JWA PTY LTD
Ecological Consultants
ABN 18 862 767 739

REVISED ECOLOGICAL ASSESSMENT

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, Tweed Heads

A Report Prepared for
Leda Manorstead Pty Ltd

NOVEMBER 2012

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1. INTRODUCTION

1.1 Background

The Minister for Planning authorised a Concept Plan for the proposed residential community at Cobaki Lakes on the 24th January 2007. Subsequently, the Director General's Environmental Assessment Requirements (DGEAR's) were issued to LEDA Manorstead Pty Ltd on the 21st August 2007. James Warren and Associates (JWA) were engaged by LEDA Manorstead Pty Ltd to complete an Ecological Assessment for land at Cobaki Lakes, Cobaki in November 2008.

Following submissions from the public and State Agencies, and subsequent amendments to the proposed Concept Plan, this Ecological Assessment has been revised to provide additional information. The Ecological Assessment has involved the following:

- Mapping and ground truthing vegetation units and determining their conservation status;
- Searching for and recording Threatened (TSC Act 1995), ROTAP (Briggs & Leigh 1995) and regionally significant (Sheringham and Westaway 1995) plant species;
- Determining the suite of Threatened fauna (TSC Act 1995) that occurs within the locality;
- Assessing habitat provided by the site in relation to adjacent habitat and making an assessment of the corridor value of the site;
- Assessing the requirements of the Tweed Shire Council Development Control Plan (DCP) 25 – Biting Midge and Mosquito Control;
- Addressing statutory requirements including the State Environmental Planning Policy No. 44 (SEPP 44 – Koala Habitat Protection), SEPP 14 – Coastal Wetlands, Section 5A of the Environmental Planning & Assessment Act (1979) and the Commonwealth EPBC Act (1999).

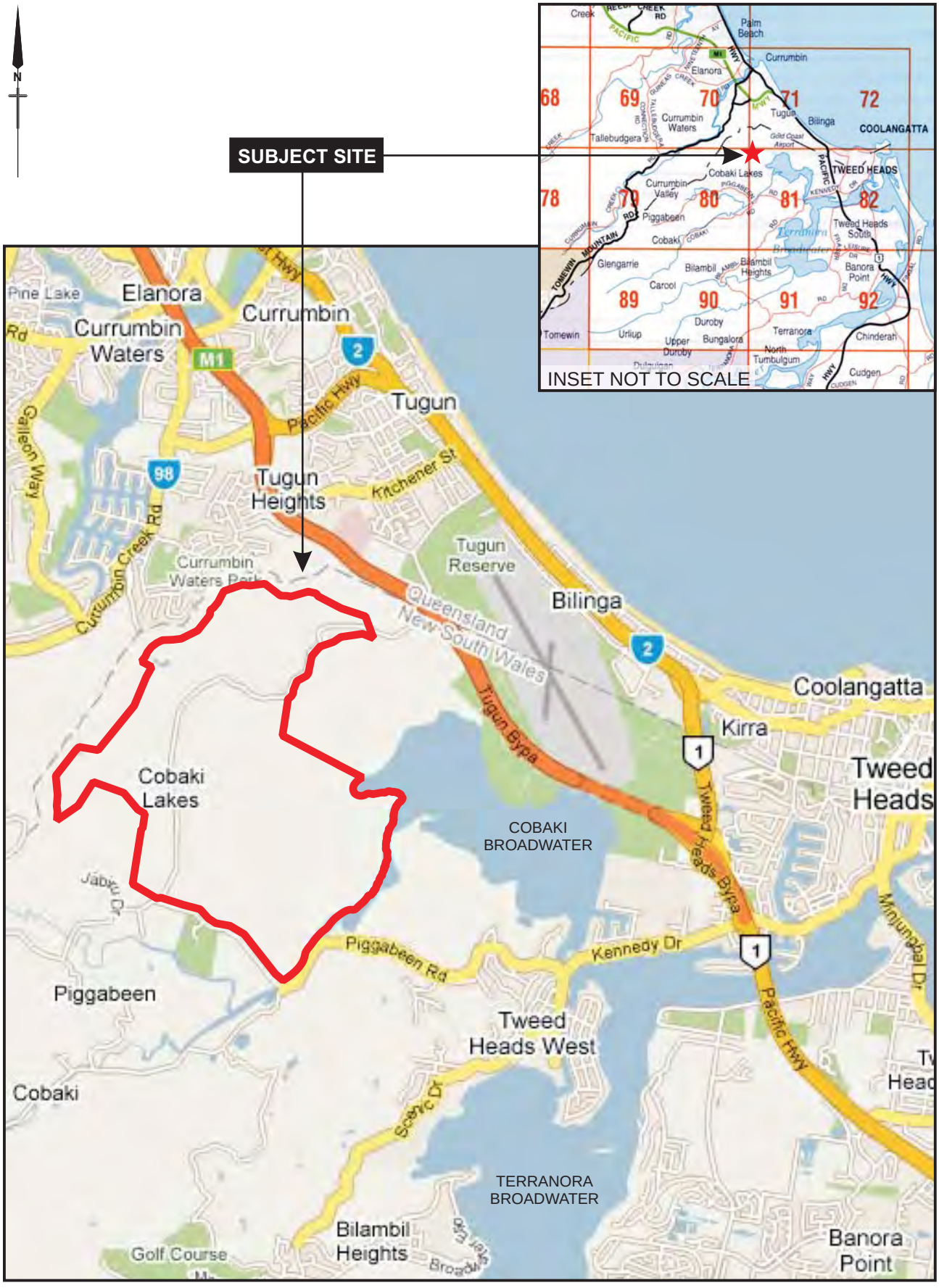
1.2 Locality

1.2.1 Introduction

The Locality is defined as the area within a 10km radius of the Subject site. The Locality therefore extends from North Tumbulgum in the south to Burleigh Heads in the north and from Currumbin Valley in the west to Tweed Heads in the east (**FIGURE 1**).

Prominent features in the locality include the townships of Coolangatta, Palm Beach and Banora Point and the villages of Tallebudgera, Pigabeen and Bilambil Heights. Prominent water bodies in the locality include the Cobaki Broadwater, Currumbin Creek, Cobaki Creek, Terranora Broadwater and the Coral Sea.

Dominant habitat types are eucalypt forest, swamp sclerophyll forest, heathlands, sedgelands, rushlands, subtropical rainforest, littoral rainforest and intertidal communities. Land uses within the locality include residential, forestry, conservation, tourism, commercial, fishing, grazing and agriculture.



SOURCE: Google Maps SCALE: 1 : 50 000 @ A4 JAMES WARREN & ASSOCIATES PTY LIMITED Environmental Consultants	CLIENT Leda Developments Pty Ltd PROJECT Revised Ecological Assessment Cobaki Lakes, Cobaki, NSW Shire of Tweed	**FIGURE 1** PREPARED: BW DATE: 30 June 2010 FILE: 97038_EA_Locality v3.cdr	TITLE **LOCALITY PLAN**

1.2.2 Conservation Reserves/Ecologically significant areas in the locality

There are three (3) dedicated conservation reserves in the locality:

- Tweed Estuary Nature Reserve, an area of 59 hectares to the east of the Subject site.
- Stotts Island Nature Reserve, an area of 142 hectares to the south of the Subject site; and
- Ukerebagh Nature Reserve, an area of 150 hectares to the east of the Subject site.

State Environmental Planning Policy No. 14 – Coastal Wetlands (SEPP 14) provides protection for a large number of mapped wetlands along the east coast of NSW. Mapped SEPP 14 Wetlands numbers 1 - 30 occur within 10km of the locality, and are shown in **FIGURE 2**. A large area of SEPP 14 wetland no. 1 is located immediately east of the subject site adjacent to Cobaki Broadwater and Cobaki Creek **FIGURE 3**.

Littoral rainforests are protected by State Environmental Planning Policy No. 26 – Littoral Rainforest (SEPP 26). Mapped SEPP 26 Littoral Rainforests numbers 2A, 2B, and 2C occur within the locality and are shown in **FIGURE 4**.

1.2.3 The Study Area

The study area is defined as the subject site together with any proximate areas that may be affected by the proposed development. The site is surrounded by a narrow belt of forested land adjacent to the northern and western boundaries of the site. This belt of vegetation occurs within the Crown Reserve separating Queensland from New South Wales. Private large landholdings occur adjacent to the southern site boundary. Piggabeen Road separates these landholdings from the Cobaki Lakes site.

Cobaki Creek (tidal) occurs adjacent to part of the eastern boundary of the site. Cobaki Broadwater and a large area of wetland occur alongside the north-eastern boundary.

1.3 The Subject Site

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 Pigabeen Road, Tweed Heads. The site covers an area of approximately 605 hectares and is shown in **FIGURE 5**.

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.

Legend

Area Subject to SEPP No. 14 (with index number)

Subject Site

0 1500m

N

SOURCE: State Env. Planning Policy No. 14 Coastal Wetlands Amendment No. 14 SCALE: 1 : 60 000 @ A4 *JAMES WARREN & ASSOCIATES PTY LIMITED* *Environmental Consultants*	CLIENT Leda Developments Pty Ltd PROJECT Revised Ecological Assessment Cobaki Lakes, Cobaki, NSW Shire of Tweed	**FIGURE 2** PREPARED: BW DATE: 30 June 2010 FILE:97038_EA_SEPP14regional.cdr	TITLE **SEPP 14 COASTAL WETLANDS**

N

LEGEND

Area subject to SEPP No. 14

Site Outline

SOURCE:
SEPP - Michel Group Services
Aerial - Michel Group Services (Ref: 6400-197.dwg)
- photo taken March 2010

0 500m

SCALE: 1 : 12 500 @ A3

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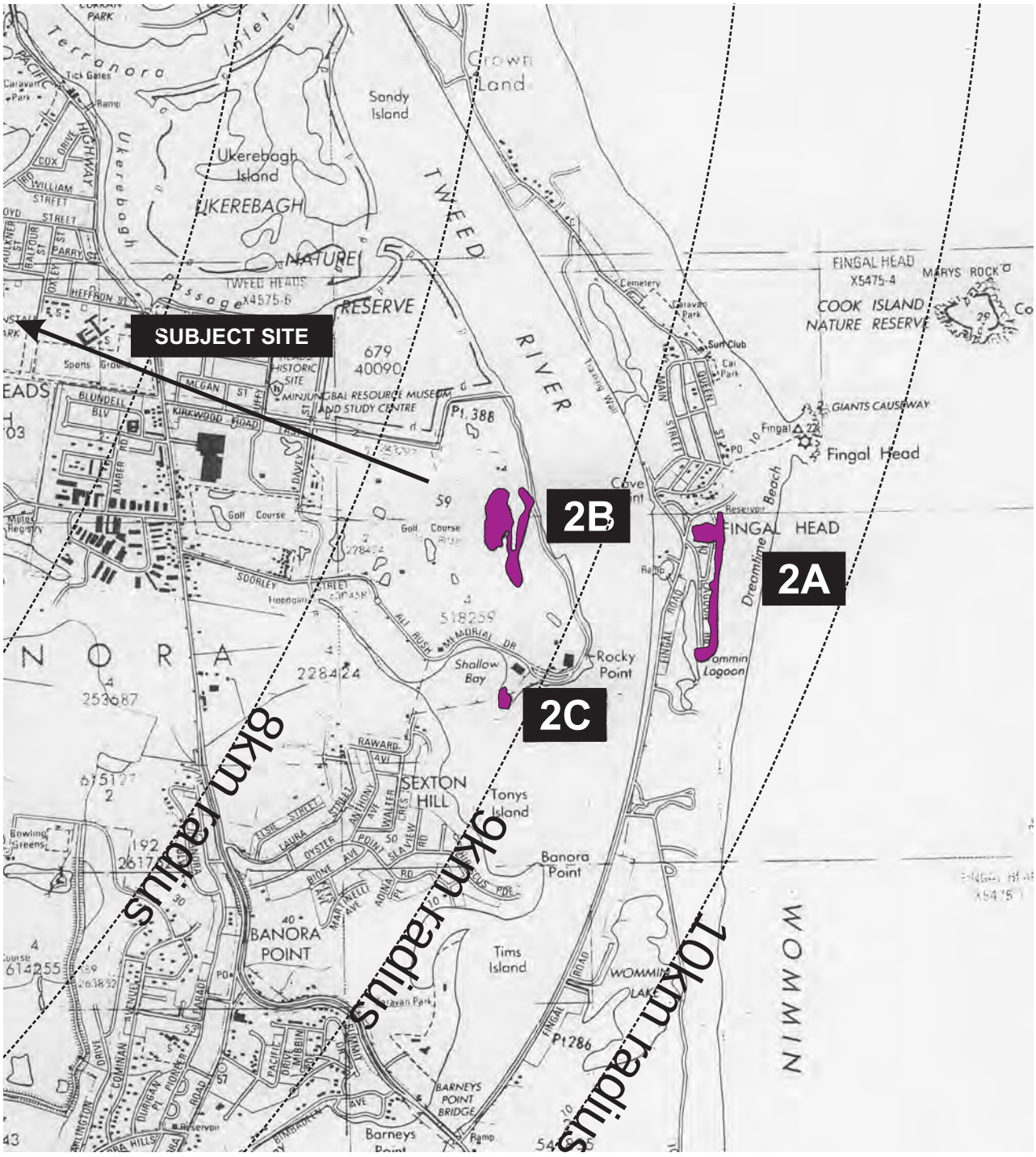
FIGURE 3

PREPARED: BW
DATE: 30 June 2010
FILE: 97038_EA_Base.dwg

TITLE
SEPP 14
COASTAL
WETLANDS



SOURCE: State Env. Planning Policy No. 26 Littoral Rainforests

SCALE: 1 : 25 000 @ A4

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FIGURE 4

PREPARED: BW
DATE: 30 June 2010
FILE: 97038_EA_SEPP26.cdr

TITLE

SEPP 26 LITTORAL RAINFOREST

N

LEGEND

- Cadastral Boundaries
- Restriction on Use Area
- Site Outline

SOURCE:
Aerial - Michel Group Services (Ref: 6400-197.dwg)
- photo taken March 2010

0 500m

SCALE: 1 : 12 500 @ A3

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FIGURE 5

PREPARED: BW
DATE: 30 June 2010
FILE: 97038_EA_Base.dwg

TITLE

SUBJECT SITE

FIGURE 6 shows a recent aerial photograph of the site. Currently sixteen (16) broad vegetation associations comprising twenty-two (22) vegetation communities occur on the site.

1.4 Landuse Zones

The Environmental zoning process on the Cobaki Lakes site has been in progress for over 15 years. A large number of environmental assessments over this period of time have informed the environmental zoning process.

The Subject site currently contains the following landuse zones:

- 2(c) Urban Expansion
- 2(e) Residential Tourist Zone
- Recreation (Special Purposes)
- Environmental Protection (Scenic Escarpment)
- Environmental Protection (Habitat)

The current zoning plan is shown in **FIGURE 7.** The Concept Plan proposes amendments to the current zoning of the site based on the results of the numerous environmental assessments completed over the site. These amendments fall into five categories as follows:

1. Amendments in accordance with Clause 52 of the Tweed LEP 2000;
2. Amendments to zonings contemplated by existing Development Consents;
3. Other proposed additions to the 2(c) Urban Expansion zone;
4. Proposed additions to the 7(l) Environmental Protection (Habitat) zone; and
5. Proposed additions to the 6(b) Recreation zone.

The proposed amended zoning plan is shown in **FIGURE 8.**

1.5 Soils and Geology

The subject site occupies the lower or eastern end of the Cobaki – Pigabeen Valley system**.** The site topography is considered as two (2) separate systems:

- The Sub-coastal foothills and outcrops of the eastern end of the McPherson Range, which comprises the western and northern part of the site and covers an area of approximately 280 hectares, or 42% of the site, and corresponding to a broad north/south line of hills. The terrain of these hills is rolling/hilly to hilly in a series of ridges and spurs with slopes of 10% to 25% and some 16% of the site having slopes in excess of 25%.
- The foothills enclose a coastal plain drainage basin comprising a composite of river/estuarine floodplain and sand-plain formed by sandbanks, beach or rolled and flattened dune systems.

The McPherson range foothills and elevated portions of the site derive from bedrock of deeply weathered argillites (greywackes, siltstones and shales) of the Neranleigh –

N

LEGEND

Site Outline

SOURCE:
Aerial - Michel Group Services (Ref: 6400-197.dwg)
- photo taken March 2010

0 500m

SCALE: 1 : 12 500 @ A3

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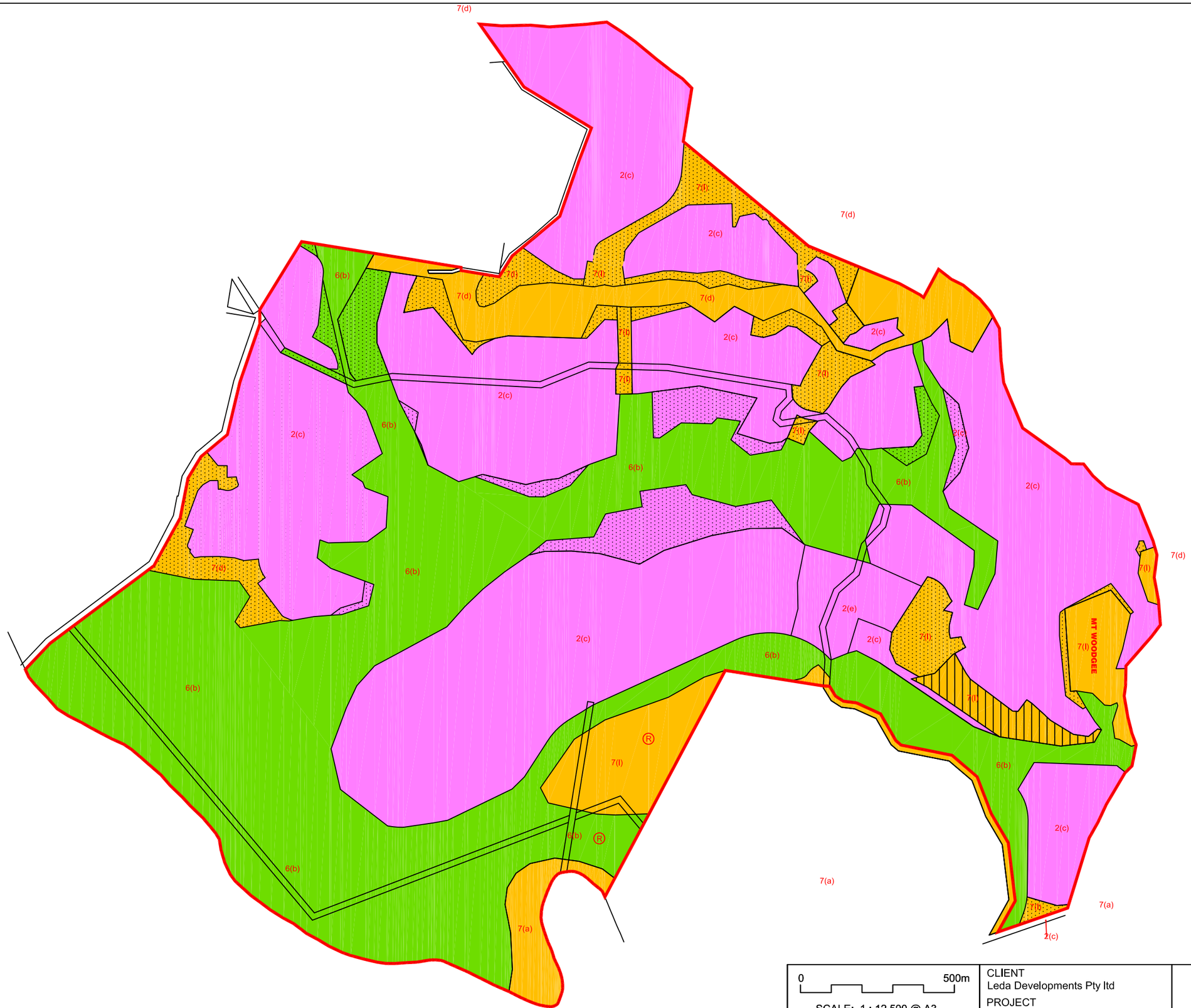
FIGURE 6

PREPARED: BW
DATE: 30 June 2010
FILE: 97038_EA_Base.dwg

TITLE

AERIAL PHOTOGRAPH



LEGEND

1. RURAL

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

2. RESIDENTIAL

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

5. SPECIAL USES

- 5(a) (a) Special Uses

6. OPEN SPACE

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

7. ENVIRONMENTAL PROTECTION

- 7(a) (a) Environmental Protection (Wetlands & Littoral Rainforests)
- 7(d) (d) Environmental Protection (Scenic/Escarpment)
- 7(f) (f) Environmental Protection (Coastal Lands)
- 7(l) (l) Environmental Protection (Habitat)
- S14 SEPP14 - Coastal Wetlands
- Clause 52 (Cobaki Lakes)
- Clause 52 (Cobaki Lakes)
- R Restriction On Use (DP1051024)
- Site Outline

SOURCE:
Zoning - Michel Group Services (Ref: 6400-133A.dwg)

0 500m

SCALE: 1 : 12 500 @ A3

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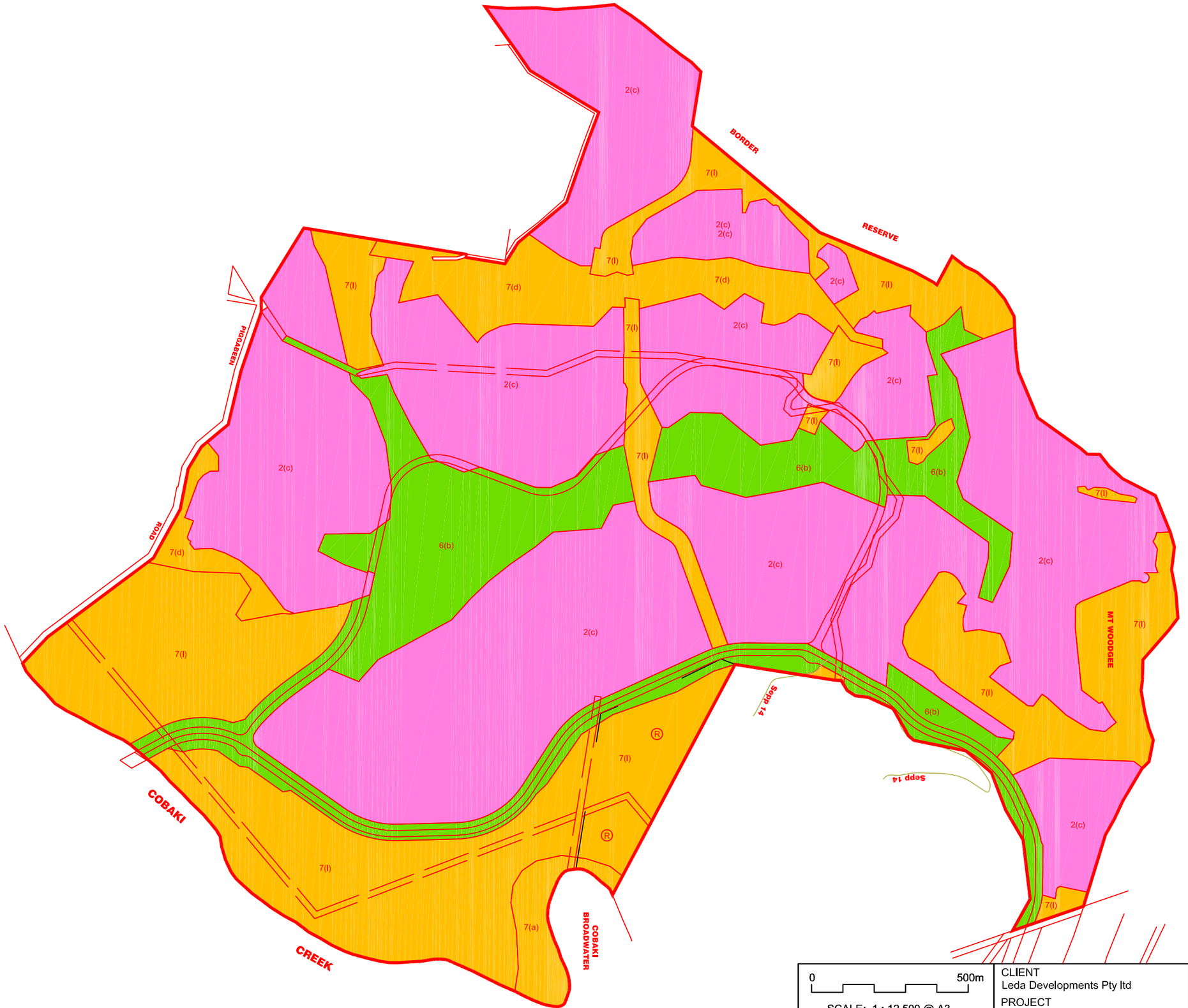
FIGURE 7

PREPARED: BW
DATE: 30 June 2010
FILE: 97038_EA_Base.dwg

TITLE

LANDUSE ZONES



LEGEND

1. RURAL

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

2. RESIDENTIAL

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

5. SPECIAL USES

- 5(a) (a) Special Uses

6. OPEN SPACE

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

7. ENVIRONMENTAL PROTECTION

- 7(a) (a) Environmental Protection (Wetlands & Littoral Rainforests)
- 7(d) (d) Environmental Protection (Scenic/Escarpment)
- 7(f) (f) Environmental Protection (Coastal Lands)
- 7(l) (l) Environmental Protection (Habitat)
- S14 SEPP14 - Coastal Wetlands
- Clause 52 (Cobaki Lakes)
- Clause 52 (Cobaki Lakes)
- (R) Restriction On Use (DP1051024)
- Site Outline

SOURCE:
Zoning - Michel Group Services (Ref: 969030.dwg)

0 500m

SCALE: 1 : 12 500 @ A3

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FIGURE 8

PREPARED: BW
DATE: 30 June 2010
FILE: 97038_EA_Base.dwg

TITLE
PROPOSED ZONING AMENDMENTS

Fernvale Group (metasediments) overlain in parts by basalt fragments of the tertiary volcanics. More recent alluvial and estuarine deposits comprise the coastal plains on the site (Woodward-Clyde 1997).

1.6 Topography and Drainage

Elevations of the poorly drained, or low lying coastal plains, range from Cobaki Broadwater level to approximately four (4) metres AHD. The elevations of the foothills extend to a maximum of approximately one-hundred (100) metres at the north-west extremity of the site, and around ninety-five (95) metres near Mt. Woodgee in the northern extremity of the site (Woodward-Clyde 1997).

A series of drains run through the site (**FIGURE 6**). Dunn's Drain is the main drain, traversing the site in a south-east to north-west direction. A floodgate located at its junction with Cobaki Creek, in the south-east portion of the site, inhibits tidal flows. Tides at the higher levels enter the low-lying land in the south of the site by over-topping the bund wall adjacent to Cobaki Creek.

2. PROPOSED DEVELOPMENT

2.1 Concept plan

The site is proposed to be developed into a master planned residential community. A concept plan for the development is shown in **FIGURE 9**. The proposed development will include the following:

- Development area (346.35ha) comprising:
  - Town centre/Neighbourhood centre;
  - Residential precincts; and
  - Community facilities/Education/Infrastructure
- Public open space (58.20 hectares); and
- Environmental protection areas (199.86 hectares).

2.2 Existing Approvals

A number of development and earthworks approvals currently exist over the site. These are shown in **FIGURES 10 & 11** respectively.

An existing development consent over a portion of land in the north-western portion of the site known as the 'Northern Hillside' is to be preserved and implemented. The approved development layout in this portion of the site is shown in **FIGURE 12.** Conditions of consent regulate the management of significant ecological matters which occur in the approved 'Northern Hillside' precinct. Consideration has, however, been given to ecological matters (i.e. Threatened species and EEC's) in all areas of the site during this assessment.

2.3 'Restriction on Use' area

A parcel of land in the eastern portion of the subject site covering an area of approximately 16.375 hectares has been dedicated to Tweed Shire Council under Section 88b of the Conveyancing Act (1919) (**FIGURE 5**). This area has been fenced and remediated by Council as works in compensation for the impact of development by Council elsewhere in the Shire.

The terms of the Restriction on Use are:

> *"That no structure shall be erected, no native fauna or flora shall be damaged in any way and no domestic animal shall be permitted on the land".*

This portion of the subject site will, therefore, not be further considered in this assessment.

BOUNDARY

Queensland

New South Wales

WATER RESERVOIR

SANDY ROAD

COBAKI PARKWAY

Piggabeen Road

Cobaki Creek

Environmental Reserve

To Boyd

N

LEGEND

- Development Footprint
- Open Space
- Environmental Protection Area
- Covenant Protected Areas
- Dam
- Site Outline

SOURCE:
Layout - SMEC (Ref: Central_Open_space.dwg & Rehab_and_Management_Precincts.dwg)

0 500m

SCALE: 1 : 12 500 @ A3

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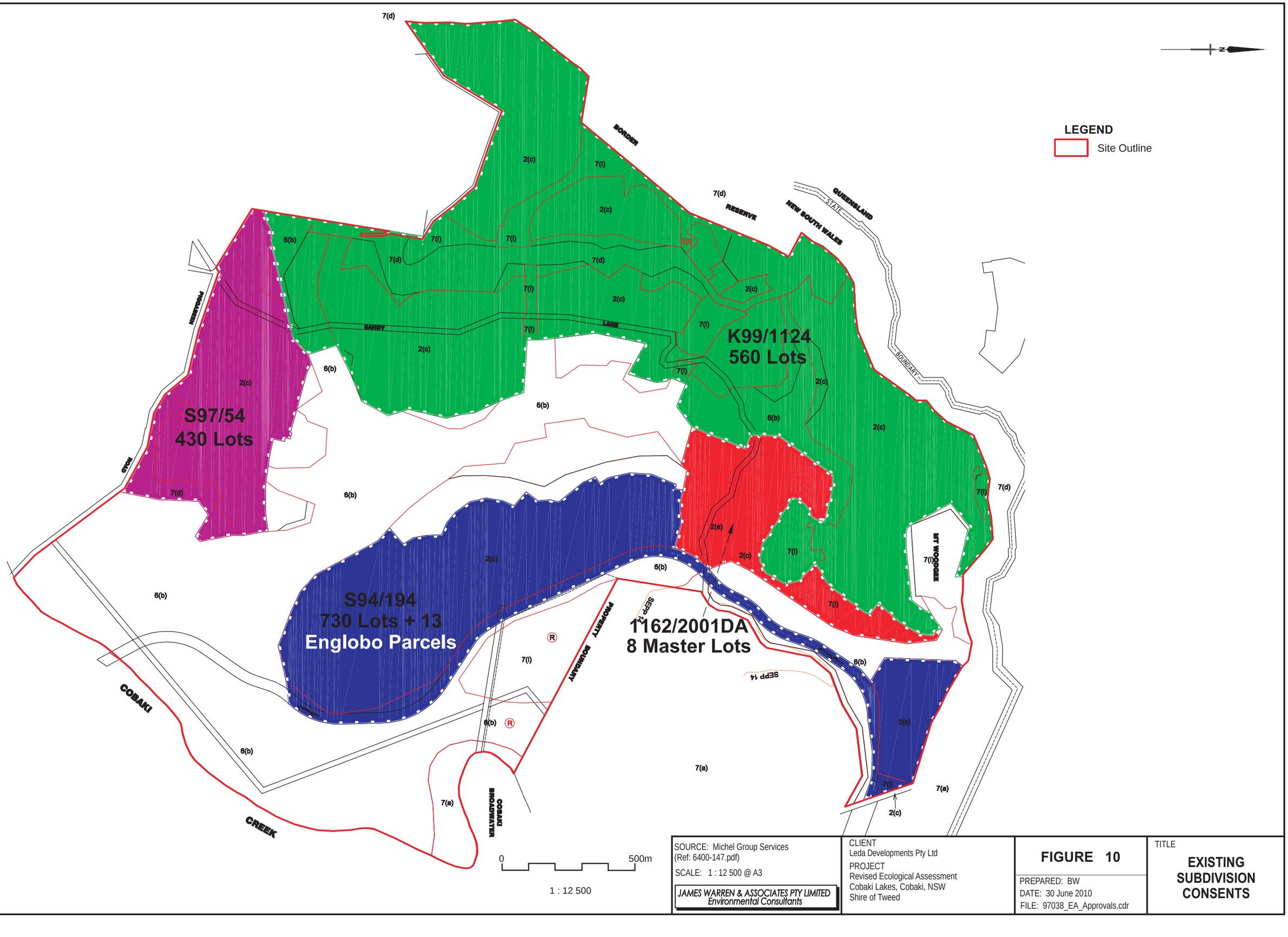
FIGURE 9

PREPARED: BW
DATE: 30 October 2012
FILE: 97038_EA_Base.dwg

TITLE
DEVELOPMENT CONCEPT PLAN



SOURCE: Michel Group Services
(Ref: 6400-147.pdf)

SCALE: 1 : 12 500 @ A3

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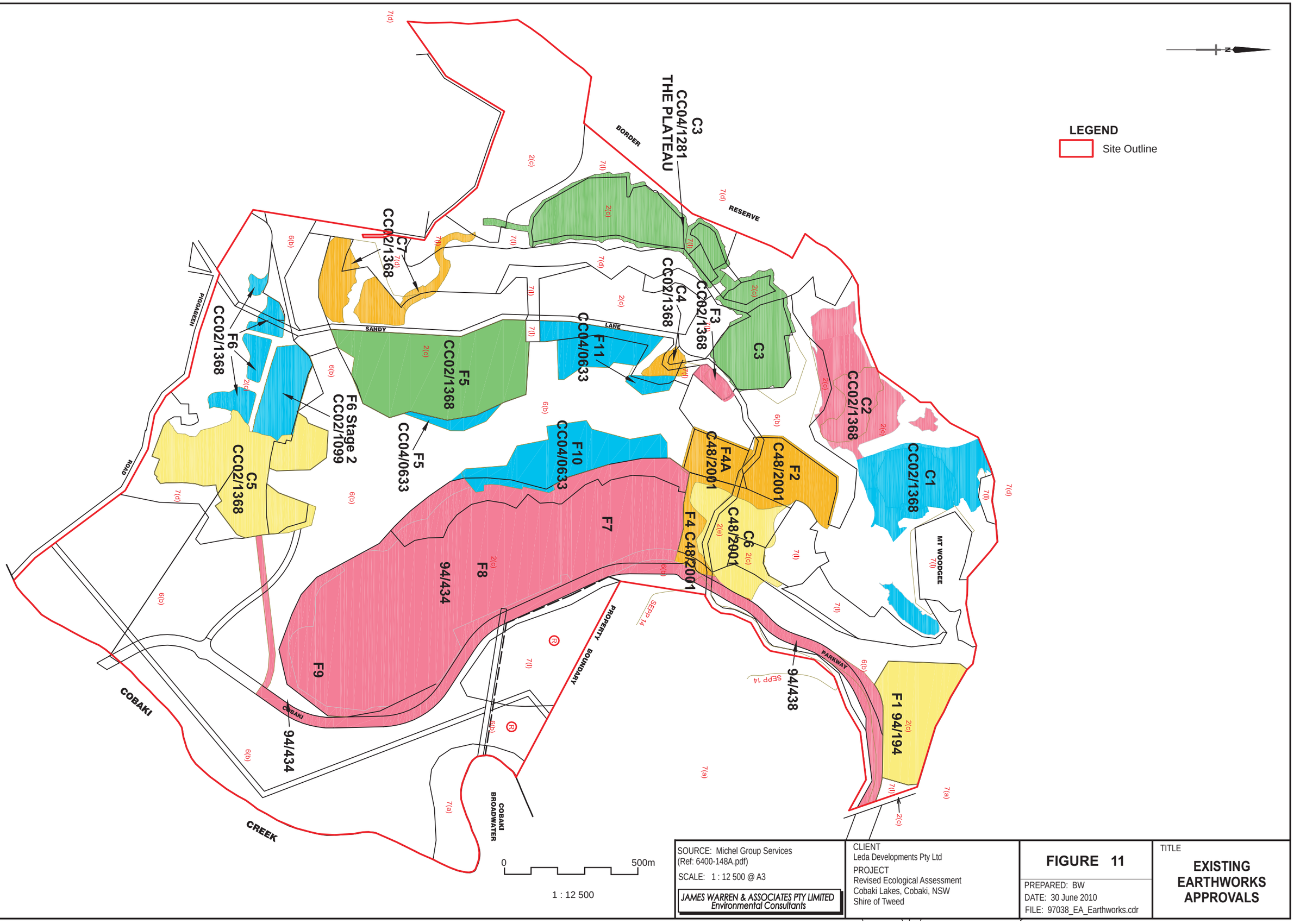
FIGURE 10

PREPARED: BW
DATE: 30 June 2010
FILE: 97038_EA_Approvals.cdr

TITLE
EXISTING SUBDIVISION CONSENTS



SOURCE: Michel Group Services (Ref: 6400-148A.pdf)

SCALE: 1 : 12 500 @ A3

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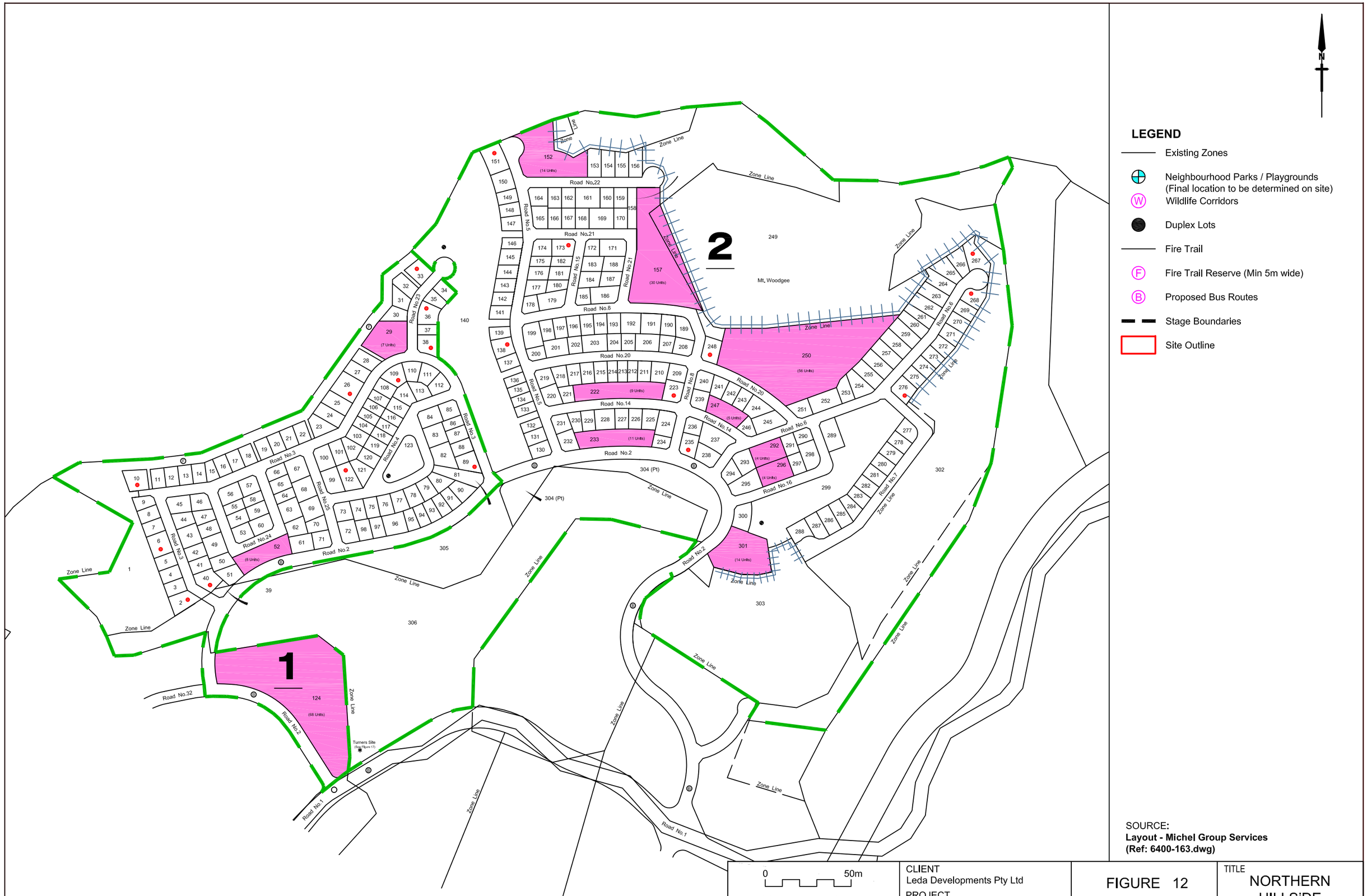
FIGURE 11

PREPARED: BW
DATE: 30 June 2010
FILE: 97038_EA_Earthworks.cdr

TITLE
EXISTING EARTHWORKS APPROVALS


N
LEGEND
Existing Zones
Neighbourhood Parks / Playgrounds
(Final location to be determined on site)
Wildlife Corridors
Duplex Lots
Fire Trail
Fire Trail Reserve (Min 5m wide)
Proposed Bus Routes
Stage Boundaries
Site Outline
1
2
Mt. Woodgee
Zone Line
Road No.1
Road No.2
Road No.3
Road No.4
Road No.5
Road No.6
Road No.7
Road No.8
Road No.14
Road No.15
Road No.16
Road No.20
Road No.21
Road No.22
Road No.23
Road No.24
Road No.25
Road No.32
304 (Pt)
Turners Site
(Ref Figure 17)
0
50m
SCALE: 1 : 200 @ A3
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CLIENT
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PROJECT
Revised Ecological Assessment
Cobaki Lakes, Cobaki, NSW
Shire of Tweed
FIGURE 12
PREPARED: BW
DATE: 30 June 2010
FILE: 97038_EA_NthHill.dwg
TITLE
NORTHERN HILLSIDE DEVELOPMENT LAYOUT
SOURCE:
Layout - Michel Group Services
(Ref: 6400-163.dwg)

2.4 Existing use rights

The property has been grazed by cattle since the early 1900's. Landuse activities which have been a long term and constant feature of this site are defined in Section 106 of the EP&A Act 1979. Existing use rights occur over the subject site for routine agricultural activities including the construction and maintenance of drains, fencing and firebreaks as well as pasture improvement activities.

3. LITERATURE REVIEW

3.1 Introduction

A number of Flora and Fauna Reports and other sources of information have been reviewed prior to the completion of the current assessment. These include:

- Cameron McNamara (1983) Cobaki Village Environmental Study (Report Prepared for the Bradshaw Group);
- WBM (1990) Evaluation of Terrestrial Fauna – Cobaki Community Project;
- WBM (1991a) Greater Gliders of the Cobaki Lakes Project Property, Cobaki, NSW;
- WBM (1991b) Flora and Fauna Studies, Proposed Boyd Street Extension to Cobaki;
- Warren (1992) Fauna Impact Assessment of the Proposed Boyd Street Access;
- Warren (1993) Flora and Fauna survey of proposed cut/fill areas at Cobaki Lakes development (Unpublished Report);
- Warren (1994) Flora and Fauna survey of the Cobaki Lakes development site (Unpublished Report);
- Warren *et al.* (1994) Draft Management Plan for the Long-nosed Potoroo (*Potorous tridactylus*);
- Debus (1994) Bird Survey of the Cobaki Community Project Site;
- Woodward-Clyde (1997) A Flora and Fauna Assessment of Parcels 7, 8, 9 and 10 of the "Cobaki Lakes Residential Development";
- Woodward-Clyde (1997) Species Impact Statement - AGC Woodward-Clyde Pty Ltd;
- Parker (1999) A Species Impact Statement for the Cobaki Lakes Project; and
- EcoPro Pty Ltd (2004) Tugun Bypass: Species Impact Statement (SIS). A report prepared for the Queensland Department of Main Roads.

A summary of findings is provided below. A detailed literature review was provided in the original Ecological Assessment report (JWA 2008).

3.2 Summary

The literature review has revealed the presence, at one time or another, of twelve (12) Threatened fauna species on the subject site with an additional eighteen (18) Threatened species recorded during surveys on adjacent land (**TABLE 1**).

The literature review has also revealed the presence (historically) of four (4) Threatened flora species and three (3) Rare or Threatened Australian Plants (ROTAP) (Briggs & Leigh 1995) listed flora species on the subject site, with an additional eight (8) Threatened flora species and two (2) ROTAP flora species recorded during surveys on adjacent land (**TABLE 2**).

Species status is listed below in accordance with the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act 1999), NSW *Threatened Species Conservation Act 1995* (TSC Act 1995) and ROTAP (Briggs & Leigh 1995).

TABLE 1
THREATENED FAUNA SPECIES RECORDED ON OR ADJACENT TO THE SUBJECT SITE

Common name	Scientific name	Status	Source
Wallum froglet	*Crinia tinnula*	Vulnerable (TSC Act 1995)	Cameron McNamara 1983, WBM 1990, Warren 1992, 1993, Woodward-Clyde 1997, EcoPro 2004
Wallum sedge-frog*	*Litoria olongburensis*	Vulnerable (TSC Act 1995) & Endangered (EPBC Act 1999)	Warren 1992, Woodward-Clyde 1997, EcoPro 2004
Bush hen*	*Amaurornis moluccana*	Vulnerable (TSC Act 1995)	EcoPro 2004
Glossy black-cockatoo*	*Calyptorhynchus lathami*	Vulnerable (TSC Act 1995)	EcoPro 2004
Brolga*	*Grus rubicunda*	Vulnerable (TSC Act 1995)	EcoPro 2004
Black bittern*[U]	*Ixobrychus flavicollis*	Vulnerable (TSC Act 1995)	EcoPro 2004
Mangrove honeyeater*	*Lichenostomus fasciogularis*	Vulnerable (TSC Act 1995)	EcoPro 2004
White-eared monarch*	*Monarcha leucotis*	Vulnerable (TSC Act 1995)	EcoPro 2004
Powerful owl	*Ninox strenua*	Vulnerable (TSC Act 1995)	Warren 1993, 1994, Woodward-Clyde 1997
Osprey	*Pandion haliaetus*	Vulnerable (TSC Act 1995)	Cameron McNamara 1983, WBM 1990, Warren 1992, 1993, Woodward-Clyde 1997, EcoPro 2004
Wompoo fruit-dove*	*Ptilinopus magnificus*	Vulnerable (TSC Act 1995)	EcoPro 2004
Rose-crowned fruit-dove*	*Ptilinopus regina*	Vulnerable (TSC Act 1995)	EcoPro 2004
Superb fruit-dove*[U]	*Ptilinopus superbus*	Vulnerable (TSC Act 1995)	EcoPro 2004
Collared kingfisher*	*Todiramphus chloris*	Vulnerable (TSC Act 1995)	EcoPro 2004
Eastern grass owl*	*Tyto longimembris*	Vulnerable (TSC Act 1995)	EcoPro 2004
Masked owl	*Tyto novaehollandiae*	Vulnerable (TSC Act 1995)	Debus 1994, Woodward-Clyde 1997, EcoPro 2004

Common name	Scientific name	Status	Source
Black neck-stork	*Xenorhynchus asiaticus*	Endangered (TSC Act 1995)	WBM 1990, Warren 1993, Woodward-Clyde 1997, EcoPro 2004
Little bent-wing bat	*Miniopterus australis*	Vulnerable (TSC Act 1995)	Warren 1994, Woodward-Clyde 1997, EcoPro 2004
Common bent-wing bat	*Miniopterus schreibersii*	Vulnerable (TSC Act 1995)	Warren 1994, Woodward-Clyde 1997
Eastern free-tail bat	*Mormopterus norfolkensis*	Vulnerable (TSC Act 1995)	Warren 1994, Woodward-Clyde 1997
Large-footed myotis*	*Myotis adversus*	Vulnerable (TSC Act 1995)	EcoPro 2004
Eastern long-eared bat*	*Nyctophilus bifax*	Vulnerable (TSC Act 1995)	EcoPro 2004
Squirrel glider*	*Petaurus norfolkensis*	Vulnerable (TSC Act 1995)	EcoPro 2004
Koala	*Phascolarctos cinereus*	Vulnerable (TSC Act 1995)	Woodward-Clyde 1997
Common planigale*	*Planigale maculata*	Vulnerable (TSC Act 1995)	EcoPro 2004
Long-nosed potoroo*	*Potorous tridactylus*	Vulnerable (TSC Act 1995)	Warren 1992, Woodward-Clyde 1997, EcoPro 2004
Grey-headed flying-fox	*Pteropus poliocephelus*	Vulnerable (EPBC Act)	Woodward-Clyde 1997, EcoPro 2004
Yellow-bellied sheathtail bat	*Saccolaimus flaviventris*	Vulnerable (TSC Act 1995)	Warren 1994, Woodward-Clyde 1997
Greater broad-nosed bat	*Scoteanax rueppellii*	Vulnerable (TSC Act 1995)	Warren 1994
Common blossom bat*	*Syconycteris australis*	Vulnerable (TSC Act 1995)	EcoPro 2004

* Recorded adjacent to the subject site only
[U] Unconfirmed sighting

TABLE 2
THREATENED FLORA SPECIES RECORDED ON OR ADJACENT TO THE SUBJECT SITE

Common name	Scientific name	Status	Source
Marblewood	*Acacia bakeri*	Vulnerable (TSC Act 1995)	Woodward-Clyde 1997, Parker 1999
White lace flower*	*Archidendron hendersonii*	Vulnerable (TSC Act 1995)	EcoPro 2004
Veiny lace flower	*Archidendron muellerianum*	ROTAP LISTED	Woodward-Clyde 1997, EcoPro 2004

Common name	Scientific name	Status	Source
Brush cassia	*Cassia brewsteri* var. *marksiana*	Endangered (TSC Act 1995)	Woodward-Clyde 1997, Parker 1999
Coastal cordyline	*Cordyline congesta*	ROTAP LISTED	Parker 1999, EcoPro 2004
Stinking cryptocarya*	*Cryptocarya foetida*	Vulnerable (TSC Act 1995 & EPBC Act 1999)	EcoPro 2004
Long-leaved tuckeroo*	*Cupaniopsis newmanii*	ROTAP LISTED	EcoPro 2004
Black walnut*	*Endiandra globosa*	ROTAP LISTED	EcoPro 2004
Green-leaved rose-walnut*	*Endiandra muelleri* subsp. *bracteata*	Endangered (TSC Act 1995)	EcoPro 2004
Pink nodding orchid*	*Geodorum densiflorum*	Endangered (TSC Act 1995)	EcoPro 2004
White yiel yiel*	*Grevillea hilliana*	Endangered (TSC Act 1995)	EcoPro 2004
Fine-leaved tuckeroo*	*Lepiderema pulchella*	Vulnerable (TSC Act 1995)	EcoPro 2004
Rough-shelled bush-nut*	*Macadamia tetraphylla*	Vulnerable (TSC Act 1995 & EPBC Act 1999)	EcoPro 2004
Swamp orchid*	*Phaius australis*	Endangered (TSC Act 1995 & EPBC Act 1999)	EcoPro 2004
Spiny gardenia	*Randia moorei*	Endangered (TSC Act 1995 & EPBC Act 1999)	Woodward-Clyde 1997
Smooth scrub turpentine	*Rhodamnia maideniana*	ROTAP LISTED	Warren 1994, Woodward-Clyde 1997, Parker 1999, EcoPro 2004
Coolamon	*Syzygium moorei*	Vulnerable (TSC Act 1995)	Woodward-Clyde 1997, EcoPro 2004

* Historically recorded adjacent to the subject site only

4. DIRECTOR GENERAL'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

4.1 Background

A concept plan for the proposed residential community at Cobaki Lakes was authorised on the 24th of January 2007. Subsequently, the Director-general's Environmental Assessment Requirements (DGEAR's) have been outlined in a letter from the NSW Governments Department of Planning dated 21st August 2007.

As previously discussed, JWA were engaged by LEDA Manorstead Pty Ltd to complete an Ecological Assessment for land at Cobaki Lakes, Cobaki in November 2008. Following submissions from the public and State Agencies, and subsequent amendments to the proposed Concept Plan, this Ecological Assessment has been revised to provide additional information.

This section of the report aims to address the flora and fauna requirements for the Concept Plan Application which are listed in Section 4 of Attachment 1 of the Department of Planning letter.

The seven (7) flora and fauna requirements that the Director-general has listed for assessment are as follows:

1. Demonstrate that the development footprint will not adversely impact on existing native flora and fauna. This should include consideration of the impact of the proposal on wildlife corridors, any remnant bushland, Koala habitat in accordance with SEPP 44 and consultation with Council and threatened species and their habitats in accordance with draft *Guidelines for Threatened Species Assessment (*July 2005).
2. Provide a description of the proposed treatment of any ecological buffers, including interaction with the proposed land uses, asset protection zones, stormwater structures, extent of proposed environmental restoration and enhancement works.
3. Assess proposed native vegetation clearing with consideration of potential impacts and if applicable, provide details of any offset strategy or other suitable mitigation measures to ensure that there is no net loss of native vegetation values.
4. Consideration of the provision, management and ongoing maintenance of general public open space.
5. Provide an assessment against SEPP 14 – Coastal Wetlands.
6. Address the requirements of Councils DCP 25 – Biting Midge and Mosquito Control.
7. Consideration of impacts, if any, on matters of national environmental significance under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999.*

Each of these requirements will be addressed in the following sections of this report.

4.2 Demonstrate that the development footprint will not adversely impact on existing native flora and fauna

4.2.1 Introduction

This section will consider the impact of the proposed development on wildlife corridors, remnant bushland, Koala habitat in accordance with SEPP 44 and Tweed Shire Council, and any threatened species and their habitats in accordance with draft *Guidelines for Threatened Species Assessment (*July 2005).

4.2.2 Summary of existing flora and fauna values

A detailed flora assessment which discusses the methods used in the vegetation assessment and provides a description of the location, composition and extent of the vegetation communities on the Subject was provided within the original Ecological Assessment (JWA 2008)**.**

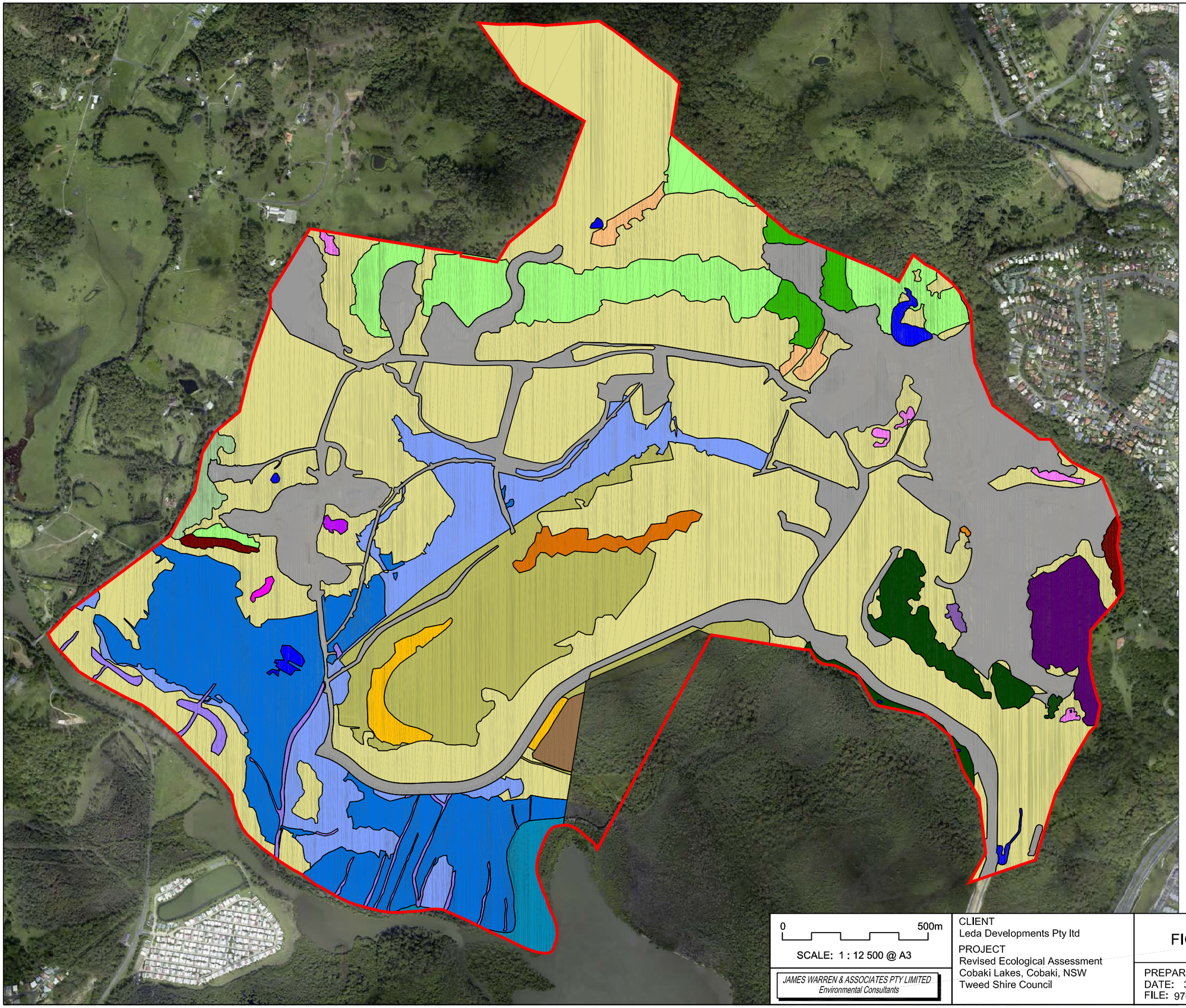
Subsequent to the completion of the 2008 Ecological Assessment, existing earthworks approvals have been implemented in some portions of the subject site and existing use rights (i.e. cattle grazing) have continued. The vegetation mapping prepared in 2008 has therefore been overlayed on a recent aerial photograph (March 2010) and mapped boundaries checked. In areas where vegetation extent was not clear on the aerial photograph, ground-truthing was completed.

The latest flora assessment recorded sixteen (16) broad vegetation associations comprising twenty-two (22) vegetation communities (**FIGURE 13**). In total, four hundred and forty-nine (449) flora species have been recorded at the subject site. This list is a compilation of all plant species recorded from the site by JWA as well as during previous flora assessments (i.e. WBM 1990 & 1991b; Woodward-Clyde 1997 & Parker 1999).

A total of eight (8) threatened flora species have been recorded on the subject site to date. An additional five (5) Threatened flora species have been recorded to date during surveys on adjacent land (EcoPro 2004).

A detailed fauna assessment which includes a description of the methods used in determining which fauna species use, or are likely to use, the Study area and a discussion of the results of fauna surveys completed on the subject site was also provided within the original Ecological Assessment (JWA 2008). Fauna surveys on the subject site have revealed the presence of thirteen (13) amphibian species, ten (10) reptile species, one hundred and thirty-eight (138) bird species and thirty-three (33) mammal species.

A total of twelve (12) Threatened fauna species have been recorded from the subject site to date. An additional eighteen (18) Threatened fauna species have been recorded to date during surveys on adjacent land (EcoPro 2004).



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 - Low closed forest (Heathland)
- Community 5 - Mid-high open woodland (Mixed rainforest species)
- Community 6 - Mid-high open woodland (*E. robusta*)
- Community 7 - Mid-high open woodland (*E. racemosa*)
- Community 8 - Mid-high open woodland (*E. siderophloia*)
- Community 9 - Low closed forest (Revegetation areas +/- Mixed *Eucalyptus* species)
- Community 10 - Low closed grassland with scattered trees (Pastoral grassess +/- Mixed species)
- Community 11 - Low closed grassland (*Sporobolus virginicus*, *Triglochin striata* +/- *Casuarina glauca*)
- Community 12 - Rushland/sedgeland/ grassland (Mixed aquatic species)
- Community 13 - Low to mid-high open mangrove forest (*Avicennia marina* var *australasica* / *Aegiceras corniculatum* +/- *Casuarina glauca*)
- Community 14 - Dams & drainage lines (Mixed aquatic species)
- Community 15 - Low open forest/woodland (*Casuarina glauca* +/- Mixed species)
- Community 16 - Slashed grassland/ heathland/sedgeland (Mixed Species)
- Unvegetated land
- Site Outline

SOURCE:
Vegetation - James Warren & Associates Pty Ltd
July/Sept 2007 & May 2008
Aerial - Michel Group Services (Ref: 6400-197.dwg)
- photo taken March 2010

0 500m

SCALE: 1 : 12 500 @ A3

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Environmental Consultants

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Tweed Shire Council

FIGURE 13

PREPARED: BW
DATE: 30 June 2010
FILE: 97038_EA_Base.dwg

TITLE

VEGETATION COMMUNITIES

4.2.3 Wildlife corridors

4.2.3.1 Applicability to the subject site

The National Parks & Wildlife Service (NPWS) Key Habitats and Corridors database shows a number of regional and sub-regional habitat corridors within the locality of the site (**FIGURE 14**).

The NPWS Key Habitats and Corridors database maps the Cobaki-Terranora Regional Corridor as traversing a large area of the eastern portion of the Subject site. The corridor is a link between Cobaki Wetlands and Terranora Broadwater.

Three (3) Sub-regional corridors branch off this Regional corridor - the Pigabeen corridor, the McPherson corridor and the Cobaki corridor. The Pigabeen corridor traverses the central portion of the site in a generally east-west direction, linking Pigabeen with Cobaki Wetlands. The McPherson corridor traverses the northern portion of the site, forking off to the north and west, and forming a link between the Cobaki Wetlands and Mt Tomewin. The Cobaki corridor branches off the Cobaki-Terranora Regional Corridor across a small portion of the far-eastern edge of the Subject site, linking Cobaki Wetlands with Cobaki Broadwater.

Additionaly, the database mapping shows that key habitat has been identified as occurring within the northern, western and southern portions of the site (**FIGURE 14**). As described by NPWS (2007), key habitats are areas of predicted high conservation value for fauna assemblages, endemic forest vertebrates or endemic invertebrates; depicted spatially as a merging of mapped assemblage hubs, assemblage hot spots and centres of endemism.

The forested Crown lands which form the boundary of NSW and QLD occur between the Cobaki Lakes northern and western boundaries and the border. This elevated forest community creates a link near the north-eastern boundary of the site to 'Wallum' habitats surrounding the Cobaki Broadwater. This link, which extends to Mt. Cougal in the north-west, is considered to be of high importance by NPWS. These issues have been addressed in a previous approval for the Boyd Street access (Warren *et al.* 1994).

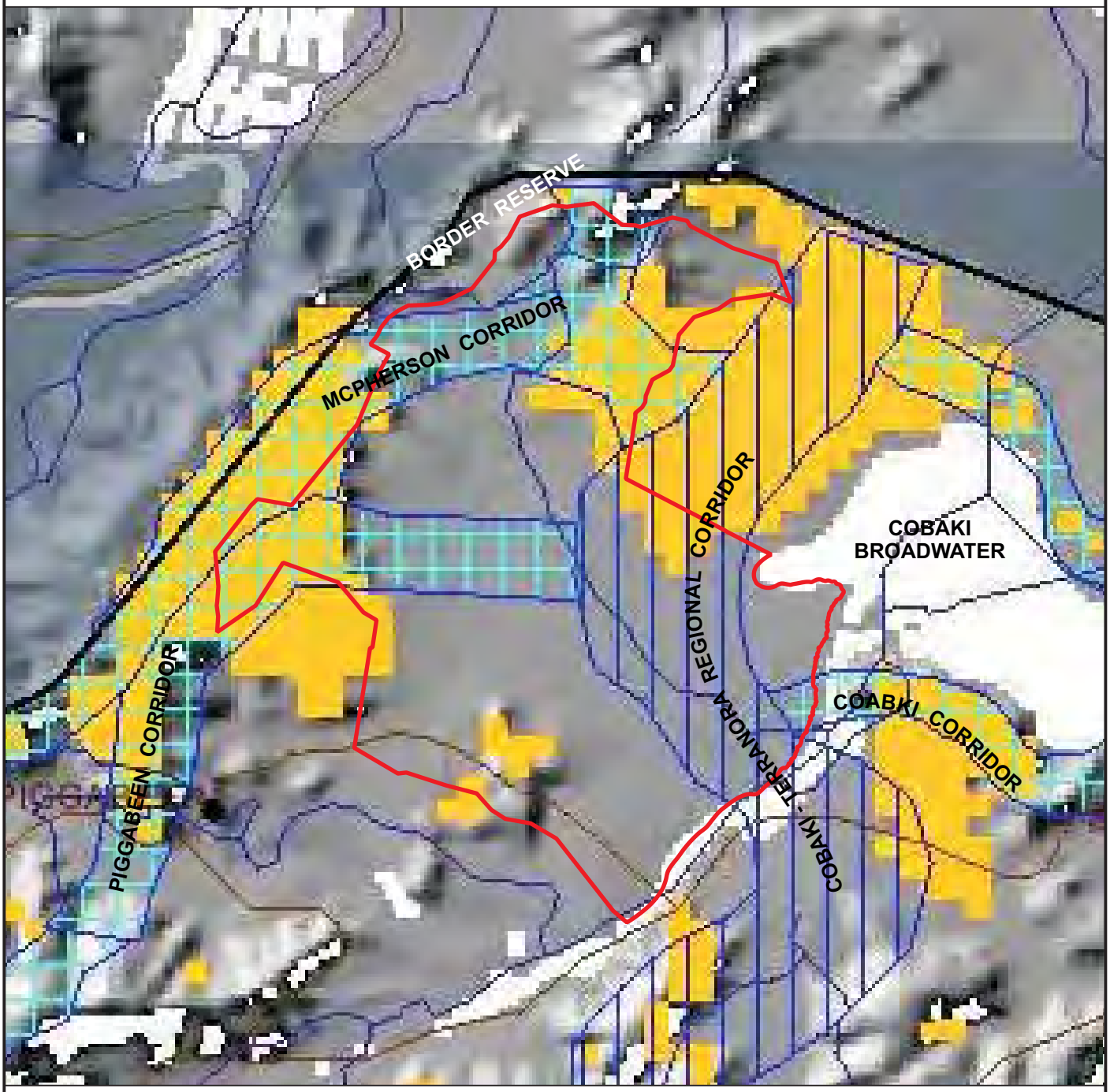
4.2.3.2 Accuracy of NPWS mapping

Site assessments have revealed that the NPWS Corridor mapping is inaccurate over the subject site. Large areas of the site that are included in the mapping have been cleared of vegetation in accordance with various development approvals. An overlay of the NPWS Corridor mapping on a recent aerial photograph of the site is included as **FIGURE 15**.

4.2.3.3 Potential impacts

The Proposed development has the potential to reduce the overall effectiveness of the site as a corridor due to habitat loss and fragmentation. Edge effects may also further impact on retained vegetation and corridor habitat.

Impacts of the proposed development on the NPWS corridor mapping are depicted in **FIGURE 16.**



Legend
- Regional Corridor
- Subregional Corridor
- Key Habitat
- Subject Site

N

0 750m

SOURCE: NSW NPWS Key Habitats & Corridors in North East NSW (NPWS website 22.10.07)

SCALE: 1 : 30 000 @ A4

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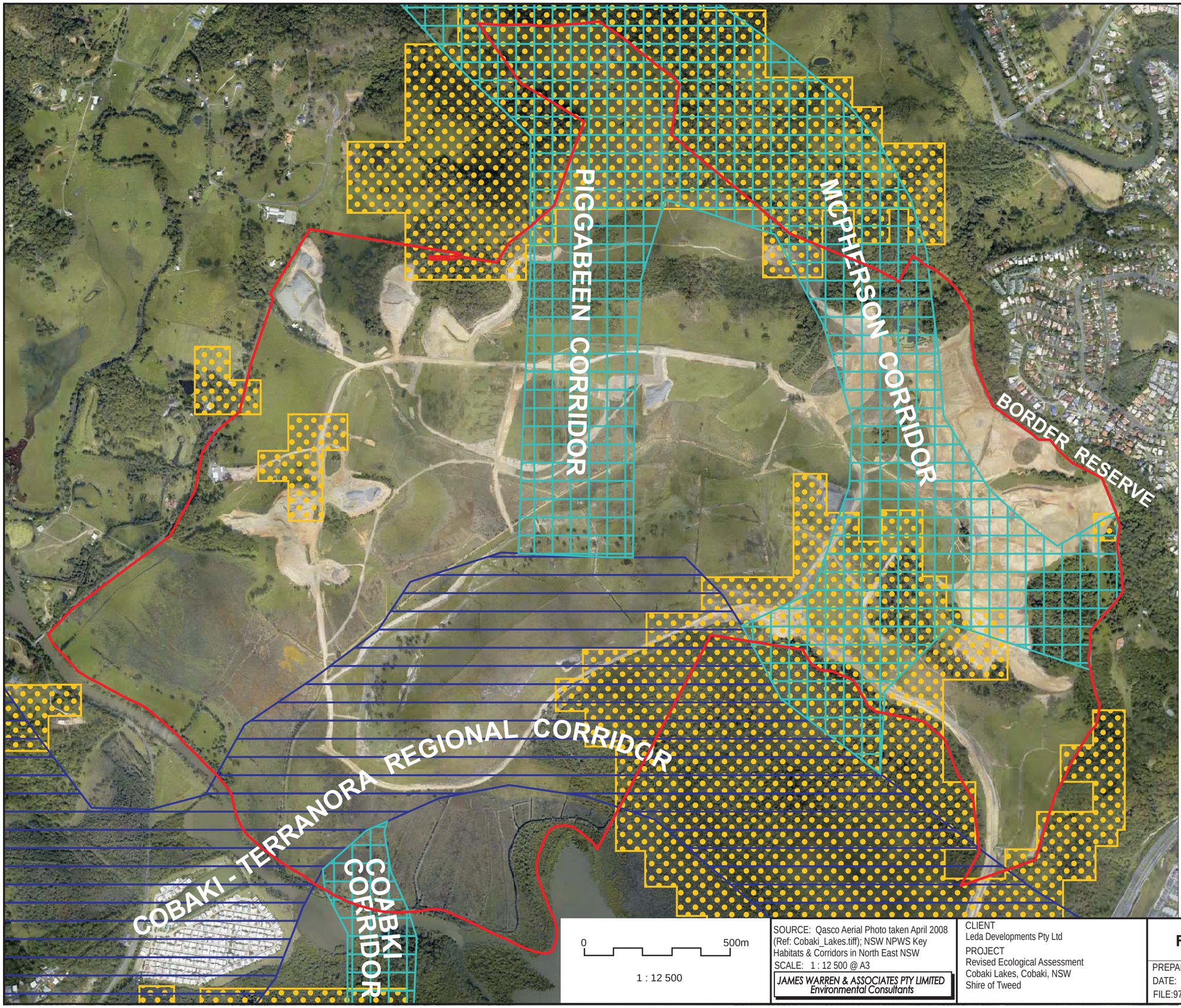
FIGURE 14

PREPARED: BW
DATE: 30 June 2010
FILE: 97038_EA_Corridors.cdr

TITLE

NPWS KEY HABITATS & CORRIDORS



N

LEGEND

- Regional Corridor
- Subregional Corridor
- Key Habitat
- Site Outline

0 500m

1 : 12 500

SOURCE: Qasco Aerial Photo taken April 2008 (Ref: Cobaki_Lakes.tiff); NSW NPWS Key Habitats & Corridors in North East NSW

SCALE: 1 : 12 500 @ A3

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FIGURE 15

PREPARED: BW
DATE: 30 June 2010
FILE:97038_EA_overlay corridor.cdr

TITLE

ACCURACY OF NPWS KEY HABITATS & CORRIDORS