected hollows should be monitored regularly for use by locally occurring hollow dependent species. Any incidences of exotic species using hollows should be reported and contingency made for removal. Any damaged nest boxes or re-erected hollows should be removed and replaced.

viii) Monitor occurrence of pest fauna species

Monitoring will include gathering information on the presence of the following pest species:

- Foxes;
- Rabbits;
- Gambusia;
- Indian Myna;
- Cats;
- Dogs.

The collection will allow for the occurrence of pest species to be recorded and provision made for their removal from those retained areas.

Any signs of predation by foxes, dogs or cats will also be monitored and reported on.

ix) Produce regular meaningful reports on results of surveys and provide analysis against baseline information

Reports will be supplied regularly to the Community Association and relevant statutory authorities in conjunction with the end of each monitoring period.

At the completion of each monitoring period an assessment report will be completed detailing all methodologies used and results gained during surveys for that monitoring period. The report should include-

- details on survey methods;
- results of surveys;
- comparison between monitoring/reporting periods;
- management issues;
- any suggested amendments to management plan.

x) Make contingency for review of management actions where monitoring identifies significant impacts

Management actions will be reviewed regularly as part of the monitoring and reporting process. Where impacts are identified that indicate the failure of management actions or the requirement for new management actions contingency will be made for these to be addressed within the ongoing environmental management framework.

PART C

IMPLEMENTATION OF MANAGEMENT ACTIONS

C1 IMPLEMENTATION

It is envisaged that the management strategies included within this plan will be enforced as conditions of consent for various stages of approval for the development application. Given that this application is at the Masterplanning concept stage it is considered that refining of the management actions and implementation will be required for the various stages of the approved development. This may be achieved by the preparation of individual Management Plans for the various development stages with this Environmental Site Management Strategy framework to form the basis of the objectives, actions and implementation strategies of those plans.

The actions detailed within this Management Strategy will be implemented over a minimum ten year period following signoff of the plan by the Department of Planning. The long term timing, implementation and responsibility of those actions will ultimately depend upon the development of the various stages of the development and the title on the land

The following table (Table 1) provides details on the implementation of management actions contained within Section B. Each of the actions relates to a Management Area within the Sandy Beach North area. These areas have been identified to ensure that only those actions relevant to certain areas are applied to the relevant area. These Management Areas have been separated as per the following:

- Management Area A – Hearnes Lake;
- Management Area B – Vegetation Protection;
- Management Area C – Open Space;
- Management Area D – Developable Area.

These Management Areas are shown in Figure 2.

C2 MANAGEMENT AREAS

Management Area A – Hearnes Lake

The area within Management Area A is that land containing the aquatic and nearshore areas of Hearnes Lake that occur within the subject site. This area will be wholly retained within the concept masterplan as part of site conservation measures. Hearnes Lake and its nearshore areas contain the most ecologically sensitive parts of the subject site and are given the highest level of protection in terms of the application of ecological management actions.

Management Area B – Vegetation Protection

This area consists of low lying riparian areas with vegetation and ecological processes closely associated with Hearnes Lake and drainage areas. This area will be wholly retained within the concept masterplan as part of site conservation measures. This riparian zone contains vegetation locally significant vegetation and habitats and is afforded a high level of protection through the implementation of ecological management actions.

Management Area C – Open Space

The Open Space areas consist of managed parklands and active spaces containing community facilities for active and passive recreation. These areas will be wholly retained with some modification within the concept masterplan as part of site conservation measures. These Open Space areas are designed to provide managed areas within remnant vegetation with tree retention a priority. While not subject to the intensity of level of management actions as the Hearnes Lake and Riparian management areas, the Open Space areas will have a moderate level of ecological management as part of site conservation measures.

Management Area D – Developable Area

This area consists of the land to be developed for residential and commercial purposes. The management actions to be implemented within Management Areas A, B and C is ultimately as a result of the activities that are to be carried out within Management Area D.

TABLE 1 APPLICATION OF MANAGEMENT STRATEGY ACTIONS TO VARIOUS MANAGEMENT AREAS WITHIN SANDY BEACH NORTH							
		APPLICABILITY OF MANAGEMENT ACTION					
SITE MANAGEMENT ISSUE	**SITE MANAGEMENT ACTION**	**A**	**B**	**C**	**D**	**RESPONSIBILITIES**	**TIMING**
B1. VEGETATION MANAGEMENT	i) Retention of vegetation within conservation areas.	√	√	√		Details on the burden of completion of vegetation management actions and financing those actions will be determined at later stages of the application process.	Pre-construction.
	ii) Preparation of Vegetation Management Plan.	√	√	√			Pre-construction.
	iii) Implementation of weed removal programs.	√	√	√			Pre-construction, construction and ongoing through occupation.
	iv) Rehabilitate disturbed areas.	√	√	√			Pre-construction, construction and ongoing through occupation.
	v) Erect signage delineating protection areas.	√	√				Pre-construction.
	vi) Erect fencing delineating protection areas.	√	√				Pre-construction.
	vii) Monitor vegetation management areas.	√	√	√			Pre-construction, construction and ongoing through occupation.
	viii) Encourage community landcare initiatives.	√	√	√	√		Occupation.

TABLE 1 (Cont.) APPLICATION OF MANAGEMENT STRATEGY ACTIONS TO VARIOUS MANAGEMENT AREAS WITHIN SANDY BEACH NORTH							
		APPLICABILITY OF MANAGEMENT ACTION					
SITE MANAGEMENT ISSUE	**SITE MANAGEMENT ACTION**	**A**	**B**	**C**	**D**	**RESPONSIBILITIES**	**TIMING**
B2. BUSHFIRE MANAGEMENT	i) Prepare Bushfire Protection Assessment.	√	√	√	√	Details on the burden of completion of bushfire management actions and financing those actions will be determined at later stages of the application process.	Pre-construction.
	ii) Identify Asset Protection Zone boundaries.		√	√	√		Pre-construction.
	iii) Maximise tree protection in APZ's.		√	√	√		Pre-construction.
	iv) Monitor bushfire risk.	√	√	√			Occupation.
	v) Implement ongoing fire hazard reduction.	√	√				Occupation.
B3. PROVISION OF ECOLOGICAL BUFFERS	i) Establish buffer areas as conservation zones.		√			Details on the burden of completion of buffer related management actions and financing those actions will be determined at later stages of the application process.	Pre-construction.
	ii) Implement vegetation management within buffers.		√				Pre-construction, construction and ongoing through occupation.
	iii) Restrict vehicle access.	√	√				Pre-construction, construction and ongoing through occupation.

TABLE 1 (Cont.) APPLICATION OF MANAGEMENT STRATEGY ACTIONS TO VARIOUS MANAGEMENT AREAS WITHIN SANDY BEACH NORTH							
		APPLICABILITY OF MANAGEMENT ACTION					
SITE MANAGEMENT ISSUE	**SITE MANAGEMENT ACTION**	**A**	**B**	**C**	**D**	**RESPONSIBILITIES**	**TIMING**
B4. EROSION AND SEDIMENT CONTROL	i) Prepare and implement Construction Management Plan and Erosion and Sediment Control Plan.	√	√	√	√	Details on the burden of completion of erosion and sediment control management actions and financing those actions will be determined at later stages of the application process.	Pre-construction.
	ii) Provide erosion and sediment control devices.		√	√	√		Pre-construction.
	iii) Implement topsoil storage methods.		√	√	√		Construction.
	iv) Restrict access to disturbed areas.				√		Construction.
	v) Rehabilitate disturbed areas.			√	√		Construction.
	vi) Monitor erosion and sediment control devices and downstream environments.	√	√				Construction.
B5. STORMWATER QUALITY AND MANAGEMENT	i) Prepare a Water Management Strategy.	√	√	√	√	Details on the burden of completion of stormwater storage and quality management actions and financing those actions will be determined at later stages of the application process.	Pre-construction.
	ii) Use of constructed wetlands.		√	√	√		Construction.

TABLE 1 (Cont.) APPLICATION OF MANAGEMENT STRATEGY ACTIONS TO VARIOUS MANAGEMENT AREAS WITHIN SANDY BEACH NORTH							
		APPLICABILITY OF MANAGEMENT ACTION					
SITE MANAGEMENT ISSUE	**SITE MANAGEMENT ACTION**	**A**	**B**	**C**	**D**	**RESPONSIBILITIES**	**TIMING**
	iii) Integrate habitat creation landscape design initiatives into stormwater storage devices.		√	√	√		Construction.
	iv) Gain advice from ecologists in design initiatives.		√	√	√		Pre-construction.
	v) Prepare landscape and habitat design plans for storage facilities.		√	√	√		Pre-construction.
	vii) Strategically locate stormwater control to minimise impacts.		√	√	√		Pre-construction.
B6. CULTURAL HERITAGE VALUES AND MANAGEMENT	i) Identify and protect significant areas.		√		√	Details on the burden of completion of cultural heritage protection management actions and financing those actions will be determined at later stages of the application process.	Pre-construction.
	ii) Provide information to community on cultural heritage issues.				√		Occupation.
B7. COMMUNITY EDUCATION, VIGILANCE AND REPORTING	i) Provide informative pamphlet to residents.				√	Details on the burden of completion of community management actions and financing those actions will be determined at later stages of the application process.	Occupation.

TABLE 1 (Cont.) APPLICATION OF MANAGEMENT STRATEGY ACTIONS TO VARIOUS MANAGEMENT AREAS WITHIN SANDY BEACH NORTH							
		APPLICABILITY OF MANAGEMENT ACTION					
SITE MANAGEMENT ISSUE	**SITE MANAGEMENT ACTION**	**A**	**B**	**C**	**D**	**RESPONSIBILITIES**	**TIMING**
	ii) Provide interpretive signage along conservation areas.		√	√	√		Construction.
	iii) Encourage community and resident involvement through Community Title initiatives.				√		Occupation.
B8. PROHIBITED USE IDENTIFICATION AND MANAGEMENT	i) Erect prohibited use signage.		√	√	√	Details on the burden of completion of prohibited use management actions and financing those actions will be determined at later stages of the application process.	Construction.
	ii) Create system for imposition of penalties/fines.	√	√	√	√		Occupation.
	iii) Implement community education programs to encourage appropriate use.				√		Occupation.
	iv) Restrict access to conservation areas.	√	√				Pre-construction.
B9. NATIVE FAUNA, HABITAT AND FERAL PEST MANAGEMENT	i) Provide compensatory habitat within retained areas.	√	√	√		Details on the burden of native fauna, habitat and feral pest management actions and financing those actions will be determined at later stages of the application process.	Pre-construction.

TABLE 1 (Cont.) APPLICATION OF MANAGEMENT STRATEGY ACTIONS TO VARIOUS MANAGEMENT AREAS WITHIN SANDY BEACH NORTH							
		APPLICABILITY OF MANAGEMENT ACTION					
SITE MANAGEMENT ISSUE	**SITE MANAGEMENT ACTION**	**A**	**B**	**C**	**D**	**RESPONSIBILITIES**	**TIMING**
	ii) Supervise clearing works during construction.				√		Construction.
	iii) Promote habitat provision initiatives by community.				√		Occupation.
	iv) Implement initiatives for domestic animal control.				√		Occupation.
	v) Implement feral pest control programs.	√	√	√	√		Pre-construction, construction and ongoing through occupation.
B10. ACCESS, SIGNAGE AND FENCING	i) Erect interpretive signage around conservation areas.	√	√			Details on the burden of completion of access, signage and fencing management actions and financing those actions will be determined at later stages of the application process.	Pre-construction.
	ii) Erect tree protection fencing during construction.		√	√	√		Pre-construction.
	iii) Erect fencing to protect conservation areas during construction.		√				Pre-construction.
	iv) Erect fencing restricting access to restoration and sensitive areas.	√	√				Pre-construction, construction and ongoing through occupation.

TABLE 1 (Cont.) APPLICATION OF MANAGEMENT STRATEGY ACTIONS TO VARIOUS MANAGEMENT AREAS WITHIN SANDY BEACH NORTH							
		APPLICABILITY OF MANAGEMENT ACTION					
SITE MANAGEMENT ISSUE	**SITE MANAGEMENT ACTION**	**A**	**B**	**C**	**D**	**RESPONSIBILITIES**	**TIMING**
	v) Monitor signage and fencing						Pre-construction, construction and ongoing through occupation.
B11. MONITORING AND REPORTING REGIME	i) Monitor water quality within Hearnes Lake.	√				Details on the burden of completion of monitoring and reporting management actions and financing those actions will be determined at later stages of the application process.	Pre-construction, construction and ongoing through occupation.
	ii) Monitor occurrence and persistence of threatened species.	√	√	√			Pre-construction, construction and ongoing through occupation.
	iii) Monitor health and status of EEC's.	√	√				Pre-construction, construction and ongoing through occupation.
	iii) Monitor abundance and diversity of native fauna species.	√	√	√			Pre-construction, construction and ongoing through occupation.
	iv) Monitor condition of native vegetation.	√	√	√			Pre-construction, construction and ongoing through occupation.
	v) Monitor occurrence and extent of weeds and rubbish.	√	√	√			Pre-construction, construction and ongoing through occupation.
	vi) Monitor use and condition of nest boxes.	√	√	√			Pre-construction, construction and ongoing through occupation.

TABLE 1 (Cont.) APPLICATION OF MANAGEMENT STRATEGY ACTIONS TO VARIOUS MANAGEMENT AREAS WITHIN SANDY BEACH NORTH							
		APPLICABILITY OF MANAGEMENT ACTION					
SITE MANAGEMENT ISSUE	**SITE MANAGEMENT ACTION**	**A**	**B**	**C**	**D**	**RESPONSIBILITIES**	**TIMING**
	vii) Monitor occurrence of pest fauna species.	√	√	√			Pre-construction, construction and ongoing through occupation.
	viii) Produce regular, meaningful reports.	√	√	√	√		Pre-construction, construction and ongoing through occupation.
	ix) Make contingency for review of management plan and actions.	√	√	√	√		Pre-construction, construction and ongoing through occupation.
Management Area A - Hearnes Lake Management Area B – Vegetation Protection Area Management Area C – Open Space Management Area D – Developable Area							

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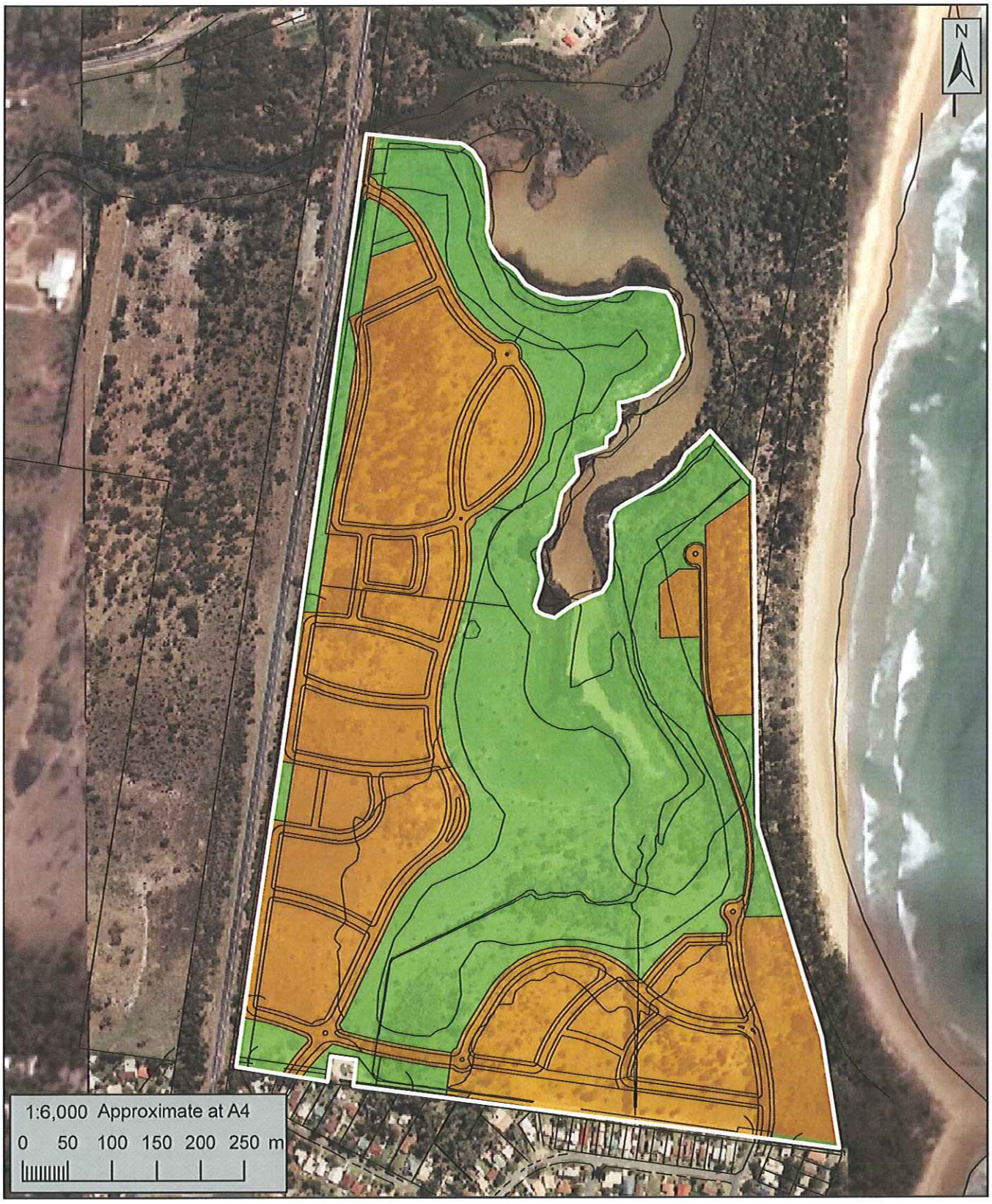

Original plan produced in A4 colour.
Plan for indicative purposes only, not for detailed measurement. Subject site boundary subject to final survey.

Legend

Subject Site Boundary — Proposed Development Layout — Conservation Area — Area Subject to Development

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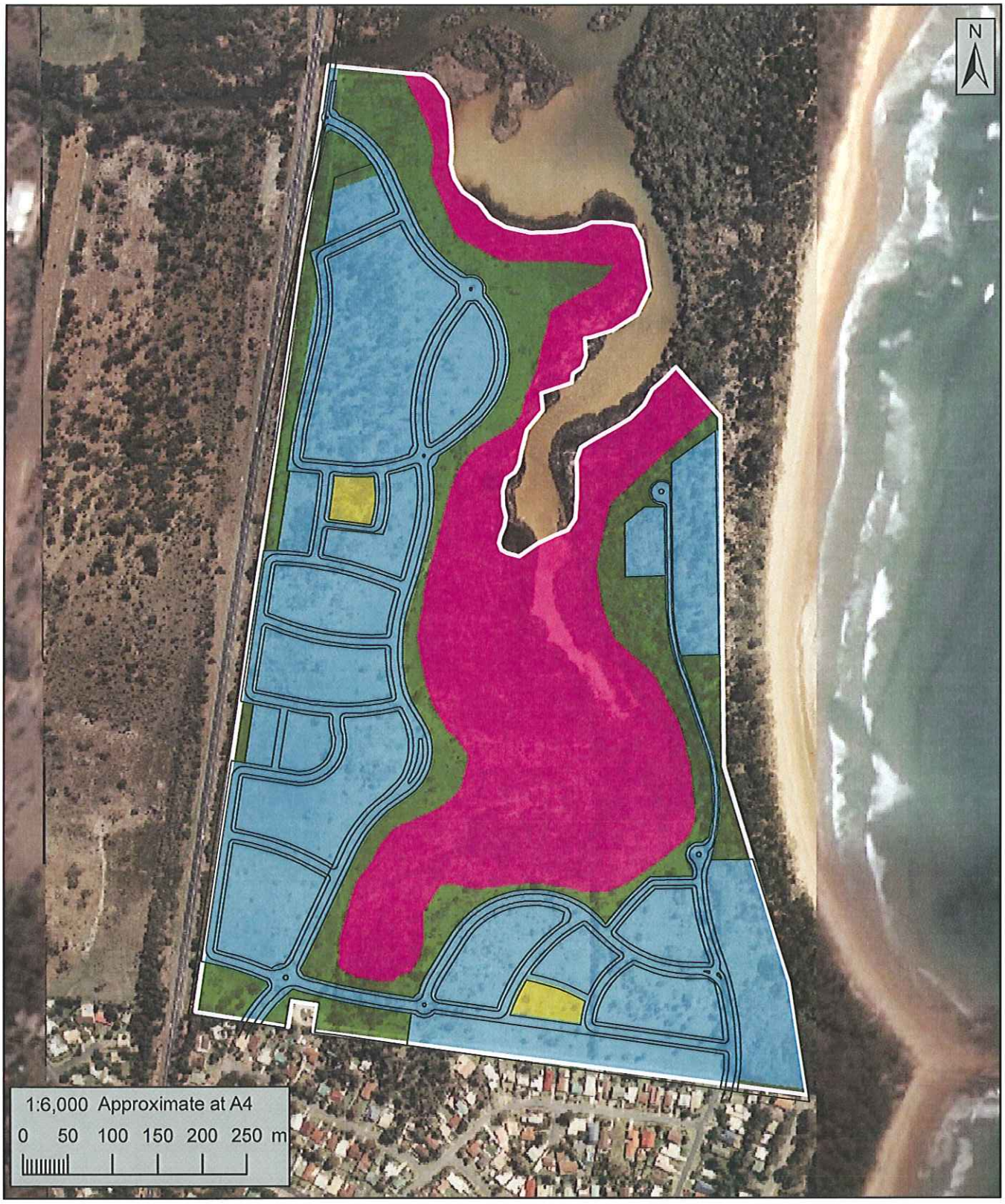
Figure 1
Concept Plan
Pacific Highway, Sandy Beach

Source: Aerial © Department of Lands (2008)



Original plan produced in A4 colour.
Plan for indicative purposes only, not for detailed measurement. Subject site boundary subject to final survey.

Legend

- Subject Site Boundary
- Proposed Development Layout
- Area A: Hearnes Lake
- Area B: Vegetation Protection Areas
- Area C: Open Space
- Area D: Developable Area

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Figure 2
Conceptual Environmental Management Areas
Pacific Highway, Sandy Beach

Source: Aerial © Department of Lands (2008)