

*JAMES WARREN & Associates Pty Ltd*

ENVIRONMENTAL CONSULTANTS



# FAUNA MANAGEMENT PLAN

COBAKI LAKES

PREFERRED PROJECT REPORT

OCTOBER 2009

A REPORT TO LEDA MANORSTEAD PTY LTD

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## 1 INTRODUCTION

### 1.1 Background

James Warren and Associates (JWA) have been engaged by LEDA Manorstead Pty Ltd to prepare a Fauna Management Plan (FMP) to accompany the Preferred Project Report for the proposed development at Cobaki Lakes.

JWA prepared an FMP for the Cobaki Lakes site in October 2008 in response to the Director General's Environmental Assessment Requirements (DGEAR's) issued 21<sup>st</sup> August 2007. The FMP was placed on public exhibition along with various other reports required under the DGEAR's.

Following submissions from the public and State Agencies, some amendments have occurred to the Concept Plan. This FMP has been revised to reflect changes to the Concept Plan and provide additional information where required.

### 1.2 Site Description

The Subject site consists of land described as Lot 1 DP 570076, Lot 2 DP 566529, Lot 1 DP 562222, Lot 1 DP 570077, Lot 1 823679, Lots 46, 54, 55, 199, 200, 201, 202, 205, 206, 209, 228 & 305 DP 755740, Cobaki Lakes, off Piggabeen Road, Tweed Heads. The site covers an area of approximately 593 hectares. The location of the subject site is shown in **FIGURE 1**.

The site lies adjacent to private landholdings to the north-west and south-east, and comprises a large portion of land cleared for agricultural purposes (i.e. grazing) throughout which a number of vegetation communities occur. Extensive clearing and subsequent slashing over the drainage basin has resulted in the recruitment of a combination of native and introduced grass species in place of native plants. Forested Crown lands which form the NSW-QLD border also form the northern and western boundary of the Cobaki Lakes site. There are no mapped State Environmental Planning Policy (SEPP) areas occurring on the site. A large area of SEPP 14 Wetland (No. 1) is located immediately west of and adjacent to Cobaki Broadwater and Cobaki Creek, in the Lower Tweed Estuary (TSC 2003).

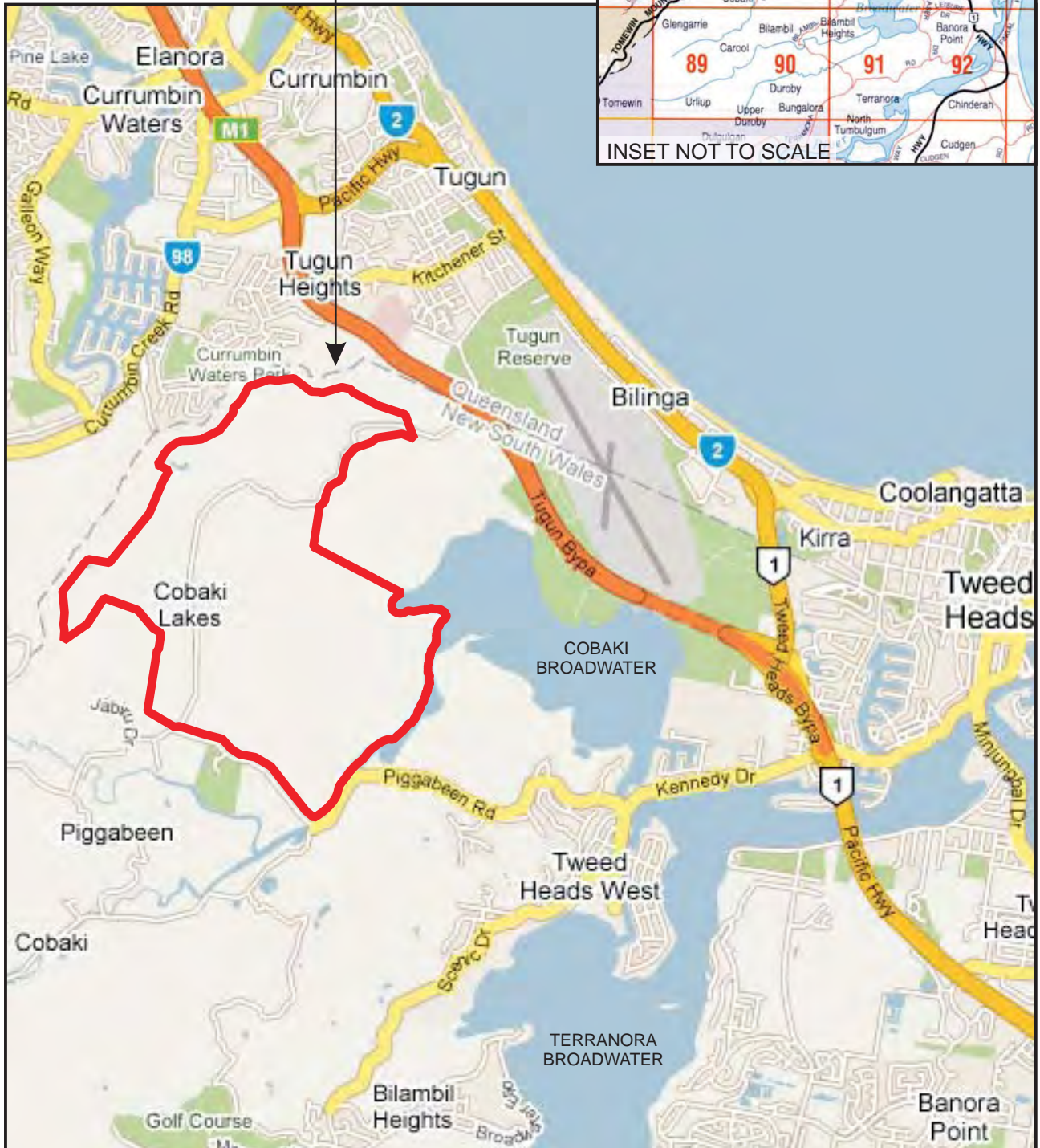
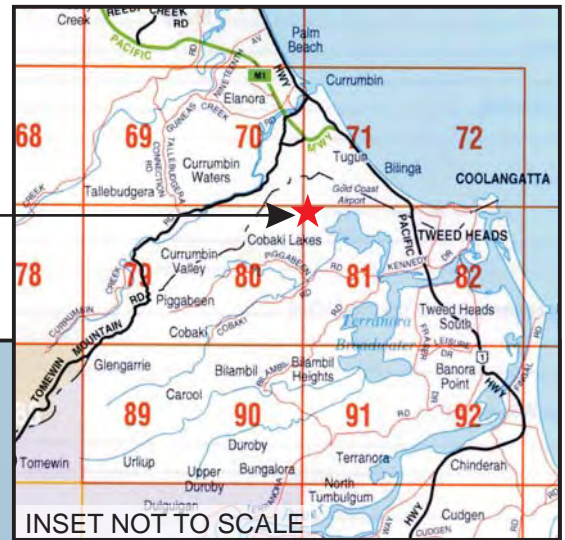
**FIGURE 2** shows a recent aerial photograph of the site. It is worth noting that vegetation clearing and earthworks have occurred in various locations of the subject site (in accordance with relevant approvals) subsequent to this aerial photograph. However, the vegetation assessment has utilised a combination of aerial interpretation and on-site surveys and reflects the current distribution and extent of vegetation communities.

Currently three (3) broad vegetation associations comprising twenty-four (24) vegetation communities occur on the site. Vegetation mapping over the subject site is shown in **FIGURE 3**.

It is worth noting that vegetation to be removed from the subject site occurs within existing 2(c) zoned land (i.e. Urban Expansion), land proposed to be rezoned



**SUBJECT SITE**



SOURCE: Google Maps

SCALE: 1 : 50 000 @ A4

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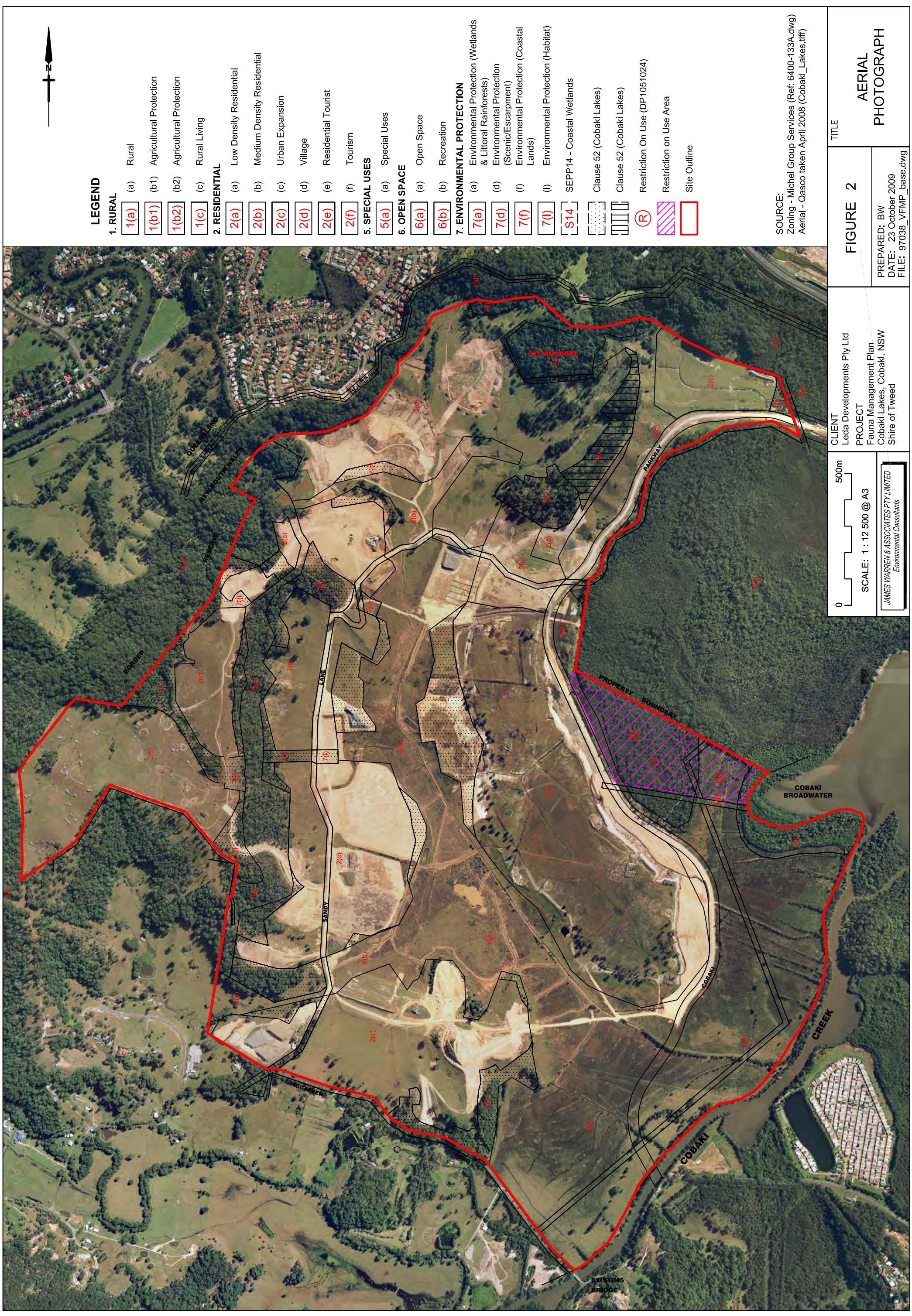
CLIENT  
Leda Developments Pty Ltd  
PROJECT  
Fauna Management Plan  
Cobaki Lakes, Cobaki, NSW  
Shire of Tweed

**FIGURE 1**

PREPARED: BW  
DATE: 23 October 2009  
FILE: 97038\_FMP\_Locality.cdr

TITLE

**LOCALITY  
PLAN**



**LEGEND**

**1. RURAL**

- 1(a) Rural
- 1(b1) Agricultural Protection
- 1(b2) Agricultural Protection
- 1(c) Rural Living

**2. RESIDENTIAL**

- 2(a) Low Density Residential
- 2(b) Medium Density Residential
- 2(c) Urban Expansion
- 2(d) Village
- 2(e) Residential Tourist
- 2(f) Tourism

**5. SPECIAL USES**

- 5(a) Special Uses

**6. OPEN SPACE**

- 6(a) Open Space
- 6(b) Recreation

**7. ENVIRONMENTAL PROTECTION**

- 7(a) Environmental Protection (Wetlands & Littoral Rainforests)
- 7(d) Environmental Protection (Scenic/Escarpment)
- 7(f) Environmental Protection (Coastal Lands)
- 7(l) Environmental Protection (Habitat)

**S14**

- SEPP14 - Coastal Wetlands
- Clause 52 (Cobaki Lakes)
- Clause 52 (Cobaki Lakes)

- Restriction On Use (DP1051024)
- Restriction on Use Area
- Site Outline

SOURCE:  
Zoning - Michel Group Services (Ref: 6400-133A.dwg)  
Aerial - Gasco taken April 2008 (Cobaki\_Lakes.tiff)

TITLE

**FIGURE 2**

**AERIAL PHOTOGRAPH**

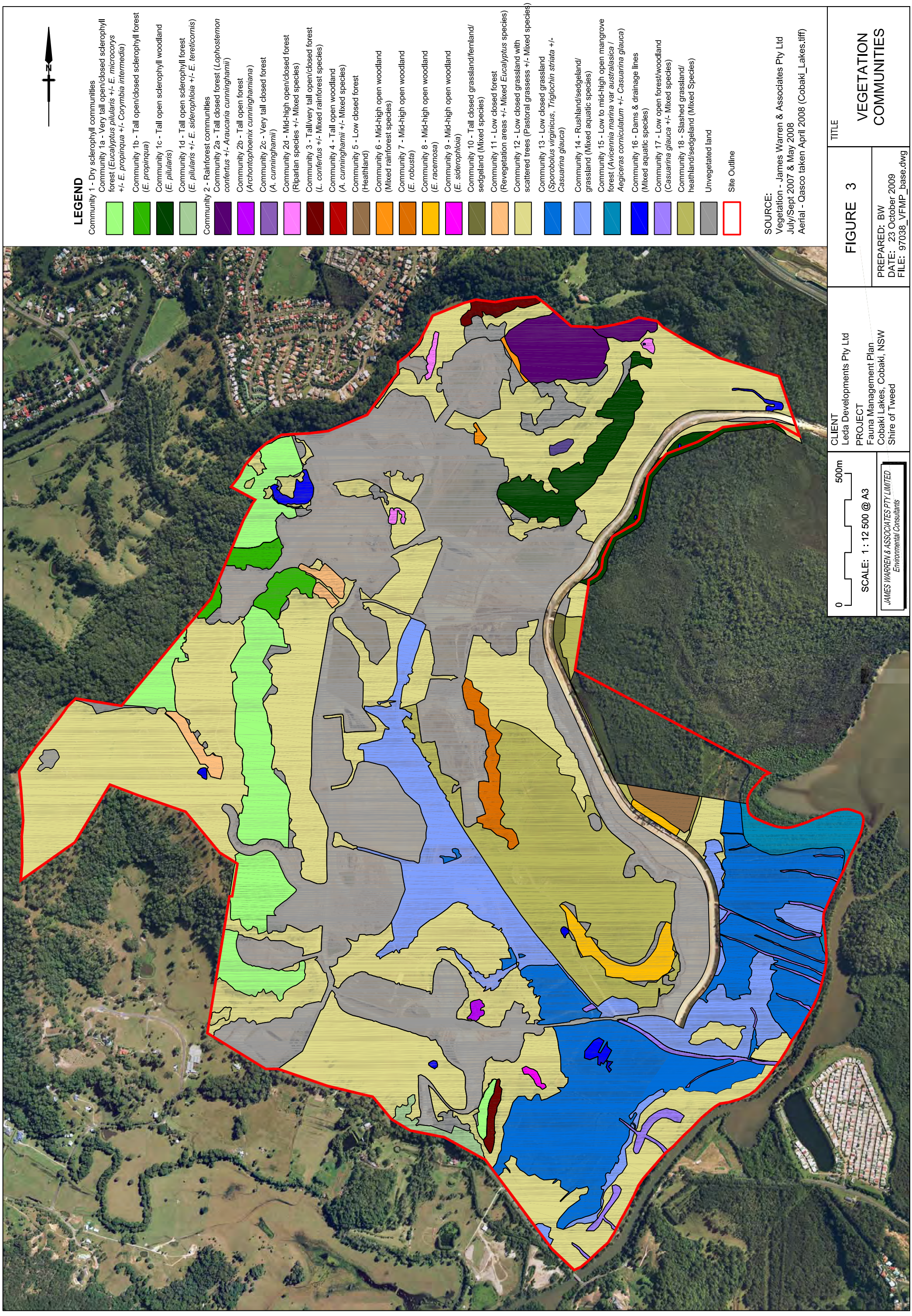
PREPARED: BW  
DATE: 23 October 2009  
FILE: 97038\_VFMP\_base.dwg

CLIENT  
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0 500m

SCALE: 1 : 12 500 @ A3

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**LEGEND**

- Community 1 - Dry sclerophyll communities
- Community 1a - Very tall open/closed sclerophyll forest (*Eucalyptus pilularis* +/- *E. microcorys* +/- *E. propinqua* +/- *Corymbia intermedia*)
- Community 1b - Tall open/closed sclerophyll forest (*E. propinqua*)
- Community 1c - Tall open sclerophyll woodland (*E. pilularis*)
- Community 1d - Tall open sclerophyll forest (*E. pilularis* +/- *E. siderophloia* +/- *E. tereticornis*)
- Community 2 - Rainforest communities
- Community 2a - Tall closed forest (*Lophostemon confertus* +/- *Araucaria cunninghamii*)
- Community 2b - Tall open forest (*Archontophoenix cunninghamiana*)
- Community 2c - Very tall closed forest (*A. cunninghamii*)
- Community 2d - Mid-high open/closed forest (Riparian species +/- Mixed species)
- Community 3 - Tall/very tall open/closed forest (*L. confertus* +/- Mixed rainforest species)
- Community 4 - Tall open woodland (*A. cunninghamii* +/- Mixed species)
- Community 5 - Low closed forest (Heathland)
- Community 6 - Mid-high open woodland (Mixed rainforest species)
- Community 7 - Mid-high open woodland (*E. robusta*)
- Community 8 - Mid-high open woodland (*E. racemosa*)
- Community 9 - Mid-high open woodland (*E. siderophloia*)
- Community 10 - Tall closed grassland/fernland/sedgeland (Mixed species)
- Community 11 - Low closed forest (Revegetation areas +/- Mixed *Eucalyptus* species)
- Community 12 - Low closed grassland with scattered trees (Pastoral grasses +/- Mixed species)
- Community 13 - Low closed grassland (*Sporobolus virginicus*, *Triglochin striata* +/- *Casuarina glauca*)
- Community 14 - Rushland/sedgeland/grassland (Mixed aquatic species)
- Community 15 - Low to mid-high open mangrove forest (*Avicennia marina* var *australasica* / *Aegiceras corniculatum* +/- *Casuarina glauca*)
- Community 16 - Dams & drainage lines (Mixed aquatic species)
- Community 17 - Low open forest/woodland (*Casuarina glauca* +/- Mixed species)
- Community 18 - Slashed grassland/heathland/sedgeland (Mixed Species)
- Unvegetated land
- Site Outline

SOURCE:  
 Vegetation - James Warren & Associates Pty Ltd  
 July/Sept 2007 & May 2008  
 Aerial - Gasco taken April 2008 (Cobaki\_Lakes.tiff)

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SCALE: 1 : 12 500 @ A3

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FIGURE 3

PREPARED: BW  
 DATE: 23 October 2009  
 FILE: 97038\_VFMP\_base.dwg

TITLE  
 VEGETATION  
 COMMUNITIES



## Fauna Management Plan - Cobaki Lakes

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as 2(c), or land that may otherwise be cleared in accordance with existing use rights. This FMP is intended to apply to these portions of the site only.

### 1.3 Aims & Objectives

The aim of this FMP is to detect habitat features and protect native fauna species and their habitats during both the construction phase and operational phase of the development. This FMP aims to ensure that:

- Retained vegetation within designated Conservation and Open Space areas are to be clearly marked and protected prior to commencement of operational works in each stage of the development;
- Tree clearing operations shall be completed in a manner that provides maximum protection of the health and livelihood of native fauna;
- Native fauna species (including Threatened fauna species) persist within retained habitats on the subject site; and
- Any population increases in pest fauna species are detected and appropriate control measures determined.

A suite of management strategies have been designed to enable each of the Performance Objectives to be satisfied during the construction phase. These strategies incorporate general best practice measures to minimise potential adverse impacts on the site's fauna.

The proposed development has been designed to utilise disturbed and cleared areas of the site. The vast majority of intact vegetation will be retained within designated Environmental Protection Areas and these areas will be managed in accordance the following relevant plans:

- Site Regeneration & Revegetation Plan (JWA 2009a);
- Overview Buffer Management Plan (JWA 2009b); and
- Freshwater Wetland Rehabilitation Plan (JWA 2009c).

These Management Plans will provide further details for the management of native fauna species throughout the relevant habitat areas of the site during the operational phase, including monitoring and maintenance of habitat areas and fauna populations, and should be read in conjunction with this FMP.

### 1.4 Significant species requiring protection

A recent fauna assessment of the Cobaki Lakes site is included in the Ecological Assessment completed in response to the DGEAR's (JWA 2008). Twelve (12) Threatened fauna species have been recorded from the subject site, including:

- Wallum froglet (*Crinia tinnula*) - Vulnerable (TSC Act 1995);
- Black-necked stork (*Xenorhynchus asiaticus*) - Endangered (TSC Act 1995);
- Powerful owl (*Ninox strenua*) - Vulnerable (TSC Act 1995);



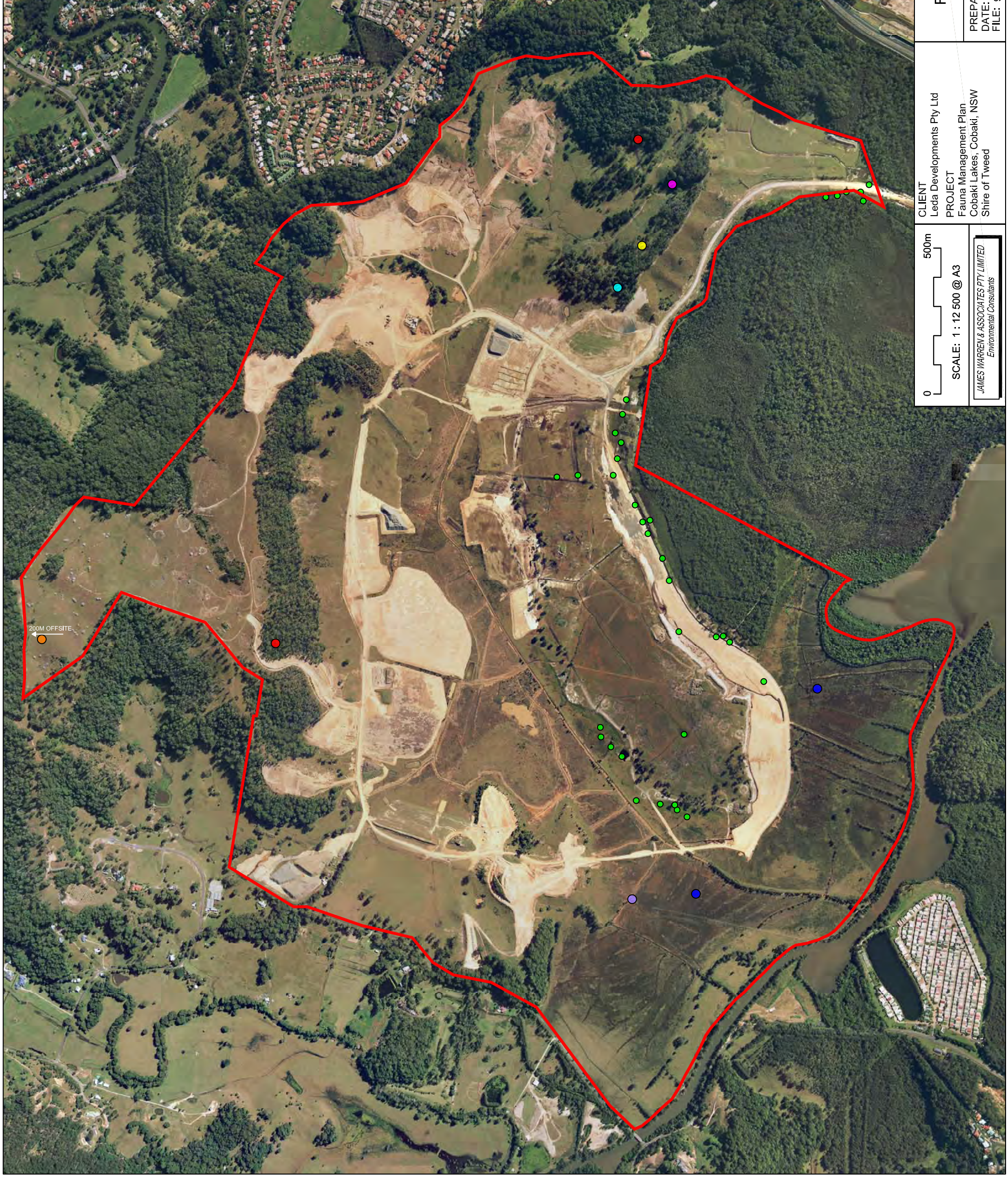
## Fauna Management Plan - Cobaki Lakes

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- Masked owl - (*Tyto novaehollandiae*) - Vulnerable (TSC Act 1995);
- Osprey (*Pandion haliaetus*) - Vulnerable (TSC Act 1995);
- Koala (*Phascolarctos cinereus*) - Vulnerable (TSC Act 1995);
- Grey-headed flying-fox (*Pteropus poliocephalus*) - Vulnerable (EPBC Act 1999);
- Little bent-wing bat (*Miniopterus australis*) - Vulnerable (TSC Act 1995);
- Common bent-wing bat (*Miniopterus schreibersii*) - Vulnerable (TSC Act 1995);
- Eastern free-tail bat (*Mormopterus norfolkensis*) - Vulnerable (TSC Act 1995);
- Yellow-bellied sheath-tail bat (*Saccolaimus flaviventris*) - Vulnerable (TSC Act 1995); and
- Greater broad-nosed bat (*Scoteanax rueppellii*) - Vulnerable (TSC Act 1995).

The locations of Threatened fauna sightings on the subject site are shown in **FIGURE 4**. The potential impacts of the proposed development on Threatened fauna species recorded on the site have been discussed within the Ecological Assessment prepared in response to the DGEAR's (JWA 2008). Amelioration measures to reduce potential impacts on Threatened Fauna species were also discussed.





**LEGEND**

- Black-necked stork (*Ephippiorhynchus asiaticus*) ●
- Osprey (*Pandion haliaetus*) - Old Nest ●
- Osprey (*Pandion haliaetus*) - New Nest ●
- Powerful owl (*Ninox strenua*) ●
- Grey-headed flying-fox (*Pteropus poliocephalus*) ●
- Koala (*Phascolarctos cinereus*) ●
- Wallum froglet (*Crinia tinnula*) Locations ●
- Masked owl (*Tyto novaehollandiae*) ●
- Site Outline

SOURCE:  
 Fauna - James Warren & Associates Pty Ltd  
 Aerial - Gasco taken April 2008 (Cobaki\_Lakes.tiff)

0 500m

SCALE: 1 : 12 500 @ A3

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FIGURE 4

PREPARED: BW  
 DATE: 23 October 2009  
 FILE: 97038\_VFMP\_base.dwg

TITLE

LOCATION OF  
 THREATENED  
 FAUNA



## 2 FAUNA MANAGEMENT STRATEGIES - CONSTRUCTION PHASE

### 2.1 Introduction

This section outlines the recommended measures to minimise potential impacts on native fauna species during the construction phase of each stage of the development. Measures to minimise adverse impacts on fauna include:

- Identification of potential fauna habitat trees;
- Demarcation of habitat trees and areas to be retained;
- Identification/assessment of the potential occurrence of significant fauna within habitat vegetation;
- Instructions to site preparation Contractors/Site Managers;
- Spotter-catcher (fauna rescue) measures during site preparation operations; and
- Fauna management prior to, during and following site preparation operations.

Additional recommendations for the use of felled timber, retention of conservation areas and reporting procedures are also proposed. As previously discussed, various Management Plans have been prepared which include management of native fauna species (specifically Threatened species) during the operational phase of the development.

### 2.2 Program of works

The majority of development will occur in disturbed or cleared areas of the site. However, where native vegetation is required to be removed it is recommended that the commencement of site work within each stage of the development takes place in accordance with the following to ensure the most suitable ecological outcome and to ensure that possible impacts on wildlife are minimised:

- Selective clearing shall be employed within the site, whereby smaller non-habitat trees are initially removed followed by the removal of habitat trees at a later time. This provides a disturbance stimulus to move wildlife into areas of retained vegetation; and
- Comprehensive protection measures are detailed in this FMP to ensure that the risk of injury to fauna is minimised and to ensure correct management of significant species.

### 2.3 General Management Actions

- 2.3.1 Prior to the commencement of the selective clearing works, a fauna survey will be completed within the relevant development precincts. The fauna survey program will consist of night-time stag watching and



## Fauna Management Plan - Cobaki Lakes

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pre-dawn spotlighting. The survey methodology will include the following:

- Targeted surveys for arboreal mammals (including Koalas) and nocturnal birds will be completed at pre-dawn of the day before site preparation is to commence. This will include experienced observers spotlighting for a minimum of three (3) hours. Trees in which arboreal mammals and nocturnal birds are sighted shall be flagged with tape. Call playback may be utilised, if required.
- 2.3.2 The sequence and timing of selective clearing work will ensure maximum opportunity for fauna movement away from operational works towards the Environmental Protection Areas and/or corridor networks and adjacent suitable habitat.
- 2.3.3 Prior to the selective clearing operations, habitat trees will be identified. Habitat trees are defined as those trees that provide suitable foraging, refuge and nesting resources for arboreal and avian fauna. These include hollow-bearing trees, trees with fissures and trees with observed nests or dreys. Larger, old growth trees are also considered to be habitat trees as they are likely to provide greater amounts of foraging resources, cover, and a high number of potential hollows. Dead (stag) trees are also regarded as important habitat trees as they provide roosting and nesting resources. Habitat trees will be clearly marked with high visibility flagging tape.
- 2.3.4 Once habitat tree identification has occurred, site preparation is to be completed using a staged approach where the smaller non-habitat trees are removed in the first stage with the larger remaining habitat trees removed after the initial clearing. This staged method provides a disturbance stimulus and provides fauna with time to leave the site thus maximising the chances of fauna survival while reducing the need for human intervention for translocation or rescue purposes.
- 2.3.5 Immediately prior to felling of the identified habitat trees, an appropriately qualified person (i.e. accredited for capture and release) "Spotter \ Catcher" shall be present to inspect the trees and relocate remaining fauna where possible.
- 2.3.6 If any denning or nesting animals are observed within hollow limbs, but cannot be readily removed by an ecologist, it is recommended that, where appropriate, the hollow end of the limb be blocked with porous material and a chainsaw be used to remove the limb. The limb should then be relocated to a suitable place and the hollow end unblocked at an appropriate time of day to minimise fauna predation.
- 2.3.7 Prior to tree removal, an appropriately qualified ecologist should attempt to "flush out" any denning or nesting animals not observed during the initial hollow inspection. This may involve hitting target trees with a sledgehammer or another similar technique.



## Fauna Management Plan - Cobaki Lakes

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- 2.3.8 Following felling, a second inspection of the relevant trees shall be carried out to relocate fauna disturbed by the clearing process or remaining within the felled timber to a suitable location.
- 2.3.9 Where possible, the actual felling of the habitat trees should be conducted in a manner that will maximise the chances of survival for any fauna remaining within the tree hollows. This will involve pushing rather than cutting, and cushioning the tree fall with other felled timber and foliage.
- 2.3.10 Any injured animals shall be immediately removed and taken to an appropriately qualified veterinary surgeon.
- 2.3.11 Intact hollow limbs will be collected for redistribution in the conservation and regeneration areas of the site. Hollow limbs may be stored until appropriate locations within these areas have been identified by a suitably qualified Ecologist. These logs shall be positioned so that a fire hazard is not created.
- 2.3.12 Following completion of the selective clearing stage, capture and release records will be supplied to the Project Manager. A copy of these records, if requested, shall be supplied to Council.
- 2.3.13 No unrestrained dogs shall be permitted on site during construction.
- 2.3.14 Buildings, roads and fences shall be sited and constructed to allow movement of fauna through and within the site. These structures would be constructed in consultation with an Ecologist, where necessary, to determine the most appropriate location and design that maximises the retention of fauna movement through and within the site.
- 2.3.15 Fauna friendly fences (e.g. posts and rails) shall be located at the interface of the development envelope and all areas of retained vegetation. They must be of a form that does not impede fauna movement along areas of retained vegetation, such as a minimum gap of 150 mm below the bottom rail, and not exceeding 1.2 metres in height. Wire mesh type fences (if utilised) must contain a top rail, while strand wire or split rail type fences should have a minimum spacing between wires/rails of 300 mm. Lockable gates shall be provided at all vehicle maintenance access points.
- 2.3.16 Further detail on fauna friendly fence design is shown in **ANNEXURE 1**.

## 2.4 Specific Management Actions

### 2.4.1 Koala (*Phascolarctos cinereus*)

In the event that a Koala is identified in any tree marked for removal, whether habitat or otherwise, that tree is not to be removed until the Koala has dispersed



## Fauna Management Plan - Cobaki Lakes

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from the tree. The tree shall be left overnight to enable the Koala to move away. The tree can only be removed following inspection by an appropriately qualified 'spotter-catcher' to ensure that the Koala has dispersed and that the removal of the tree poses no direct threat to the health or survival of the Koala.

### 2.4.2 Wallum froglet (*Crinia tinnula*)

- 2.4.2.1 The boundaries of the Environmental Protection areas and the wetland rehabilitation area will be identified and demarcated by flagging tape prior to commencement of site works. The boundaries will also be fenced, if necessary, to exclude construction traffic.
- 2.4.2.2 Sediment fencing will be erected around the Environmental Protection areas and wetland rehabilitation area prior to adjacent clearing works.
- 2.4.2.3 Exclusion fences will be retained until selective clearing works are completed.
- 2.4.2.4 Signage is to be erected on exclusion fencing stating: "No Entry - Environmental Protection Area" or "No Entry - Wetland Rehabilitation Area" as appropriate.

### 2.4.3 Black-necked stork (*Xenorhynchus asiaticus*)

- 2.4.3.1 The boundaries of the Environmental Protection areas and the wetland rehabilitation area will be identified and demarcated by flagging tape prior to commencement of site works. The boundaries will also be fenced, if necessary, to exclude construction traffic.
- 2.4.3.2 Sediment fencing will be erected around the Environmental Protection areas and wetland rehabilitation area prior to adjacent clearing works.
- 2.4.3.3 Exclusion fences will be retained until selective clearing works are completed.
- 2.4.3.4 2.4.2.4 Signage is to be erected on exclusion fencing stating: "No Entry - Environmental Protection Area" or "No Entry - Wetland Rehabilitation Area" as appropriate.

### 2.4.4 Powerful owl (*Ninox strenua*)

In the event that a Powerful owl is identified in any tree marked for removal, whether habitat or otherwise, that tree is not to be removed until the owl has dispersed from the tree. The tree shall be left overnight to enable the owl to move away. The tree can only be removed following inspection by an appropriately qualified 'spotter-catcher' to ensure that the owl has dispersed and that the removal of the tree poses no direct threat to the health or survival of the owl.



## Fauna Management Plan - Cobaki Lakes

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### 2.4.5 Masked owl - (*Tyto novaehollandiae*)

In the event that a Masked owl is identified in any tree marked for removal, whether habitat or otherwise, that tree is not to be removed until the owl has dispersed from the tree. The tree shall be left overnight to enable the owl to move away. The tree can only be removed following inspection by an appropriately qualified 'spotter-catcher' to ensure that the owl has dispersed and that the removal of the tree poses no direct threat to the health or survival of the owl.

### 2.4.6 Osprey (*Pandion haliaetus*)

2.4.6.1 An osprey nest has been identified in the south-eastern portion of the subject site (**FIGURE 4**). This nest occurs within an area designated as Open Space and will not be affected by the proposed development.

2.4.6.2 No works will be allowed within 100m of this nest site.

### 2.4.7 Grey-headed flying-fox (*Pteropus poliocephalus*)

No flying-fox roosting camps have been identified on or adjacent to the subject site. Clearing works on the subject site are not likely to affect this species.

### 2.4.8 Microchiropteran bats

2.4.8.1 In the event that a Little bent-wing bat, Common bent-wing bat, Eastern free-tail bat, Yellow-bellied sheath-tail bat or Greater broad-nosed bat is located within felled timber, the bat will be captured and relocated to a suitable location. The bat will be released at dusk to prevent undue stress or predation.

2.4.8.2 If a bat is located within a hollow limb, but cannot be readily removed by an ecologist, it is recommended that, where appropriate, the hollow end of the limb be blocked with porous material and a chainsaw be used to remove the limb. The limb should then be relocated to a suitable place and the hollow end unblocked at an appropriate time of day to minimise fauna predation.



### 3 FAUNA MANAGEMENT STRATEGIES - OPERATIONAL PHASE

#### 3.1 Introduction

This section outlines the recommended measures to minimise potential impacts on native fauna species during the operational phase of each stage of the development. Measures to minimise adverse impacts on fauna include:

- Pest species management;
- Management of retained habitat areas;

#### 3.2 Pest Species Management

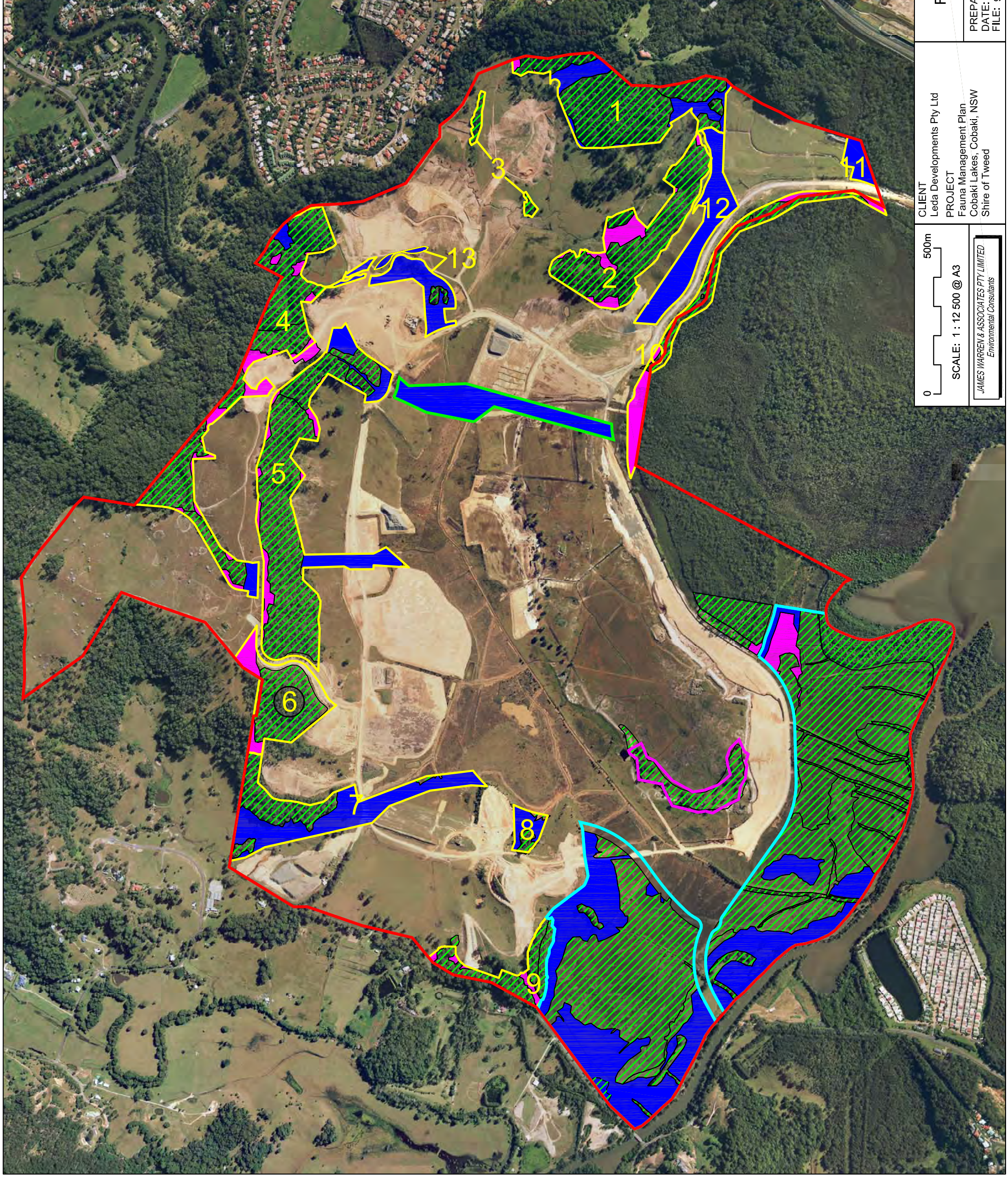
- 3.1 Pest animal control measures, where necessary shall be completed using suitable and appropriate strategies as employed elsewhere within the Council area.
- 3.2 Unrestrained dogs shall not be allowed on the site during construction.
- 3.3 All stormwater treatment and sediment control devices shall be designed and managed so they do not create breeding habitat for mosquitoes and cane toads (e.g. ponds of standing water). Refer to the approved Stormwater Management Plan.
- 3.4 Construction activities shall be carried out in such a way so as to prevent the creation of ponded or standing water, which would result in breeding habitat for mosquitoes and cane toads.
- 3.5 In the event that monitoring surveys reveal an increase in pest species on the subject site, recommendations will be made for appropriate control measures.

#### 3.3 Habitat management

This FMP has been prepared ensure the detection of habitat features and protection of native fauna species and their habitats during the construction phase of the development.

A number of Management Plans have been prepared for the Cobaki Lakes development that provide for the management of native fauna species throughout the relevant habitat areas of the site during the operational phase:

- Regeneration & Revegetation Plans. A Site Regeneration & Revegetation Plan has been prepared for the Cobaki Lakes development (JWA 2009a). The proposed conservation areas on the subject site have been divided into thirteen (13) rehabilitation/management precincts (FIGURE 5). Detailed regeneration and revegetation plans are to be completed for each of the precincts at the Operational Works stage.



**LEGEND**

- Proposed Revegetation Areas
- Proposed Natural Regeneration Areas
- Retained Vegetation
- Rehabilitation & Management Precincts
- Proposed Development Areas
- Proposed Open Space
- Areas with Existing Subdivision Consents & Earthworks Approvals
- Freshwater Wetland Management Area (Note 1)
- Scribbly Gum Management Area Boundary
- Salt Marsh Rehabilitation Area Boundary
- Site Outline

Note 1: Refer to Freshwater Wetland Rehabilitation Plan.

SOURCE:  
 Regen/Reveg - James Warren & Associates Pty Ltd  
 Layout - Design Forum Pty Ltd  
 (Ref: 01.01 Concept Plan Z.dwg)  
 Aerial - Gasco taken April 2008 (Cobaki\_Lakes.tiff)

TITLE  
**REHABILITATION & MANAGEMENT PRECINCTS**

**FIGURE 5**

PREPARED: BW  
 DATE: 23 October 2009  
 FILE: 97038\_VFMP\_base.dwg

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0 500m





## Fauna Management Plan - Cobaki Lakes

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- Buffer Management Plans (BMP's). An Overview Buffer Management Plan has been prepared for the Cobaki Lakes development (JWA 2009b) and includes the principles and management procedures that will be fundamental in future detailed BMP's prepared for all relevant stages of the proposed development.
- Freshwater Wetland Rehabilitation Plan. The proposed development will remove areas that provide forage habitat for the Wallum froglet - a species listed as Vulnerable within schedules of the *Threatened Species Conservation Act 1995*. No 'core' habitat will be removed. The majority of Wallum froglet habitat to be removed is comprised of exotic grassland which provides some forage opportunities during wet weather. The creation of a more suitable 'core' habitat area, linked to adjacent SEPP 14 wetlands via a vegetated corridor, will benefit the local population (FIGURE 6). Furthermore, an off-site offset for the removal of Wallum froglet forage habitat will be completed in agreement with DECC.

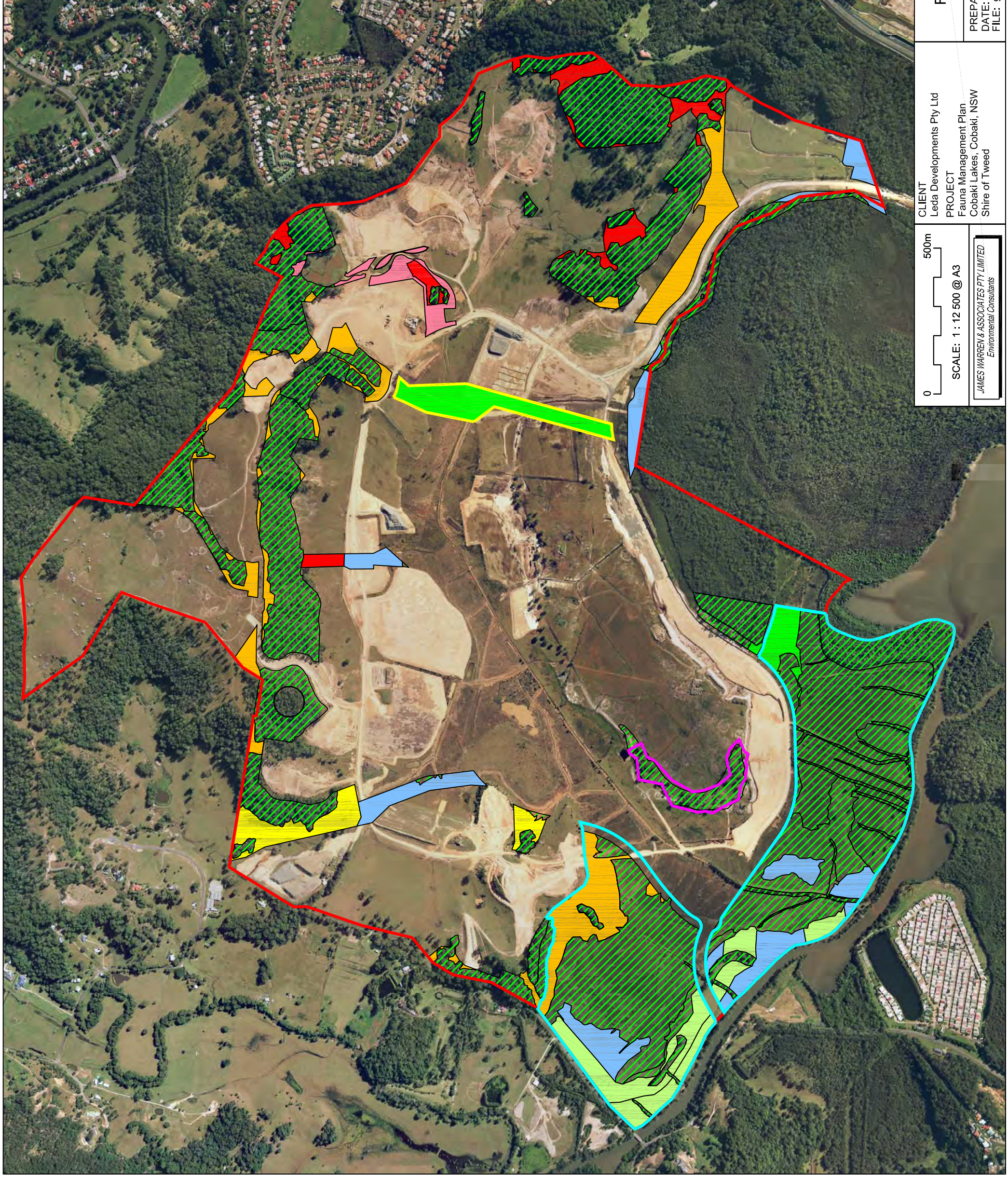
Additional management measures for native fauna species include:

- Nest boxes in retained vegetation shall be inspected for colonisation by exotic bees (*Apis mellifera*) and maintained on an annual basis. If colonisation by bees has occurred, the nest box shall be removed and replaced. Inspections for bees shall occur in winter to avoid disturbance to breeding animals. Nest boxes within the retained vegetation areas shall be maintained by the landholder or other designated person/body/agency.
- Design and construction of fauna crossing structures to allow fauna movement through retained and rehabilitated corridors. Locations requiring fauna crossing treatments are identified in FIGURE 7.
- Completion of regular fauna surveys to ensure fauna species continue to utilise the retained habitat area after development has occurred.

### 3.4 Specific Management Actions

#### 3.4.1 Koala (*Phascolarctos cinereus*)

- 4.4.1.1 Koala habitat will be retained and protected within Environmental Protection and Open Space areas throughout the subject site (FIGURE 8). Additional areas will be enhanced to facilitate Koala movement through the site in accordance with the Site Regeneration & Rehabilitation Plan (JWA 2009a).
- 2.4.1.3 Where appropriate, additional Koala food trees (e.g. Eucalypts and allies) shall be planted as part of the landscaping practices throughout the development site.



**LEGEND**

**ENDANGERED ECOLOGICAL COMMUNITIES (EEC) OFFSET AREAS**

- Lowland Rainforest
- Lowland Rainforest on Floodplain
- Swamp Sclerophyll Forest on Floodplain
- Freshwater Wetland
- Saltmarsh
- Freshwater Wetland / Swamp Sclerophyll Forest on Floodplain
- Swamp Sheoak Floodplain Forest / Saltmarsh
- OTHER**
- Wet Sclerophyll Forest
- Retained Vegetation
- Freshwater Wetland Management Area (Note1)
- Salt Marsh Rehabilitation Area Boundary
- Site Outline

Note 1: Refer to Freshwater Wetland Rehabilitation Plan.

SOURCE:  
 EEC's - James Warren & Associates Pty Ltd  
 Road - BradLees Consulting  
 Aerial - Gasco taken April 2008 (Cobaki\_Lakes.tiff)

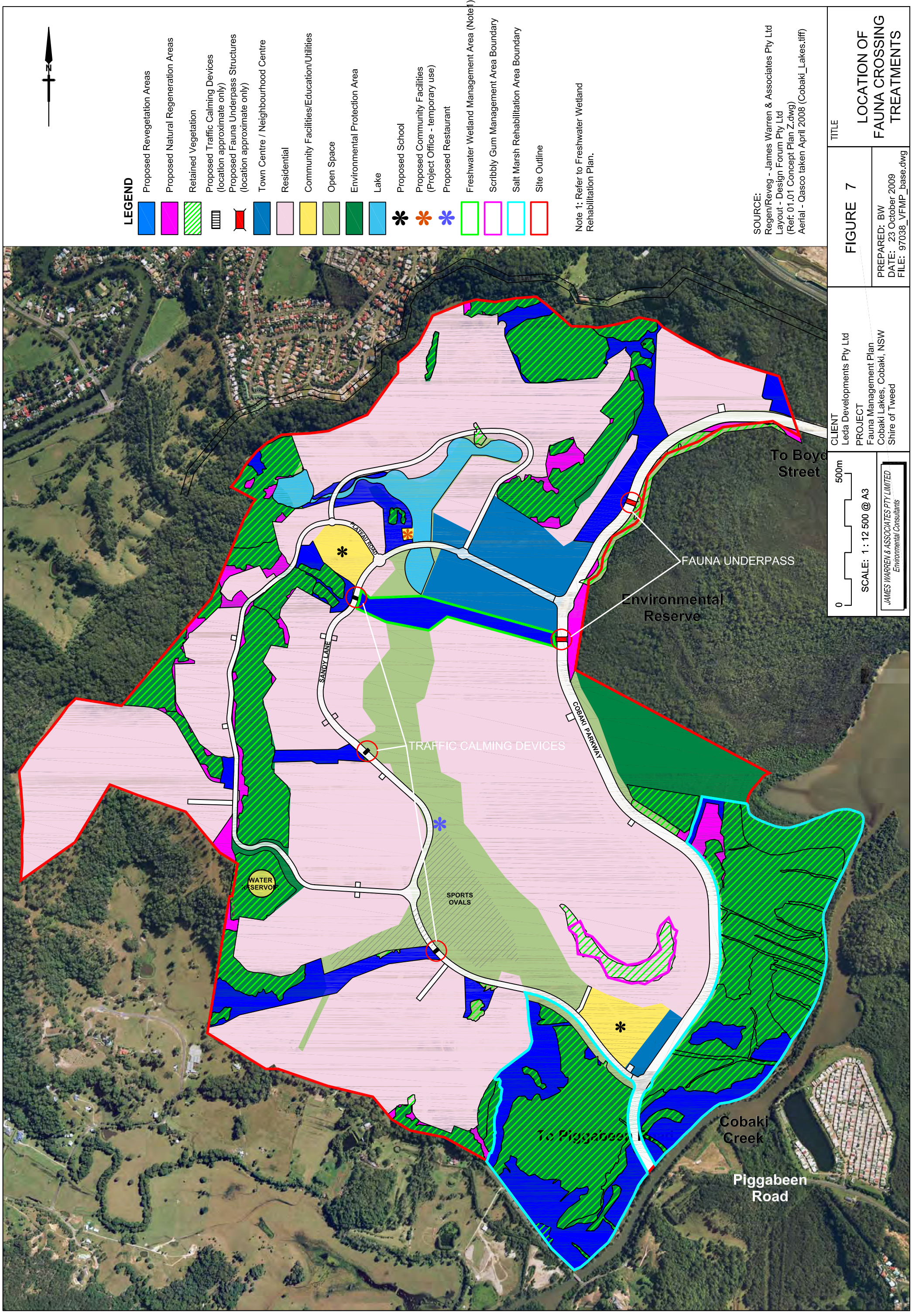
|  |                        |
|--|------------------------|
| <b>FIGURE 6</b>  | <b>EEC<br/>OFFSETS</b> |
| PREPARED: BW<br>DATE: 23 October 2009<br>FILE: 97038_VFMP_base.dwg |                        |

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0 500m

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**LEGEND**

- Proposed Revegetation Areas
- Proposed Natural Regeneration Areas
- Retained Vegetation
- Proposed Traffic Calming Devices (location approximate only)
- Proposed Fauna Underpass Structures (location approximate only)
- Town Centre / Neighbourhood Centre
- Residential
- Community Facilities/Education/Utilities
- Open Space
- Environmental Protection Area
- Lake
- Proposed School
- Proposed Community Facilities (Project Office - temporary use)
- Proposed Restaurant
- Freshwater Wetland Management Area (Note 1)
- Scribbly Gum Management Area Boundary
- Salt Marsh Rehabilitation Area Boundary
- Site Outline

Note 1: Refer to Freshwater Wetland Rehabilitation Plan.

SOURCE:  
 Regen/Reveg - James Warren & Associates Pty Ltd  
 Layout - Design Forum Pty Ltd  
 (Ref: 01.01 Concept Plan Z.dwg)  
 Aerial - Gasco taken April 2008 (Cobaki\_Lakes.tiff)

|  |  |              |
|--|--|--------------|
| <b>FIGURE 7</b>  |  | <b>TITLE</b> |
| <b>LOCATION OF FAUNA CROSSING TREATMENTS</b>                       |  |              |
| PREPARED: BW<br>DATE: 23 October 2009<br>FILE: 97038_VFMP_base.dwg |  |              |

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|  |  |
|--|--|
| SCALE: 1 : 12 500 @ A3<br>JAMES WARREN & ASSOCIATES PTY LIMITED<br>Environmental Consultants | 0 500m<br>To Boyd Street<br>FAUNA UNDERPASS<br>Environmental Reserve<br>TRAFFIC-CALMING DEVICES<br>SANDY LANE<br>WATER RESERVOIR<br>SPORTS OVALS<br>COBAKI PARKWAY<br>To Piggabeen<br>Cobaki Creek<br>Piggabeen Road |
|--|--|



**LEGEND**

- Town Centre / Neighbourhood Centre
- Residential
- Community Facilities/Education/Utilities
- Open Space
- Environmental Protection Area
- Lake
- Proposed School
- Proposed Community Facilities (Project Office - temporary use)
- Proposed Restaurant
- Site Outline

SOURCE:  
Layout - Design Forum Pty Ltd  
(Ref: 01.01 Concept Plan Z.dwg)

**DRAFT**

TITLE

**FIGURE 8**

**PROPOSED  
CONCEPT  
PLAN**

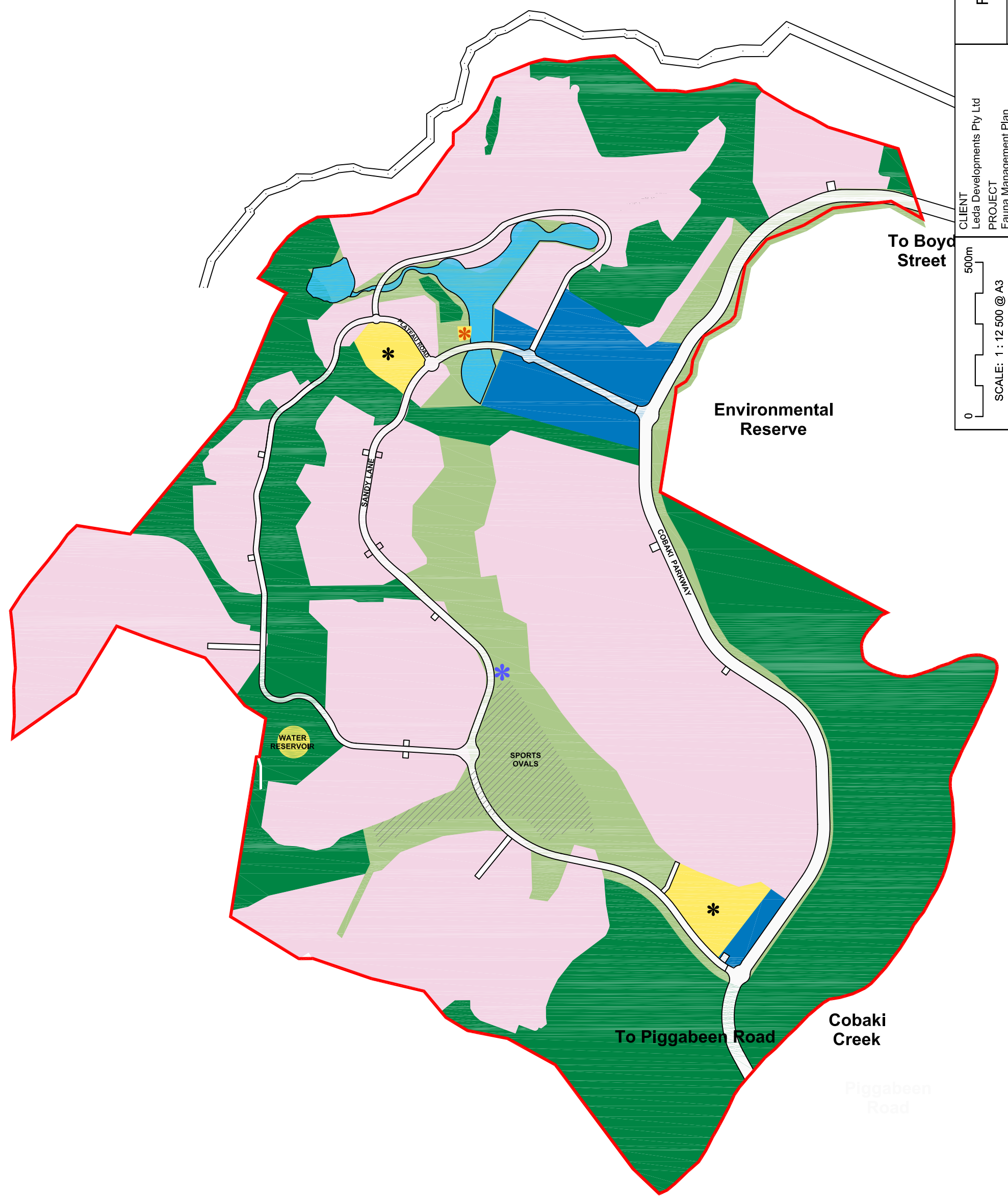
PREPARED: BW  
DATE: 20 October 2009  
FILE: 97038\_VFMP\_base.dwg

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0 500m

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#### 3.4.2 Wallum froglet (*Crinia tinnula*)

Habitat for the Wallum froglet is proposed to be retained within Environmental Protection and Open Space areas throughout the site (FIGURE 8). An area of freshwater wetland will also be rehabilitated in accordance with the Freshwater Wetland Rehabilitation Plan (JWA 2009c) in order to provide additional habitat for this species (FIGURE 6).

Furthermore, an off-site offset for the removal of Wallum froglet forage habitat will be completed in agreement with DECC.

#### 3.4.3 Black-necked stork (*Xenorhynchus asiaticus*)

Habitat for the Black-necked stork is proposed to be retained within Environmental Protection and Open Space areas throughout the site (FIGURE 8). Furthermore, an area of freshwater wetland will be rehabilitated in accordance with the Freshwater Wetland Rehabilitation Plan (JWA 2009c) and will provide additional habitat for this species.

#### 3.4.4 Powerful owl (*Ninox strenua*)

3.4.4.1 Habitat for the Powerful owl will be retained and protected within Environmental Protection and Open Space areas throughout the subject site (FIGURE 8). Additional areas will be enhanced to facilitate fauna movement through the site, and the provide forage resources, in accordance with the Site Regeneration & Rehabilitation Plan (JWA 2009a).

3.4.4.2 Where appropriate, large nest-boxes should be installed within retained vegetation that are suitable for use by the Powerful owl.

#### 3.4.5 Masked owl - (*Tyto novaehollandiae*)

3.4.5.1 Habitat for the Masked owl will be retained and protected within Environmental Protection and Open Space areas throughout the subject site (FIGURE 8). Additional areas will be enhanced to facilitate fauna movement through the site, and the provide forage resources, in accordance with the Site Regeneration & Rehabilitation Plan (JWA 2009a).

3.4.5.2 Where appropriate, large nest-boxes should be installed within retained vegetation that are suitable for use by the Masked owl.

#### 3.4.6 Osprey (*Pandion haliaetus*)

The Osprey nest in the south-eastern portion of the site occurs on a telegraph pole and has recently shown signs of deterioration. It is considered that this nest site



## Fauna Management Plan - Cobaki Lakes

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will not be suitable for use in the long-term. The developer is therefore committed to erecting at least two (2) artificial nesting platforms on the site (FIGURE 9). It is well known that these platforms are highly successful.

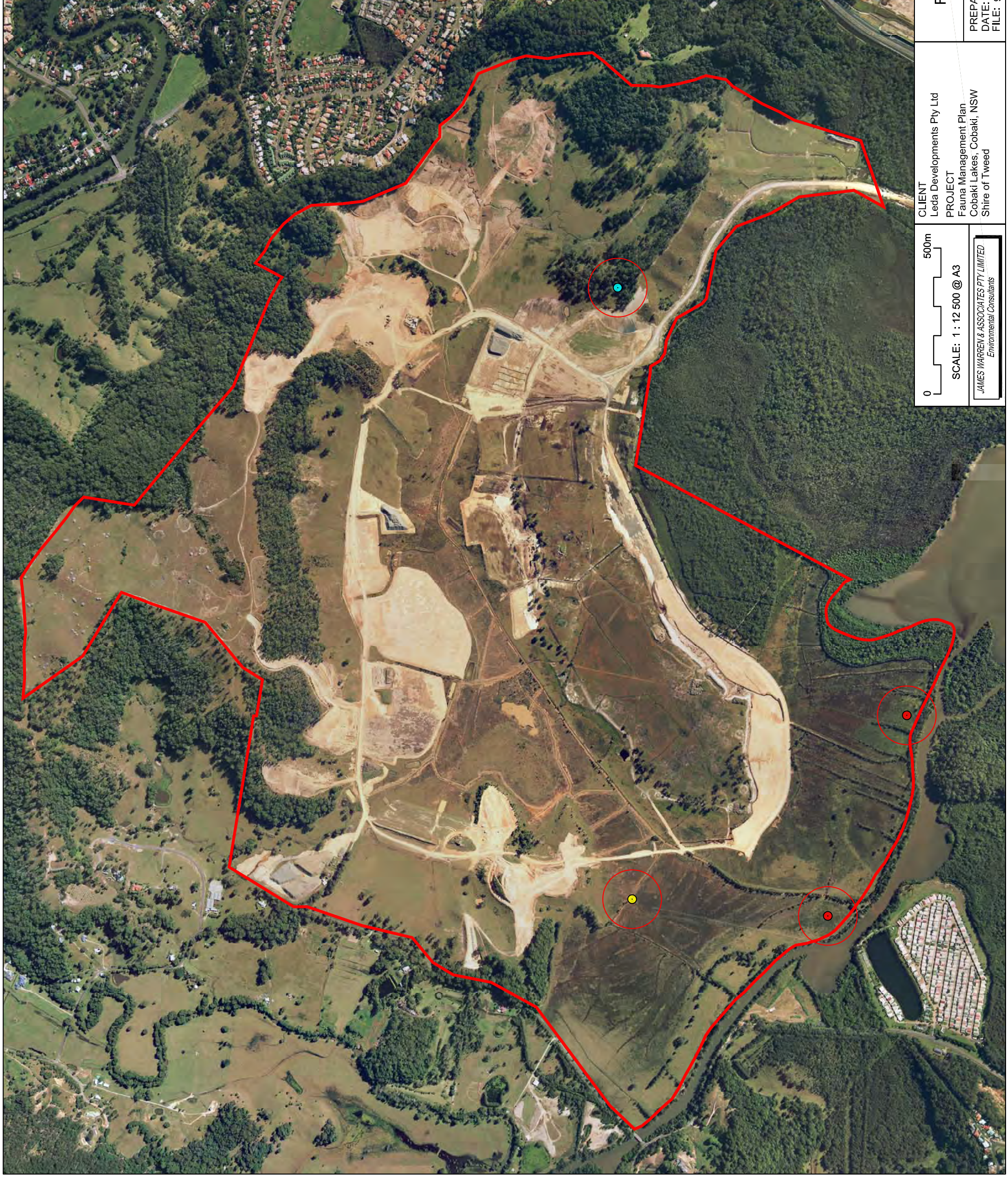
### 3.4.7 Grey-headed flying-fox (*Pteropus poliocephalus*)

3.4.7.1 Forage habitat for the Grey-headed flying-fox will be retained and protected within Environmental Protection and Open Space areas throughout the subject site (FIGURE 8). Additional areas will be enhanced to facilitate fauna movement through the site, and the provide forage resources, in accordance with the Site Regeneration & Rehabilitation Plan (JWA 2009a).

3.4.7.2 Where appropriate, flowering and fruiting trees and shrubs (e.g. Eucalypts and allies, Figs etc.) shall be planted as part of the landscaping practices throughout the development site.

### 3.4.8 Microchiropteran bats

Where appropriate, nest-boxes should be installed within retained vegetation that are suitable for use by microchiropteran bat species.



**LEGEND**

- Osprey (*Pandion haliaetus*) - Old Nest  
(Nest tree has recently collapsed) ●
- Osprey (*Pandion haliaetus*) - New Nest  
(Nest no longer present) ●
- Proposed Nesting Platforms ●
- 100m Buffer
- Site Outline

SOURCE:  
 Osprey Nests - James Warren & Associates Pty Ltd  
 Aerial - Qasco taken April 2008 (Cobaki\_Lakes.tiff)

0 500m

SCALE: 1 : 12 500 @ A3

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**FIGURE 9**

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TITLE

**OSPREY  
 NESTS**



## 4 MONITORING & REPORTING

### 4.1 Introduction

The objectives of this management program are to ensure the protection of native fauna species and areas of retained habitat during both the construction phase and operational phase of the development.

This section provides details of monitoring programs and specific performance criteria against which success may be measured.

### 4.2 Performance Indicators

The following performance criteria are to be used to determine the success of this management program:

- The risk (of injury and death) to fauna is managed and minimised during site clearing works;
- Retained habitat is not compromised by site clearing works, gross mechanical disturbance or impacts associated with sedimentation and/or pollutant export from the development area; and
- the suite of native fauna species currently occupying the subject site continue to do so after completion of construction works.

### 4.3 Fauna surveys

An annual fauna survey will be completed within Environmental Protection Areas (EPA's) at the subject site until development is complete, or until each EPA is dedicated to the relevant local or state government agency. A baseline survey will be completed within each EPA prior to commencement of construction to determine species presence. The fauna surveys will include the following methodology (where appropriate):

- Elliott trapping;
- Cage trapping;
- Pitfall trapping;
- Arboreal Elliott trapping;
- Spotlighting/stag watching;
- Call playback;
- Dawn & dusk bird surveys;
- Hair tubes; and
- Active searching.

### 4.4 Reporting

A report will be prepared after each annual fauna survey and will include the following:





## Fauna Management Plan - Cobaki Lakes

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- Results of the fauna survey;
- A comparison of results with previous years;
- Discussion regarding the absence of previous species/occurrence of new species;
- Any habitat maintenance recommendations (i.e. additional nest boxes etc.);
- Discussion regarding the occurrence of any pest species; and
- Recommendations for controlling pest species (if required).



## REFERENCES

James Warren & Associates (2008). Response to the Director General's Environmental Assessment Requirements COBAKI LAKES VOLUME 1 - Ecological Assessment. A Report to Leda Manorstead Pty Ltd

JWA (2009a). Site Regeneration & Revegetation Plan. Cobaki Lakes - Preferred Project Report. A Report to Leda Manorstead Pty Ltd

JWA (2009b). Overview Buffer Management Plan. Cobaki Lakes - Preferred Project Report. A Report to Leda Manorstead Pty Ltd

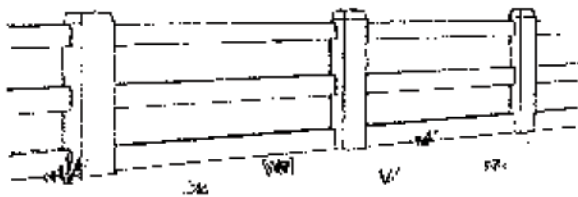
JWA (2009c). Freshwater Wetland Rehabilitation Plan. Cobaki Lakes - Preferred Project Report. A Report to Leda Manorstead Pty Ltd



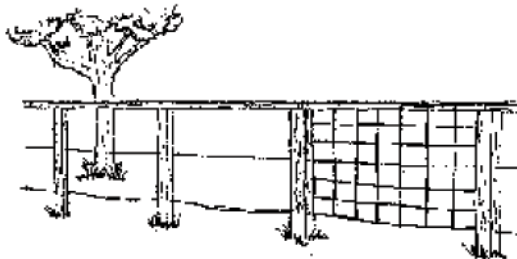
## ANNEXURE 1 - INDICATIVE FAUNA FRIENDLY FENCE DESIGN

**Ideally a Fauna Friendly Fence should have either:**

1. A 50cm gap between ground level and the first rail or strand. Spacing above this level is at the owner's discretion.
2. A series of 30cm gaps between the rails or strands (the first gap should be no higher than 15cm above ground level).



3. A 15cm gap between ground level and the first rail or strand followed by a series of 30cm gaps.
4. Box wire mesh (squares of no less than 15cm) may be used provided that there is a 15cm gap between the ground level and the mesh, and provided the fence is not more than 1.2m in height. A capping rail along the top allows for easy movement.



**Note:** Rails should not be in excess of 15cm wide. Wire strands should not be too tightly strung.

### Fencing materials

When choosing your fencing materials, consider the environment in which it will be situated. The character of an area, whether it is of a rural, bush or park nature, attracts residents to live within its boundaries and as such should be taken into account when designing fences.

Wood, brick, metals and wire can be combined in a variety of designs to create an effective and unique fence while maintaining the character of the area. Slight variations in the materials and design of these fences can create an individual look for your property.

**Barbed wire and electric fences of any description are definitely NOT fauna friendly!**

Fauna Friendly Fence Design Guidelines: Source Redland Shire Council Fact Sheet: Fauna Friendly Fencing.