

LEGEND

- Marblewood (*Acacia bakeri*)
- Fine-leaved tuckeroo (*Lepiderema pulchella*)
- Spiny gardenia (*Randia moorei*)
- Y'iel yiel (*Grevillea hilliana*)
- Coolamon (*Syzygium moorei*)
- Brush cassia (*Cassia brewsteri* var. *marksiana*)
- Scented acronychia (*Acronychia littoralis*)
- Green-leaved rose walnut (*Endiandra muelleri* subsp. *bracteata*)
- Site Outline

SOURCE:
 Flora - James Warren & Associates Pty Ltd
 June/July 2004, July 2006, July/Sept 2007 & Feb 2008
 Aerial - Gasco taken April 2008 (Cobaki_Lakes.tiff)

TITLE	
FIGURE 11B	LOCATION OF THREATENED FLORA
PREPARED: BW DATE: 19 October 2009 FILE: 97038_BMP_Base.dwg	

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

0 50m 100m
 SCALE: 1 : 4000 @ A3
 JAMES WARREN & ASSOCIATES PTY LIMITED
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Overview Buffer Management Plan - Cobaki Lakes PPR

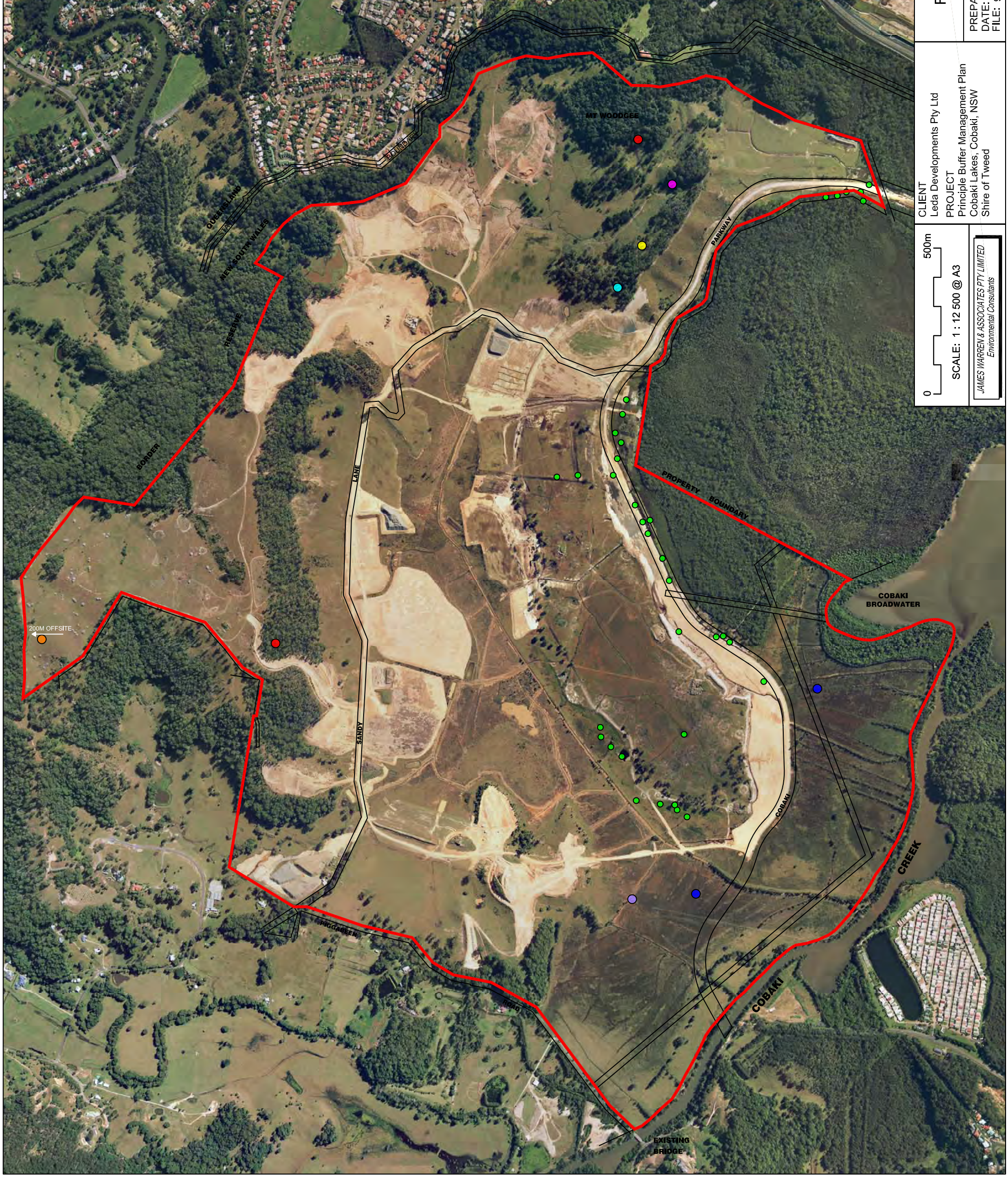
- Fine-leaved tuckeroo (*Lepiderema pulchella*) - Vulnerable (TSC Act);
- Spiny gardenia (*Randia moorei*) - Endangered (TSC Act & EPBC Act);
- Marblewood (*Acacia bakeri*) - Vulnerable (TSC Act);
- Brush cassia (*Cassia brewsteri* var. *marksiana*) - Endangered (TSC Act);
- Coolamon (*Syzygium moorei*) - Vulnerable (TSC Act & EPBC Act); and
- Green-leaved rose walnut (*Endiandra muelleri* subsp. *bracteata*) - Endangered (TSC Act).

3.5.2 Fauna

Twelve (12) Threatened³ fauna species have been recorded from the subject site (JWA 2008) (FIGURE 12). These species are as follows:

- Wallum froglet (*Crinia tinnula*) - Vulnerable (TSC Act);
- Black-necked stork (*Xenorhynchus asiaticus*) - Endangered (TSC Act);
- Powerful owl (*Ninox strenua*) - Vulnerable (TSC Act);
- Masked owl - (*Tyto novaehollandiae*) - Vulnerable (TSC Act);
- Osprey (*Pandion haliaetus*) - Vulnerable (TSC Act);
- Koala (*Phascolarctos cinereus*) - Vulnerable (TSC Act);
- Grey-headed flying-fox (*Pteropus poliocephalus*) - Vulnerable (EPBC Act);
- Little bent-wing bat (*Miniopterus australis*) - Vulnerable (TSC Act);
- Common bent-wing bat (*Miniopterus schreibersii*) - Vulnerable (TSC Act);
- Eastern free-tail bat (*Mormopterus norfolkensis*) - Vulnerable (TSC Act);
- Yellow-bellied sheath-tail bat (*Saccolaimus flaviventris*) - Vulnerable (TSC Act); and
- Greater broad-nosed bat (*Scoteanax rueppellii*) - Vulnerable (TSC Act).

³ As listed within schedules of the TSC Act (1995) and EPBC Act (1999).



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 - Qasco taken April 2008 (Cobaki_Lakes.tiff)

FIGURE 12

TITLE
LOCATION OF THREATENED FAUNA SIGHTINGS

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 Cobaki Lakes, Cobaki, NSW
 Shire of Tweed

0 500m

SCALE: 1 : 12 500 @ A3

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4 BUFFER ASSESSMENT

4.1 Introduction

This section provides details of the principles that will guide the completion of future detailed Buffer Management Plans (BMP's). Detailed BMP's will be prepared for all stages of the proposed development, as part of related Development/Project Applications. Descriptions of general management procedures are provided in Section 5.

4.2 Objectives of Buffers at Cobaki Lakes

The overall objectives of the ecological buffers and related provisions at the Cobaki Lakes development site are:

- to protect Threatened flora and fauna species and their habitats, Endangered Ecological Communities, and retained remnant bushland areas; and
- to incorporate stormwater treatment areas, Asset Protection Zones, and environmental restoration and enhancement works, where appropriate.

4.3 Potential Development Impacts

An environmental assessment of the proposed Cobaki Lakes Development Footprint has been completed by JWA (2008). JWA has identified the following potential impacts from the development of the site (JWA 2008):

- Fragmentation and loss of habitat within Wildlife corridors;
- Vegetation and habitat loss within Remnant Bushland;
- Loss of habitat for Threatened flora;
- Loss of Endangered Ecological Communities;
- Loss of habitat for Threatened Fauna;
- Alterations to hydrology, sediment load and general disturbance to SEPP 14 wetlands and the Cobaki Broadwater;
- Introduction of weeds and pest animals; and
- Bushfires.

4.4 Buffer principles

4.4.1 Background

Various development approvals have been obtained over the Cobaki Lakes site since 1994, covering most of the area proposed for development under the current Concept Plan. Considerable disturbance to the site has occurred by way of the implementation of approved bulk earthworks. It is important to note that the original development approvals:



Overview Buffer Management Plan - Cobaki Lakes PPR

- did not provide for any ecological buffers to Environmental Protection Zones; and
- provided for fire trails only, and these were located within the boundaries of the Environmental Protection Zones.

4.4.2 Principles of proposed buffers

A Section 96 amendment to the original development approval (DA K99/1124) provides for the following amendments to the development layout with regards to ecological buffers:

- fire trails are now set outside the Environmental Protection Zones (**FIGURE 13**);
- Generally, ecological buffers to the Environmental Protection Zones, including land covered by DA K99/1124 and the Crown Border Reserve, will coincide with the required Asset Protection Zones (**FIGURE 14**). The bushfire Asset Protection Zones are anticipated to be between 20m and 40m. The edge of the Environmental Protection Zones will be vegetated in accordance with Buffer Management Plans to be approved with respect to each zone of development.
- The road reserve and buffer, adjacent to the proposed Environmental Protection Zone on the eastern side of the Cobaki Parkway, will be no less than 50m in width. Similarly, the road reserve and buffer, along the length of Sandy Lane which abuts the proposed Environmental Protection Zone to south, will also be a width of no less than 50m. In both instances, the minimum 50m strip of land will constitute the ecological buffer to the Environmental land (**FIGURE 13**);
- A vegetated buffer of 5m will be provided to the following areas (**FIGURE 13**):
 - three (3) isolated vegetation remnants (marked 1, 2 & 3 on **FIGURE 13**) in the north of the site. These remnants are proposed to be rezoned for Environmental Protection; and
 - two (2) vegetation remnants (marked 4 & 5 on **FIGURE 13**) in the south of the site. These areas are proposed to be protected by an Environmental Covenant;
- No buffer will be provided to the parcel of land (marked as 6 on **FIGURE 13**) proposed to be protected by an Environmental Covenant;
- No buffer will be provided to the area of Scribbly gums in the south of the site (marked as 7 on **FIGURE 13**). The Scribbly gum community occurs as an isolated patch of vegetation surrounded by large expanses of pasture. An off-site offset is proposed for the eventual removal of Scribbly gums from the Cobaki Lakes site. The Amended Scribbly gum Management Plan (JWA 2009a) provides for the management of this community until such time that the off-site offset has become established to the satisfaction of DECC.



LEGEND

2. RESIDENTIAL

2(c) Urban Expansion

6. OPEN SPACE

6(b) Recreation

7. ENVIRONMENTAL PROTECTION

7(a) Environmental Protection (Wetlands & Littoral Rainforests)

7(d) Environmental Protection (Scenic/Escarpment)

7(i) Environmental Protection (Habitat)

S14 SEPP14 - Coastal Wetlands

(R) Restriction On Use (DP1051024)

Areas with (Amended) DA to be implemented (APZ's / ecological buffers approved)

QLD border reserve

Other vegetated areas

Ecological buffers coincide with APZ

QLD border reserve

Other vegetated areas

Road / reserve as buffer to Environmental Protection zone (minimum 50m)

Buffers to vegetation isolates:

Minimum 5m to Environmental Protection zoned areas

Minimum 5m to covenant protected areas

No buffer to covenant protected area

Scibbly Gum Management Area - No Buffer

Site Outline

SOURCE:
Zoning - Michel Group Services (Ref: 6400-155B.dwg)

TITLE

ECOLOGICAL BUFFERS

FIGURE 13

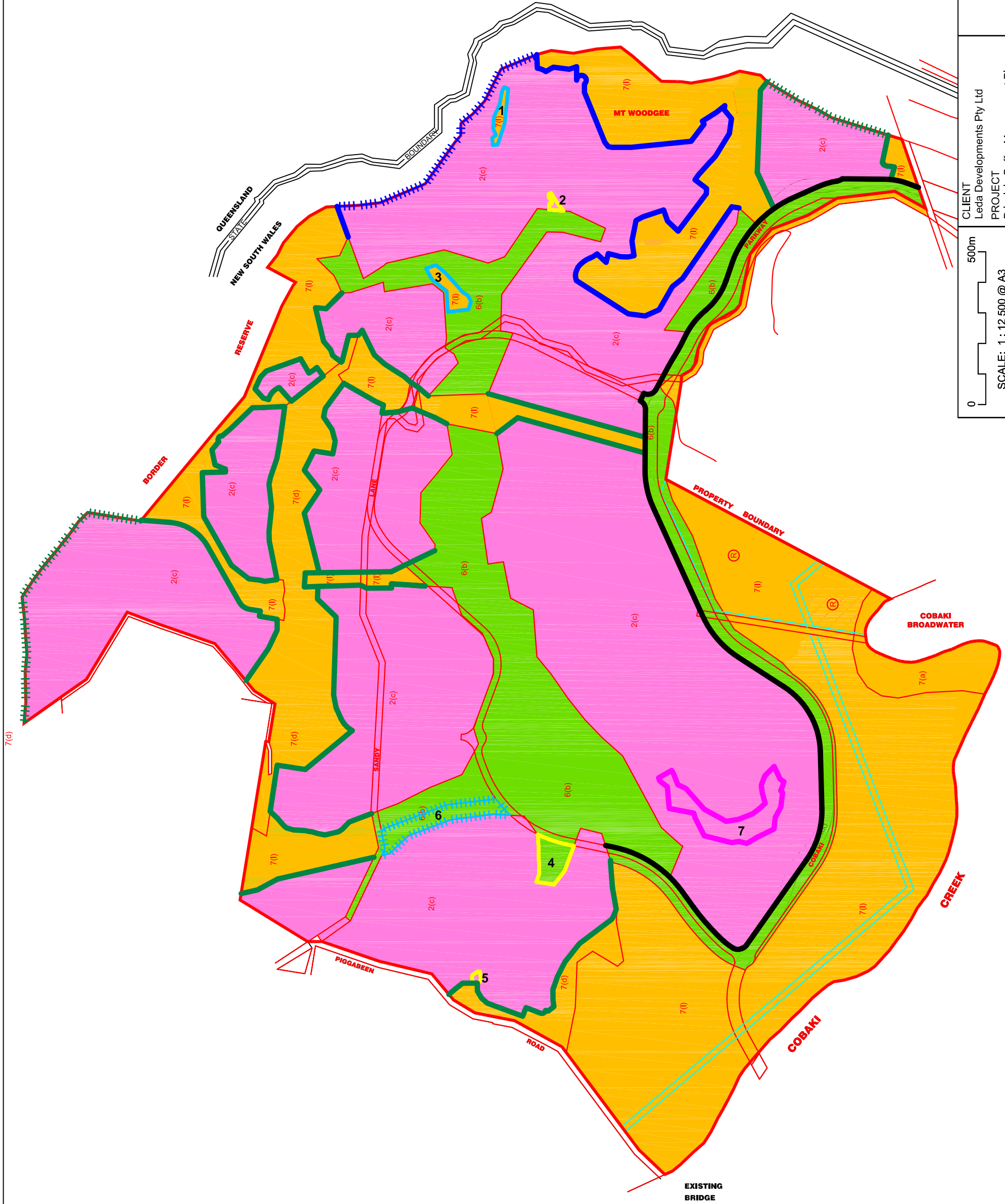
PREPARED: BW
DATE: 19 October 2009
FILE: 97038_BMP_Base.dwg

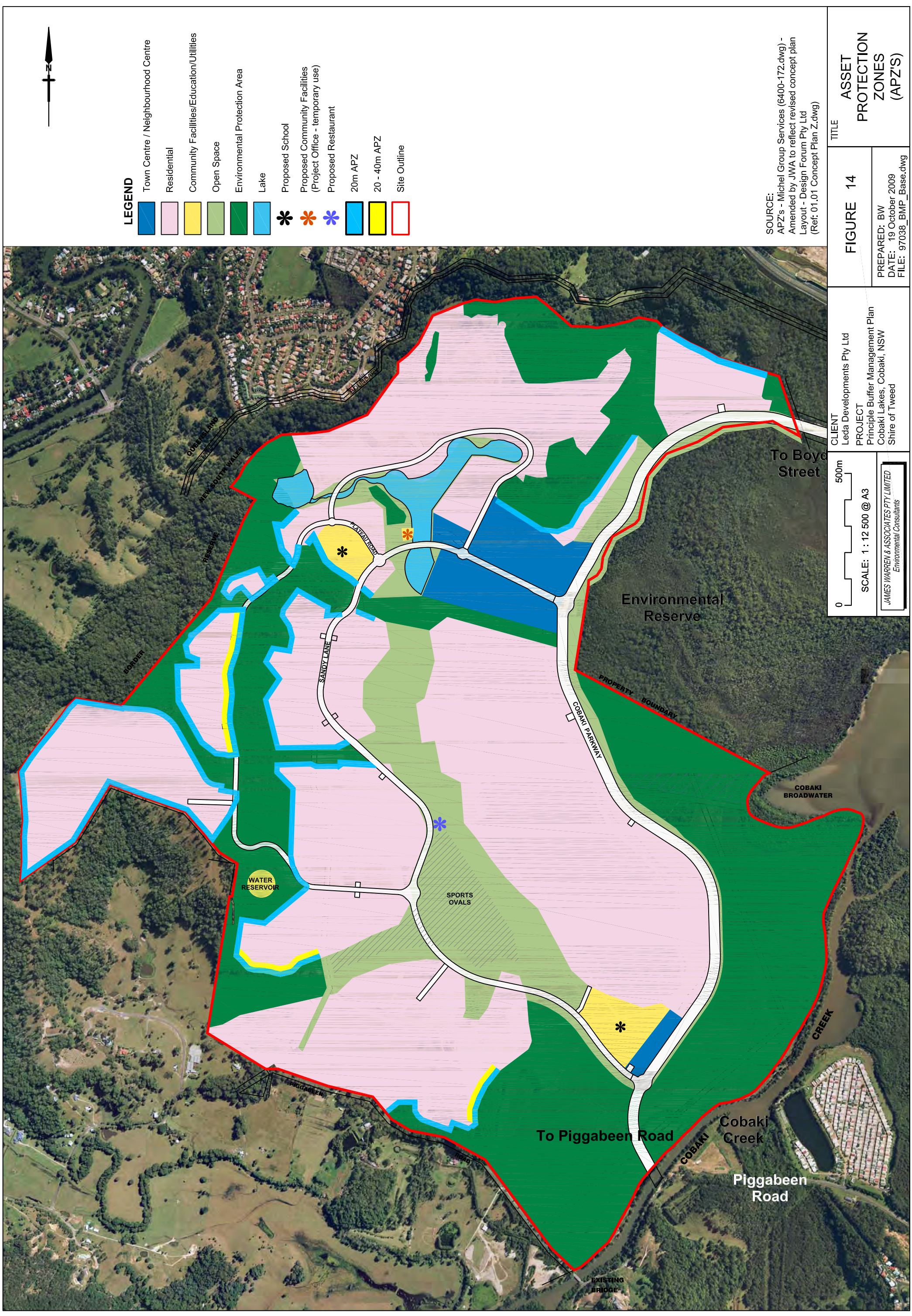
CLIENT
Leda Developments Pty Ltd
PROJECT
Principle Buffer Management Plan
Cobaki Lakes, Cobaki, NSW
Shire of Tweed

0 500m

SCALE: 1 : 12 500 @ A3

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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
- 20m APZ
- 20 - 40m APZ
- Site Outline

SOURCE:
 APZ's - Michel Group Services (6400-172.dwg) -
 Amended by JWA to reflect revised concept plan
 Layout - Design Forum Pty Ltd
 (Ref: 01.01 Concept Plan Z.dwg)

FIGURE 14	ASSET PROTECTION ZONES (APZ'S)
PREPARED: BW DATE: 19 October 2009 FILE: 97038_BMP_Base.dwg	

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 Principle Buffer Management Plan
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 Shire of Tweed

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0 500m

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BORDER

QUEENSLAND STATE RESERVE
 NEW DOTTEN WALKS

SANDY LANE

PLAYERS ROAD

COBAKI PARKWAY

Environmental Reserve

WATER RESERVOIR

SPORTS OVALS

COBAKI BROADWATER

To Piggabeen Road

Cobaki Creek

Piggabeen Road

CREEK

EXISTING BRIDGE



5 GENERAL MANAGEMENT STRATEGIES

5.4 Introduction

Buffer zone management strategies may vary according to the specific ecological conditions of the area being buffered and the particular adjacent development. General management issues for the ecological buffers at Cobaki Lakes are prescribed in this section. Detailed BMP's, which adhere to these principle provisions, will be prepared for each stage of the Cobaki Lakes development.

5.5 Identification of Significant Ecological Values

Endangered Ecological Communities, Threatened flora species and habitat for Threatened fauna species will generally be retained within Environmental Protection Areas. Various offset proposals have been designed to compensate for any loss of EEC's or Threatened species habitat. In some areas EEC's and/or Threatened flora species occur within or immediately adjacent to proposed buffer areas (FIGURES 15, 15a & 15b).

Further detailed assessment of the ecological values of proposed buffer areas will be completed during the preparation of detailed BMP's for each stage of the Cobaki Lakes development. The detailed BMP's will include the following details:

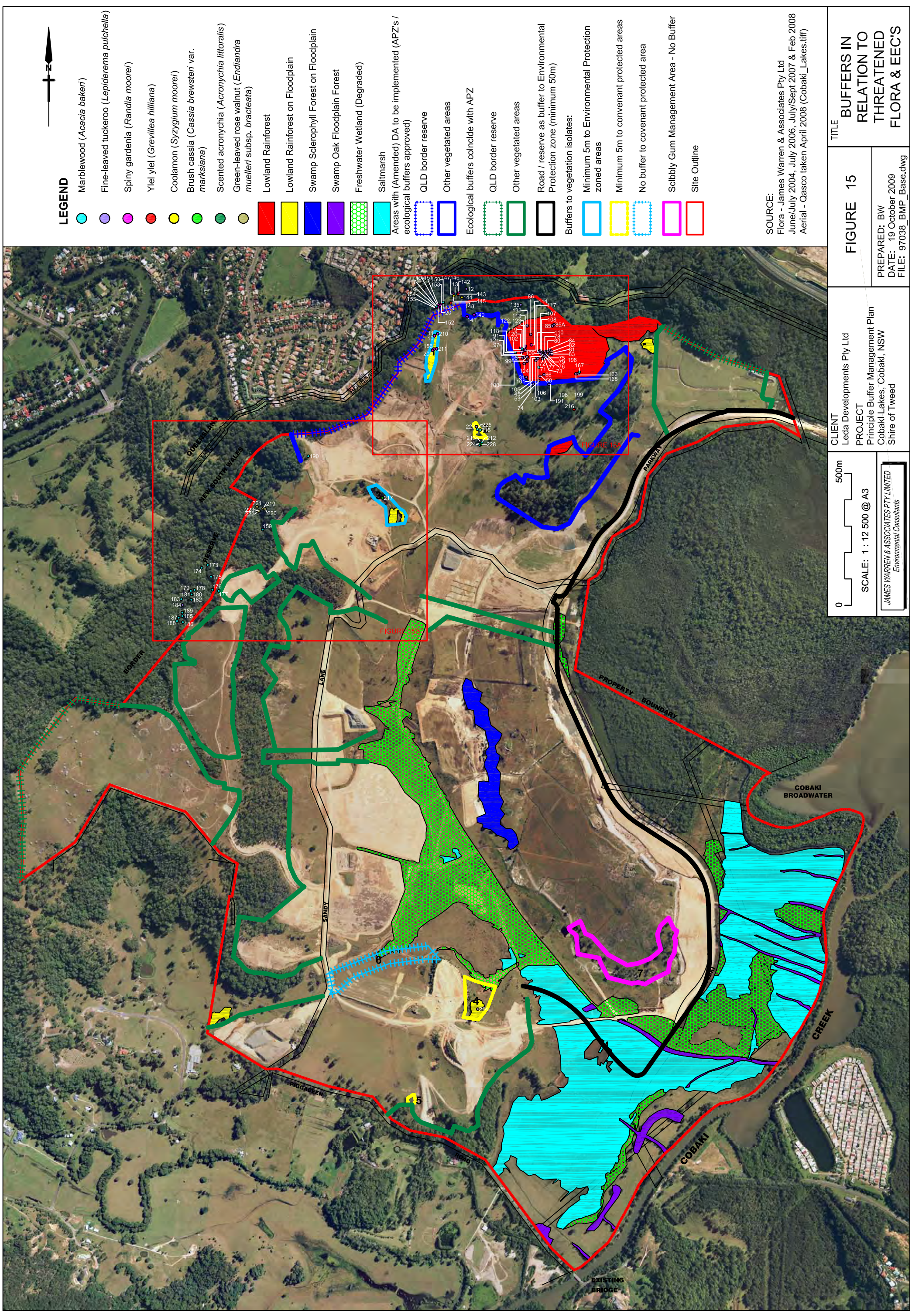
- location and extent of EEC's;
- location of Threatened flora species; and
- location of fauna habitat features.

Measures to retain and protect these significant ecological values will be discussed where necessary and appropriate to bushfire Asset Protection Zone requirements. Amelioration measures for impacts on these features may also be determined on a case by case basis, as well as appropriate rehabilitation and/or revegetation techniques in accordance with the following sections.

A significant vegetation corridor occurs within Crown Reserve 90227 and Part Crown Reserve 755740 to the north and west of the subject site. Where residential development is proposed adjacent to these Crown Reserves ecological buffers will coincide with the required Asset Protection Zones. Future detailed BMP's prepared for these areas will include as assessment of potential impacts from encroachment, weed invasion and uncontrolled access, and will suggest suitable amelioration measures. The inclusion of walking tracks and other appropriate infrastructure will also be considered.

5.6 Rehabilitation Strategies

Buffer areas requiring rehabilitation will be identified in detailed Buffer Management Plans for each area of development. Buffer areas that contain existing native vegetation will, where necessary and appropriate to bushfire Asset Protection Zone requirements, be rehabilitated to enhance the existing natural



LEGEND

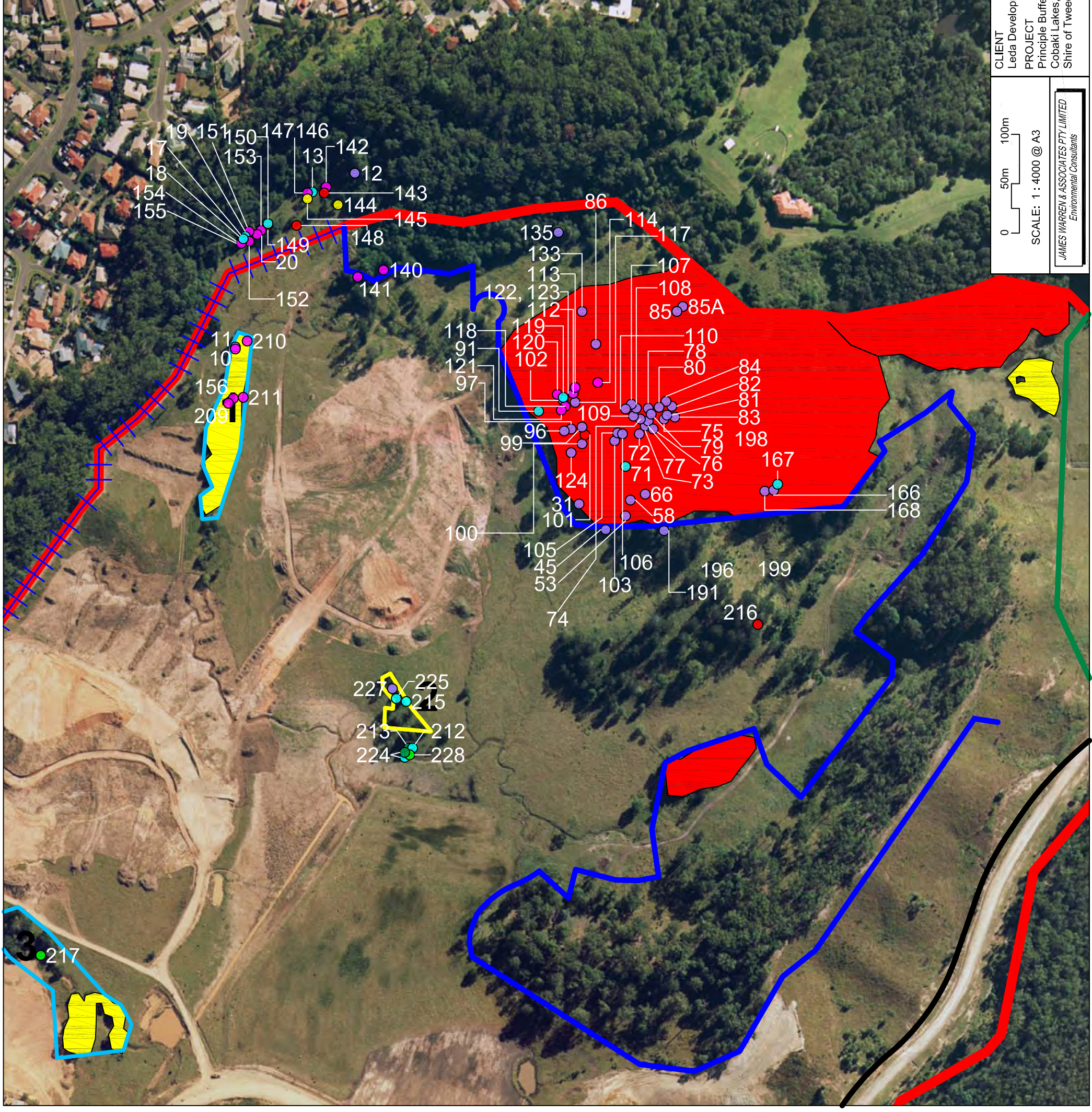
- North
- Marblewood (*Acacia bakeri*)
- Fine-leaved tuckeroo (*Lepiderema pulchella*)
- Spiny gardenia (*Randia moorei*)
- Yiel yiel (*Grevillea hilliana*)
- Coolamon (*Syzygium moorei*)
- Brush cassia (*Cassia brewsteri* var. *marksiana*)
- Scented acronychia (*Acronychia littoralis*)
- Green-leaved rose walnut (*Endiandra muelleri* subsp. *bracteata*)
- Lowland Rainforest
- Lowland Rainforest on Floodplain
- Swamp Sclerophyll Forest on Floodplain
- Swamp Oak Floodplain Forest
- Freshwater Wetland (Degraded)
- Saltmarsh
- Areas with (Amended) DA to be implemented (APZ's / ecological buffers approved)
- QLD border reserve
- Other vegetated areas
- Ecological buffers coincide with APZ
- QLD border reserve
- Other vegetated areas
- Road / reserve as buffer to Environmental Protection zone (minimum 50m)
- Buffers to vegetation isolates:
- Minimum 5m to Environmental Protection zoned areas
- Minimum 5m to covenant protected areas
-
- Scibbly Gum Management Area - No Buffer
- Site Outline

SOURCE:
 Flora - James Warren & Associates Pty Ltd
 June/July 2004, July 2006, July/Sept 2007 & Feb 2008
 Aerial - Gasco taken April 2008 (Cobaki_Lakes.tiff)

FIGURE 15	TITLE BUFFERS IN RELATION TO THREATENED FLORA & EEC'S
PREPARED: BW DATE: 19 October 2009 FILE: 97038_BMP_Base.dwg	

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 Principle Buffer Management Plan
 Cobaki Lakes, Cobaki, NSW
 Shire of Tweed

0 500m
 SCALE: 1 : 12 500 @ A3
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LEGEND

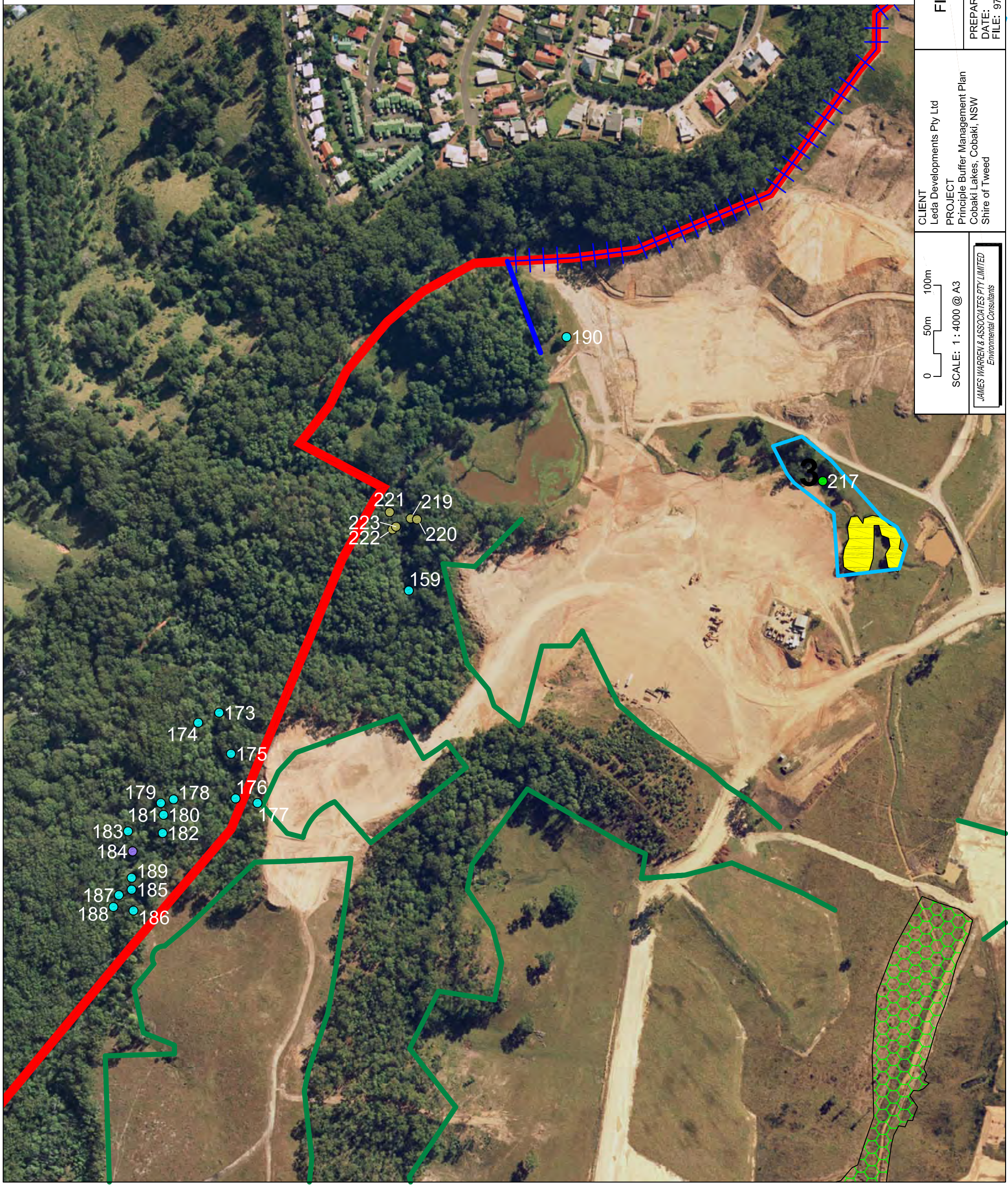
- Marblewood (*Acacia bakeri*)
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- QLD border reserve
- Other vegetated areas
- Ecological buffers coincide with APZ
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- Other vegetated areas
- Road / reserve as buffer to Environmental Protection zone (minimum 50m)
- Buffers to vegetation isolates:
- Minimum 5m to Environmental Protection zoned areas
- Minimum 5m to covenant protected areas
- No buffer to covenant protected area
- Scibbly Gum Management Area - No Buffer
- Site Outline

SOURCE:
 Flora - James Warren & Associates Pty Ltd
 June/July 2004, July 2006, July/Sept 2007 & Feb 2008
 Aerial - Gasco taken April 2008 (Cobaki_Lakes.tiff)

FIGURE 15A	TITLE BUFFERS IN RELATION TO THREATENED FLORA & EEC'S
PREPARED: BW DATE: 19 October 2009 FILE: 97038_BMP_Base.dwg	

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 Principle Buffer Management Plan
 Cobaki Lakes, Cobaki, NSW
 Shire of Tweed

0 50m 100m
 SCALE: 1 : 4000 @ A3
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LEGEND

- Marblewood (*Acacia bakeri*)
- Fine-leaved tuckeroo (*Lepiderema pulchella*)
- Spiny gardenia (*Randia moorei*)
- Yiel yiel (*Grevillea hilliana*)
- Coolamon (*Syzygium moorei*)
- Brush cassia (*Cassia brewsteri* var. *marksiiana*)
- Scented acronychia (*Acronychia littoralis*)
- Green-leaved rose walnut (*Endiandra muelleri* subsp. *bracteata*)
- Lowland Rainforest
- Lowland Rainforest on Floodplain
- Swamp Sclerophyll Forest on Floodplain
- Swamp Oak Floodplain Forest
- Freshwater Wetland (Degraded)
- Saltmarsh
- Areas with (Amended) DA to be implemented (APZ's / ecological buffers approved)
- QLD border reserve
- Other vegetated areas
- Ecological buffers coincide with APZ
- QLD border reserve
- Other vegetated areas
- Road / reserve as buffer to Environmental Protection zone (minimum 50m)
- Buffers to vegetation isolates:
- Minimum 5m to Environmental Protection zoned areas
- Minimum 5m to covenant protected areas
- No buffer to covenant protected area
- Scibbly Gum Management Area - No Buffer
- Site Outline

SOURCE:
 Flora - James Warren & Associates Pty Ltd
 June/July 2004, July 2006, July/Sept 2007 & Feb 2008
 Aerial - Gasco taken April 2008 (Cobaki_Lakes.tiff)

TITLE
**BUFFERS IN
 RELATION TO
 THREATENED
 FLORA & EEC'S**

FIGURE 15B
 PREPARED: BW
 DATE: 19 October 2009
 FILE: 97038_BMP_Base.dwg

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 Principle Buffer Management Plan
 Cobaki Lakes, Cobaki, NSW
 Shire of Tweed

SCALE: 1 : 4000 @ A3

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Overview Buffer Management Plan - Cobaki Lakes PPR

values of the buffer areas through the use of weed removal and revegetation techniques.

Rehabilitation works will generally be focused within the edges of Environmental Protection Zones. A Site Regeneration & Revegetation Plan has been prepared for the Cobaki Lakes site (JWA 2009b). The proposed conservation areas on the subject site have been divided into thirteen (13) rehabilitation/management precincts (FIGURE 16). Individual regeneration and revegetation plans are to be completed for each of the precincts at the Operational Works stage. Any rehabilitation works within buffer zones will be in accordance with the strategies and performance objectives of the relevant Regeneration & Revegetation Plan.

The objectives of regeneration works within buffer areas are to:

- Remove weeds utilising “best practice” protocols;
- Conserve the current ecological values of areas containing habitat for identified significant species; and
- Naturally regenerate vegetation communities where compatible with bushfire Asset Protection Zone requirements.

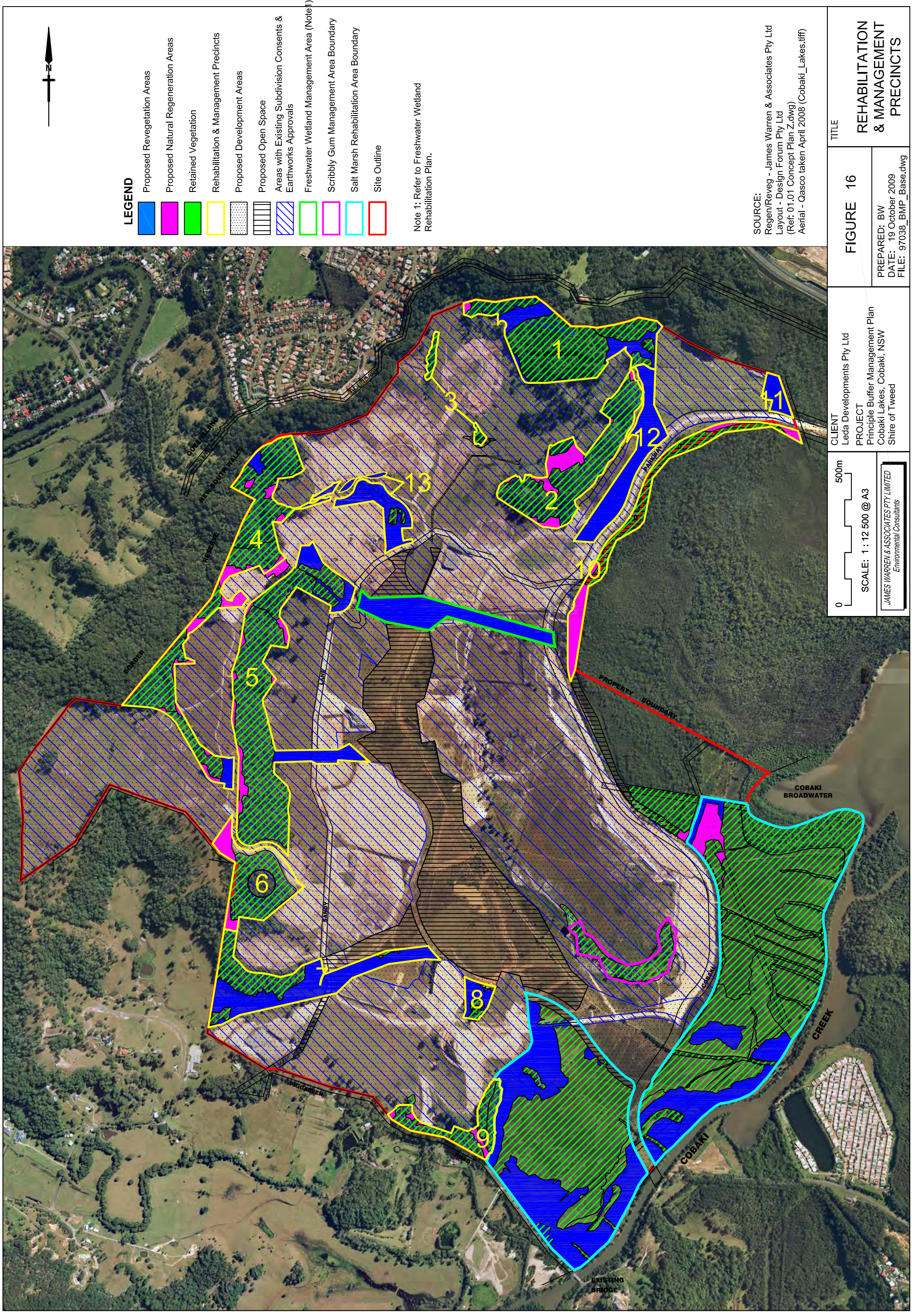
A suitably qualified Bush Regeneration Company will be engaged to complete necessary rehabilitation works. The Bush Regeneration Company will employ qualified Bush Regenerators, including a Regeneration Site Manager, who will be responsible for all project management and staff supervision, and report directly to the site Ecologist.

Specific actions will be prescribed in detailed Buffer Management plans prepared for each stage of development. Any proposed rehabilitation works which occur outside the boundaries of Environmental Protection Zones will strictly comply with bushfire Asset Protection Zone requirements.

5.7 Revegetation Strategies

Within disturbed areas, competition between native propagules and exotic weeds often favours the exotic pioneering. Thus, in order to enhance the ecological functioning of areas degraded by exotic species, revegetation works will provide a framework by which indigenous species may reclaim lost habitat via the processes of natural recruitment and succession. Therefore, the aim of the revegetation works is to restore the historical ecological values of relevant areas of the site through the use of weed removal techniques and the provision of indigenous canopy species.

Buffer areas requiring revegetation will be identified in detailed Buffer Management Plans completed for each stage of development. Revegetation works will generally be focused within the edges of Environmental Protection Zones. Any proposed revegetation areas which occur outside of Environmental Protection Zones will strictly comply with bushfire Asset Protection Zone requirements and be completed in accordance with the strategies and performance objectives of the relevant Regeneration & Revegetation Plan.



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 16

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PREPARED BY: BW
 DATE: 19 October 2009
 FILE: 97038_BMP_Base.dwg

0 500m

SCALE: 1 : 12 500 @ A3

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Objectives of revegetation works within buffer areas are to:

- achieve overall enhancement of the existing vegetation communities at the interface of Environmental Protection Zones and adjoining Asset Protection Zones, Open Space Areas and/or development;
- buffer Environmental Protection Zones from edge effects and other disturbance related impacts;
- revegetate the edges of Environmental Protection Zones disturbed by weeding activities with local species with a view to re-establishing historical patterns of vegetation;
- improve the value of the Environmental Protection Zones as habitat for fauna groups;
- manage weeds using plantings of native species; and
- utilise endemic species to reduce nutrient and sediment loads and other potential impacts arising from removal of weeds and future proposed development activities.

5.8 Weed Management Strategies

Parts of the Cobaki Lakes site support a variety of weed species. Weeds will be strictly controlled within buffer zones. Buffers are to be designed to form a barrier to prevent weed invasion into the Environmental Protection Zones and will generally consist of planting a dense screen of native vegetation (where required) within the edges of the Environmental Protection Zones and within adjacent Asset Protection Zones where compatible with Asset Protection Zone requirements.

Weed Management is an integral part of the Site Regeneration and Revegetation Plan (JWA 2009b) and the Vegetation Management Plan (JWA 2009c). However, weed assessment and management strategies will also be included in the stage and zone specific Buffer Management plans. Principle objectives of weed control are:

- implement weed control measures aimed at improving the quality of native vegetation at the site, and therefore improving fauna habitat (including habitat for Threatened fauna);
- improve future outcomes for threatened flora species and EP land; and
- identify strategies for future weed management as development of the site proceeds.

Stage specific Buffer Management Plans will provide a list of all weed species recorded from the relevant areas, measures for controlling these weeds and a monitoring and maintenance program to ensure ongoing weed control. Weed control techniques within buffer zones will be in strict compliance with the strategies and performance objectives of the relevant Regeneration & Revegetation Plan.

5.9 Fencing

Fencing requirements will be specified in Buffer Management Plans for each stage of development. All required fencing to buffers should be in place before



Overview Buffer Management Plan - Cobaki Lakes PPR

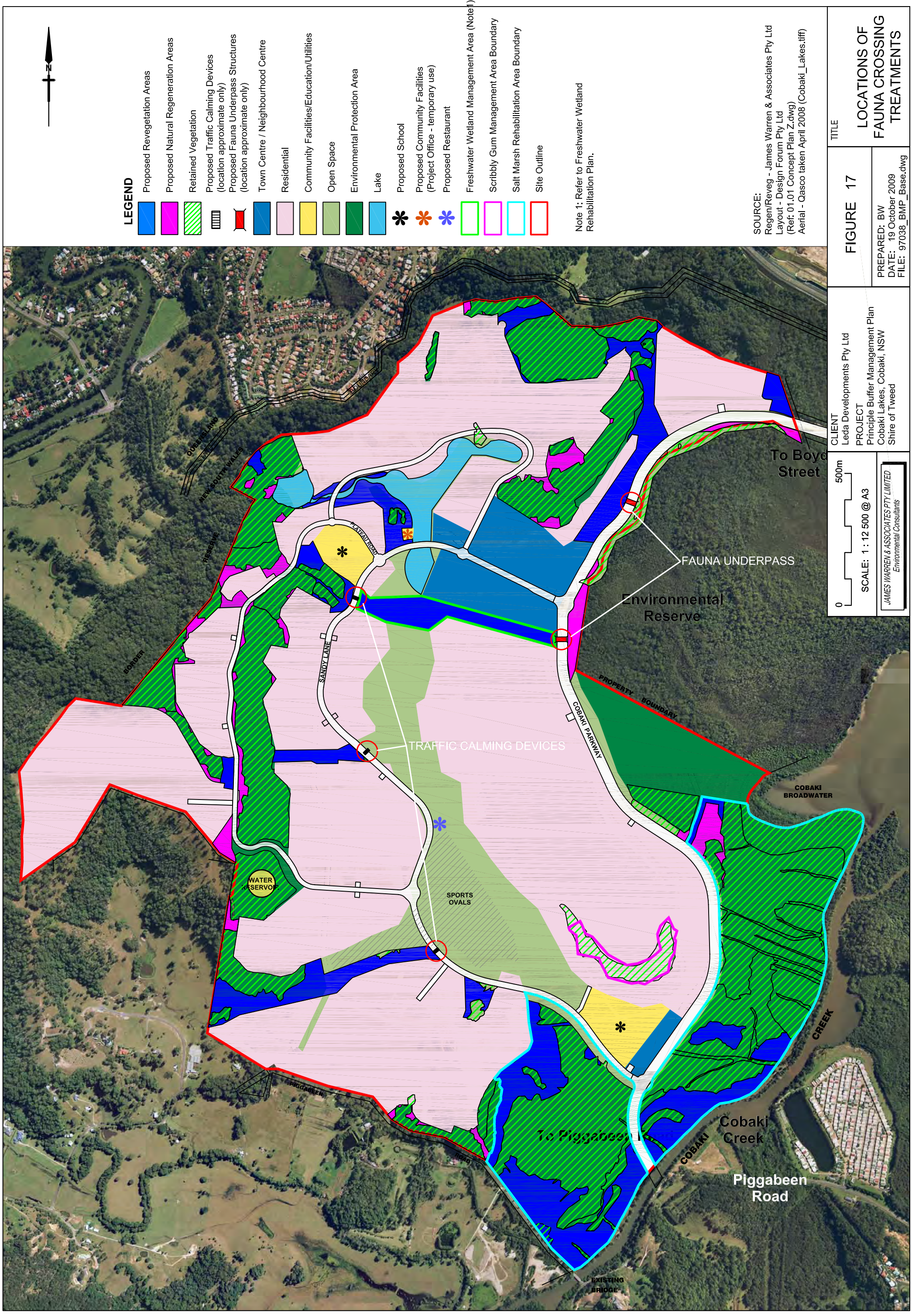
construction begins on adjacent development. Temporary fencing that meets the intended purpose may be erected initially, however the specified permanent fencing must be completed as a condition of the relevant development consent.

5.10 Signage

Signs will be provided indicating the nature of the area subject to Environmental Protection (e.g. vegetation communities, fauna habitat and rehabilitation areas). Additionally, there should be signs with an educational function, where appropriate. Specific signage requirements will be prescribed in detailed Buffer Management Plans prepared for each stage of development.

5.11 Reduction of Road Impacts

Fauna crossings and appropriate management methods have been identified within the Fauna Management Plan (JWA 2009d) to ensure that fauna groups are protected and able to move freely between areas of suitable habitat. Locations requiring fauna crossing treatments are identified in **FIGURE 17**.



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 f)
- 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)

FIGURE 17	TITLE LOCATIONS OF FAUNA CROSSING TREATMENTS
PREPARED: BW DATE: 19 October 2009 FILE: 97038_BMP_Base.dwg	

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Principle Buffer Management Plan
Cobaki Lakes, Cobaki, NSW
Shire of Tweed

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0 500m

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FAUNA UNDERPASS

Environmental Reserve

TRAFFIC CALMING DEVICES

WATER RESERVOIR

SPORTS OVALS

To Piggabeen

Cobaki Creek

Piggabeen Road

To Boyd Street

PROPERTY BOUNDARY

COBAKI PARKWAY

SANDY LANE

RESERVE

NEW DUTTA VALLES

QUEENSLAND STATE

BORDER

EXISTING BRIDGE



6 MONITORING & REPORTING

6.4 Introduction

Monitoring and reporting is an integral component of any management plan. A well-designed monitoring program will allow project managers to detect results months, years, or decades following implementation of a plan. This section outlines the general monitoring principles for the proposed buffer areas at Cobaki Lakes. A specific monitoring program will be designed and incorporated into each detailed BMP prepared for each stage of the proposed development.

6.5 Biodiversity Monitoring

Parts of Cobaki Lakes have been identified as areas of environmental significance. Buffers and related provisions will play a significant role in cushioning the effect of urban development and protecting the biodiversity within the site. Monitoring is an important part of the cycle of management and will be crucial to ensure that the buffers are achieving their desired aim of providing adequate protection to environmental areas.

A detailed biodiversity monitoring regime will be included in detailed Buffer Management Plans prepared for each stage of development.

The following is an example of the data that will be routinely collected:

- Photos
- Species list
- Canopy height
- Canopy cover
- Weed invasion
- Fauna species list
- Fauna sightings
- Evidence of target species (i.e. scats, nest)
- Condition of habitat (i.e. water quality or condition of Koala food trees)

Base-line data should be collected before construction begins on adjacent development.



6.6 Water Quality Monitoring

Any water from the adjacent development which enters areas of retained vegetated and/or rehabilitated areas within buffers will be strictly monitored. Swamp sclerophyll and Saltmarsh communities within the Environmental Protection Zones depend on water free from pollutants and added nutrients. A monitoring regime for ground, stormwater and surface water should be completed for all stages of the development.

6.7 Reporting

A detailed reporting regime will be incorporated into each Buffer Management Plan as the stages of development proceed. Reporting will involve the following:

- Details of the structure and function of buffer zones (i.e. retained vegetation areas, rehabilitation areas, Asset Protection Zone requirements etc.);
- Monitoring of buffer zones (i.e. condition and maintenance); and
- Monitoring of Environmental Protection areas (i.e. effectiveness of buffers).



7 OWNERSHIP AND RESPONSIBILITIES

Leda Manorstead Pty Ltd will be responsible for:

- the preparation and implementation of detailed Buffer Management Plans for each successive stage of development.
- the monitoring and maintenance of ecological buffers (where appropriate) and of the adjacent Environmental Protection Zones, during the on-maintenance period, or until performance objectives are met.



REFERENCES

- Belt, G., O'Laughlin J. and Merrill T. (1992) Analysis of Scientific Literature Idaho forest, Wildlife and Range Policy analysis Group Report No. 8.
- Correll, D.L. (1997). Buffer Zones and Water Quality Protection: General Principles. Pages 7-20. In: Haycock, N.E., T.P. Burt, K.W.T. Goulding and G. Pinay (eds.).
- Davies P.M. & Lane J.A.K. (1995) Effective Buffers for Wetlands. Wetlands Australia - Issue No. 2.
- Desbonnet, A., Lee, V., Pogue, P., Reis, D., Boyd, J., Willis, J. and Imperial, M. (1994) Development of Coastal Vegetated Buffer Programs. Coastal Management (23): 91-109.
- Donatiu, P. (2001). Working on the Edge. Greening Australia Technical Advice. www.greeningaustralia.org.au 26/1/2001.
- JWA (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). Scribbly Gum Management Plan. Cobaki Lakes - Preferred Project Report. A Report to Leda Manorstead Pty Ltd
- JWA (2009b). Site Regeneration & Revegetation Plan. Cobaki Lakes - Preferred Project Report. A Report to Leda Manorstead Pty Ltd
- JWA (2009c). Vegetation Management Plan. Cobaki Lakes - Preferred Project Report. A Report to Leda Manorstead Pty Ltd
- JWA (2009d). Fauna Management Plan. Cobaki Lakes - Preferred Project Report. A Report to Leda Manorstead Pty Ltd
- Kooyman, R. (1996). Growing Rainforest - Rainforest Restoration and Regeneration. Recommendations for the humid sub-tropical region of northern NSW and south east Queensland. State Forests of NSW (Casino District).
- Leishman M.R. (1986) The Distribution of Soil Phosphorus within Urban Bushland in the Area of Ku-ring-gai Sydney. Honours Thesis, School of Biological Sciences, Macquarie University: North Sydney.
- Marrs, R.H., Frost, A. J., Plant, R. A., and Lunnis, P. (1993). Determination of buffer zones to protect seedlings of non-target plants from the effects of glyphosate spray drift. Agriculture, Ecosystems and Environment 45:283-293.
- National Conservation Buffer Council (NCBC) - Types of Buffers (2001a). <http://www.buffercouncil.org/types.htm>



Overview Buffer Management Plan - Cobaki Lakes PPR

National Conservation Buffer Council (NCBC) - Benefits of Buffers (2001b).
<http://www.buffercouncil.org/benefits.htm>

United States Department of Agriculture (2000) Conservation Buffers. United States Department of Agriculture.