

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

0500m

SCALE: 1 : 12 500 @ A3

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Revised Ecological Assessment
Cobaki Lakes, Cobaki, NSW
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.

Additionally, 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).

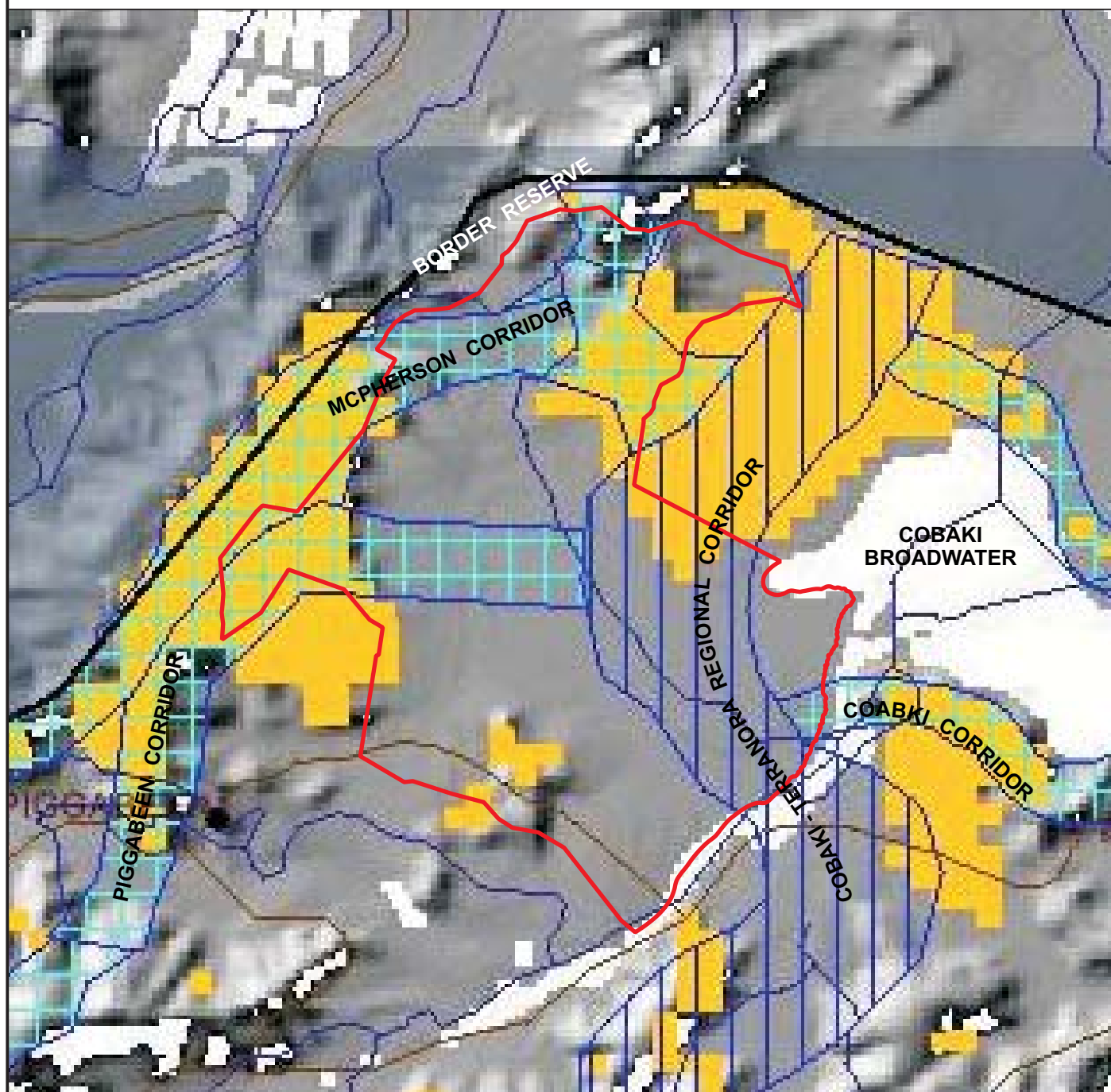
4.2.3.2 Accuracy of NPWS mapping

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

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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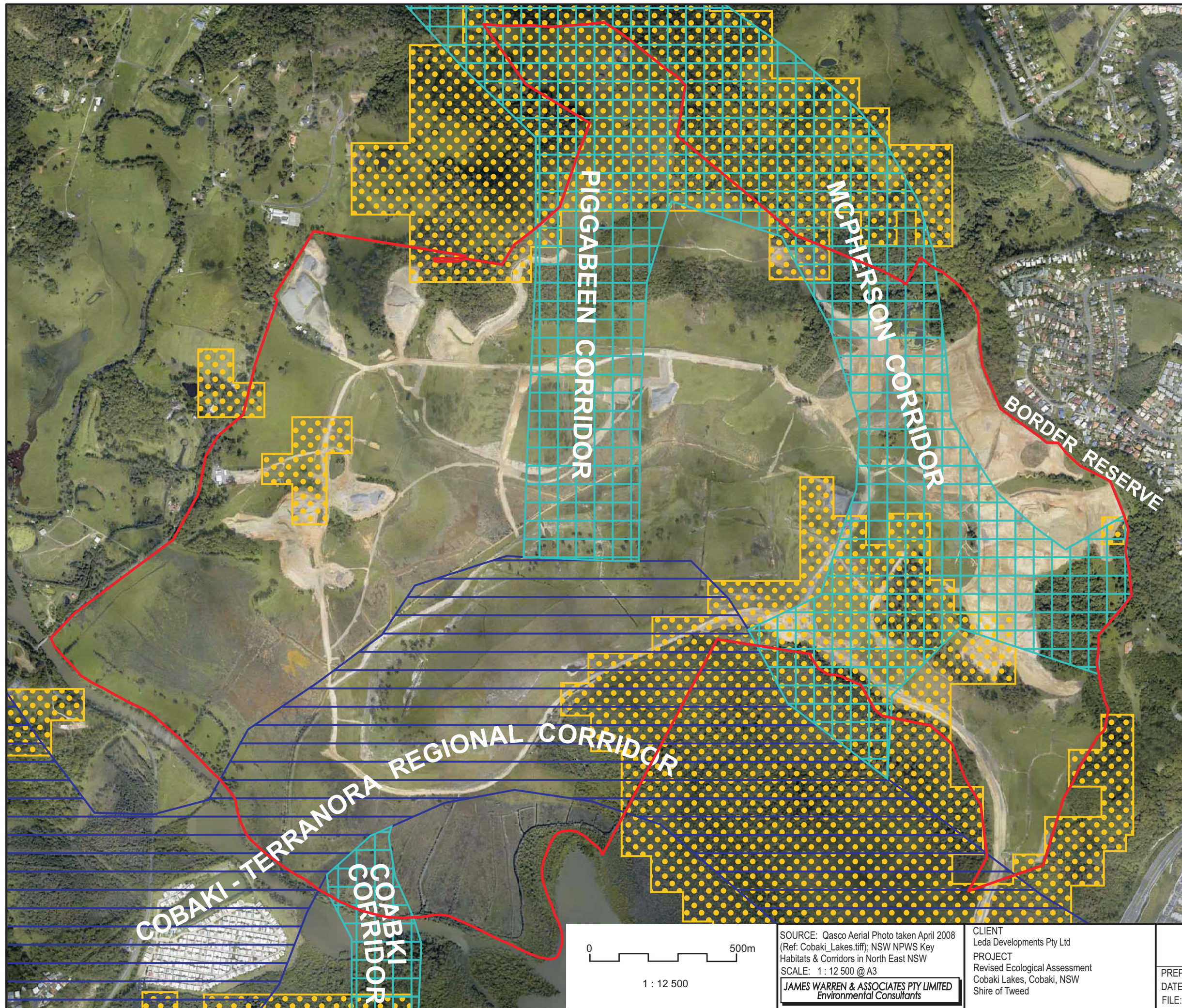
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Cobaki Lakes, Cobaki, NSW
Shire of Tweed

FIGURE 14

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

TITLE

**NPWS
KEY HABITATS
& CORRIDORS**



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

COBAKI - TERRANORA REGIONAL CORRIDOR

COBAKI CORRIDOR

PIGGABEEN CORRIDOR

MCPHERSON CORRIDOR

BORDER RESERVE

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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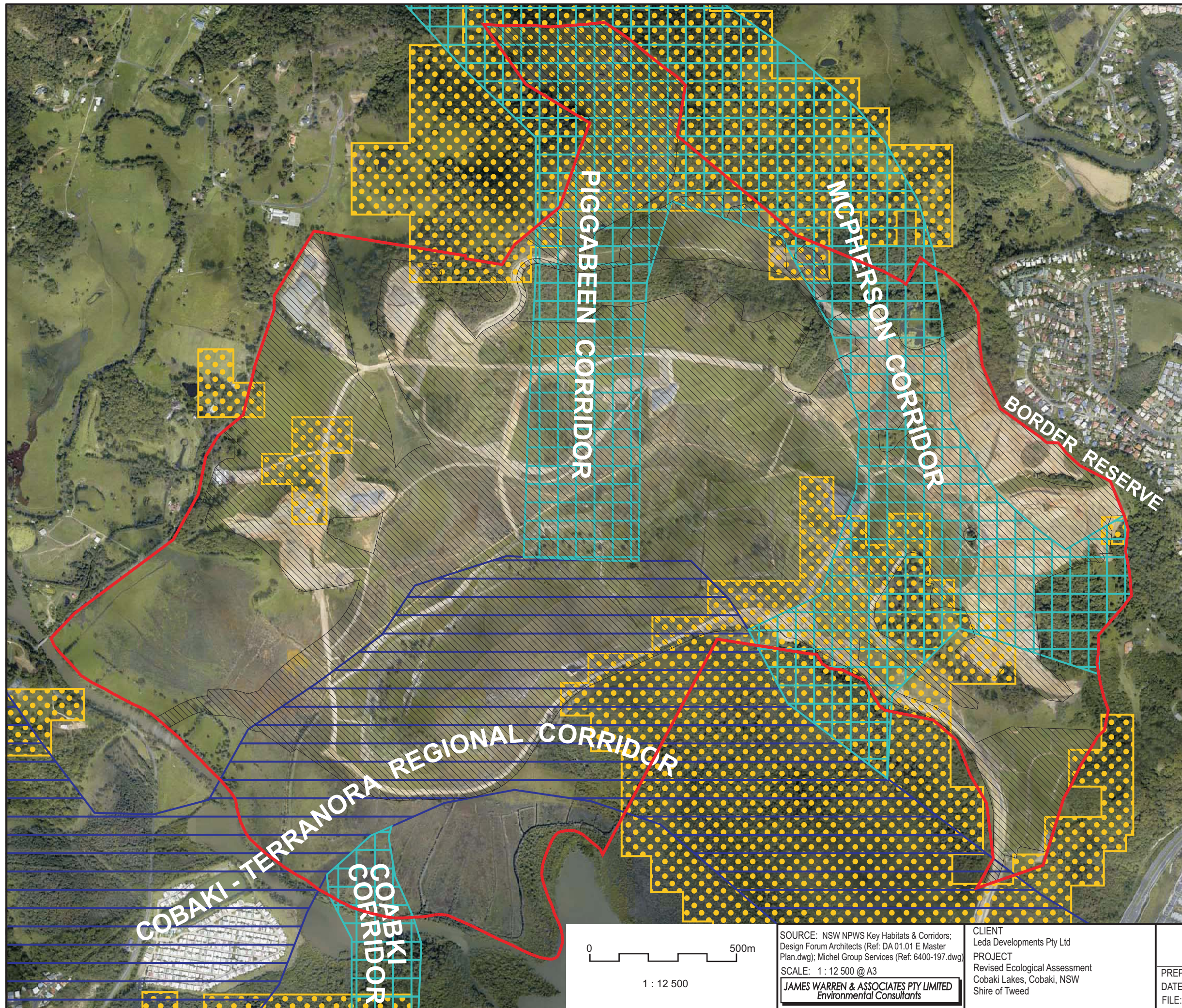
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FIGURE 15






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

TITLE

**ACCURACY OF
NPWS KEY HABITATS
& CORRIDORS**



LEGEND

-  Regional Corridor
-  Subregional Corridor
-  Key Habitat
-  Proposed Development Areas
-  Site Outline

COBANKI - TERRANORA REGIONAL CORRIDOR

COBANKI CORRIDOR

PIGGABEEN CORRIDOR

MCPHERSON CORRIDOR

BORDER RESERVE

0 500m
1 : 12 500

SOURCE: NSW NPWS Key Habitats & Corridors;
Design Forum Architects (Ref: DA 01.01 E Master
Plan.dwg); Michel Group Services (Ref: 6400-197.dwg)
SCALE: 1 : 12 500 @ A3
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Shire of Tweed

FIGURE 16

PREPARED: BW
DATE: 22 October 2012
FILE: 97038_EA_Impact corridor.cdr

TITLE
**IMPACT ON NPWS
KEY HABITATS
& CORRIDORS**

4.2.3.4 Proposed amelioration measures

The proposed development has been designed to utilise existing cleared areas where possible. A network of existing vegetated corridors will be retained on the site the most significant of which, include the forested escarpment in the western portion of the site and Mt. Woodgee and associated rainforest habitats in the northern portion of the site. Additionally, smaller interlinking corridors will be provided on the Subject site through regeneration and revegetation works.

A Revised Site Regeneration and Revegetation Plan has been prepared for the Subject site (JWA 2013a) and will result in approximately 83.06ha of revegetation and 9.54ha of regeneration works. The regeneration and revegetation works will provide vegetated links across the site and ensure that the remaining wildlife corridors will be embellished utilising revegetation and natural regeneration principles.

4.2.4 *Remnant Bushland*

4.2.4.1 Applicability to the Subject site

NPWS (2003) describe remnant vegetation as those patches of native trees, shrubs and grasses remaining following clearing operations. The NSW *Native Vegetation Act* (2003) (NV Act 2003) defines remnant native vegetation as any native vegetation other than regrowth. For the purposes of NV Act 2003, regrowth refers to any native vegetation that has regrown since 1st January 1990.

Remnant vegetation:

- can be of any shape or size;
- can include all types of native vegetation communities, including forest woodland, native grasslands, mallee, coastal heathland or rainforest.

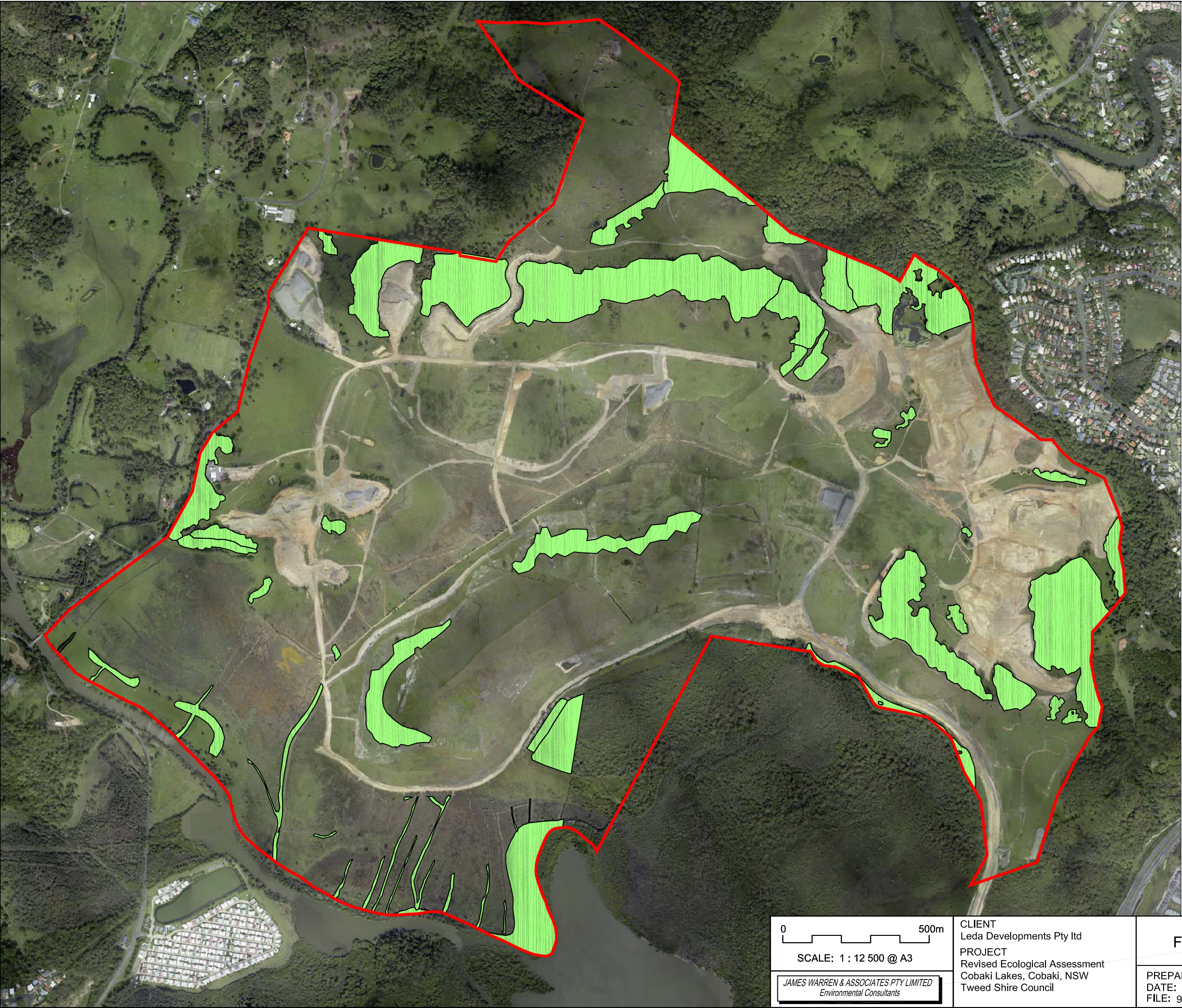
Numerous vegetation surveys have been completed on the Subject site by JWA between 2000 and the present and have included detailed mapping of vegetation communities as well as searches for Threatened flora species. A plan showing the location of the remnant bushland occurring on the Subject site is included in **FIGURE 17**.

4.2.4.2 Impacts on Remnant Bushland

The potential impacts on remnant bushland from the proposed development are shown in **FIGURE 18**. A summary of the potential loss of remnant bushland is shown in **TABLE 3**.

TABLE 3
POTENTIAL LOSS OF REMNANT BUSHLAND
FROM THE PROPOSED DEVELOPMENT

| Community | TOTAL AREA (ha) | Area to be Removed (ha) | Area to be Removed (%) |
|-----------|-----------------|-------------------------|------------------------|
| 1a | 31.84 | 3.65 | 11.46% |
| 1b | 4.84 | 0.75 | 15.50% |
| 1c | 9.35 | 0.19 | 2.03% |



LEGEND

Remnant Bushland

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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FIGURE 17

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

TITLE

REMNANT
BUSHLAND



- LEGEND**
- Remnant Bushland
 - Proposed Development Areas
 - Site Outline

SOURCE:
Vegetation - James Warren & Associates Pty Ltd
July/Sept 2007 & May 2008
Impact Area - Design Forum Architects
(Ref: DA 01.01 E Master Plan.dwg)
Aerial - Michel Group Services (Ref: 6400-197.dwg)
- photo taken March 2010

0 500m
SCALE: 1 : 12 500 @ A3

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FIGURE 18
PREPARED: BW
DATE: 05 April 2013
FILE: 97038_EA_Base.dwg

TITLE
IMPACT ON
REMNANT
BUSHLAND

| Community | TOTAL AREA (ha) | Area to be Removed (ha) | Area to be Removed (%) |
|--------------|-----------------|-------------------------|------------------------|
| 1d | 2.58 | 0.77 | 29.84% |
| 2a | 8.86 | 0.07 | 0.79% |
| 2b | 0.34 | 0.01 | 2.94% |
| 2c | 0.39 | 0.02 | 5.13% |
| 2d | 1.41 | - | 0% |
| 3 | 1.88 | 0.01 | 0.53% |
| 4 | 2.44 | - | 0% |
| 5 | 0.07 | 0.01 | 14.29% |
| 6 | 3.80 | 3.80 | 100% |
| 7 | 4.19 | 3.60 | 85.92% |
| 8 | 0.27 | - | 0% |
| 9 | 2.67 | 0.13 | 4.87% |
| 13 | 5.66 | - | 0% |
| TOTAL | 80.59ha | 13.01ha | 16.14% |

In total 13.01 hectares of remnant bushland will be lost from the Subject site (16.14% of the total area of remnant bushland). The majority of remnant bushland to be removed occurs within portions of the site with existing development approval whilst a small area of remnant bushland will be removed from areas without current development approvals.

4.2.4.3 Proposed amelioration measures

The majority of existing remnant bushland on the Subject site will be retained. A total of 71.35 hectares (88.33%) of the remnant bushland on the Subject site will be retained. This bushland will be retained within Environmental Protection Areas as well as Open Space areas throughout the development envelope.

The Revised Site Regeneration and Revegetation Plan (JWA 2013a) outlines the various measures to ensure that the retained remnant vegetation is adequately managed. Approximately 60.76ha of revegetation/regeneration works will be completed in accordance with this plan to offset any loss of remnant bushland and to provide vegetated links across the site. Additional amelioration measures for the remnant vegetation will include:

- Weed control will primarily be completed by a qualified Bush regenerator;
- All weed control will be completed using the recommended methods (ARBA approved);
- Weed control will be undertaken on a progressive basis over a three (3) - five (5) year period;
- Embellishment plantings are to be used to consolidate each of the areas of remnant vegetation;
- All areas of remnant vegetation will be fenced to exclude pedestrian traffic and cattle grazing;
- Formal pathways are to be provided through areas of remnant vegetation to prevent the creation of numerous informal tracks;

- All of the rehabilitation works are to be completed by qualified bush regenerators;
- A monitoring and maintenance program for areas of remnant vegetation will be included in the Vegetation Rehabilitation and Management Plan.

4.2.5 Koala Habitat

4.2.5.1 Council consultation - Tweed Coast Koala Atlas (TCKA)

In April, 1993 Council resolved to contribute \$10,000 to the Australian Koala Foundation (AKF) to assist them in the preparation of a Tweed Coast Koala Atlas for the eastern section of the Shire. The 37,608 hectare study area comprises approximately 29 percent of Tweed Shire.

The Tweed coast Koala atlas maps parts of the site as Secondary Habitat (**FIGURE 19**). However, clearing activities on the Subject site have occurred subsequent to the preparation of the Koala habitat mapping. This has resulted in the removal of vegetation within large areas of the mapped secondary habitat, which now consists of open grassland and is not considered to represent Koala habitat. Recent vegetation assessments of the site have recorded grasslands with scattered trees occurring over much of the Secondary habitat mapped in the Tweed Koala Atlas.

JWA are of the opinion that the large area of mapped Secondary habitat located on the elevated plateau in the western portion of the site, does not represent secondary Koala habitat as described in the Summary of Tweed Coast Koala Atlas.

It should be noted that in the absence of a shire-wide Koala Plan of Management (KPOM), State Environmental Planning Policy No. 44 (SEPP 44) applies.

4.2.5.2 State Environmental Planning Policy No. 44 - Koala Habitat Protection

In response to the state-wide decline of Koala populations the Department of Planning has enacted SEPP - 44 Koala Habitat Protection. The Policy aims to “encourage the proper conservation and management of area of natural vegetation that provide habitat for Koalas, to ensure permanent free-living populations over their present range and to reverse the current trend of population decline.”

A number of criteria in the SEPP are to be addressed:

1. *Does the policy apply?*

Does the subject land occur in an LGA identified in Schedule 1?

The Subject site occurs in the Tweed LGA, which is listed under Schedule 1.

Is the landholding to which the DA applies greater than 1 hectare in area?

Yes.



Legend

- Primary Habitat
- Secondary Habitat (Class A)
- Secondary Habitat (Class B)
- Unknown Habitat Quality
- Mainly Cleared (Some Trees)
- Other Vegetation Communities
- Subject Site



0 750m

SOURCE: Australian Koala Foundation - Tweed Coast Koala Habitat Atlas (Tweed Shire Council Mapping)

SCALE: 1 : 30 000 @ A4

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Cobaki Lakes, Cobaki, NSW
Shire of Tweed

FIGURE 19

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

TITLE

**KOALA
HABITAT
AREAS**

2. *Is the land potential Koala habitat?*

Does the site contain areas of native vegetation where the trees of types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component?

The majority of scattered trees within Community 6 in the eastern portion of the site are Swamp mahogany (*Eucalyptus robusta*), which is listed as a Primary Koala food tree under Schedule 2 of SEPP 44. This community covers a total area of approximately 3.80 hectares and Swamp mahogany in this area constitutes 95% of the total number of trees in the upper strata.

The majority of scattered trees within Community 7 in the eastern portion of the site are Scribbly gum (*Eucalyptus signata*), which is listed as a Primary Koala food tree under Schedule 2 of SEPP 44. This community covers a total area of approximately 4.19 hectares and Scribbly gum in this area constitutes 95% of the total number of trees in the upper strata.

At least 15% of the total number of trees in the upper strata of Community 1a (Blackbutt - Tallowwood association), are Tallowwood (*E. microcorys*), which is also listed under Schedule 2 of SEPP 44. This community covers a total area of approximately 31.84 hectares and Tallowwoods constitute at least 15% of the total number of trees in the upper strata, whilst the lower strata comprises a sparse midstorey of dry Sclerophyll species including Crinkle bush (*Lomatia silaifolia*), Geebung, Grass trees, various *Acacia* species (*A. melanoxylon*, *A. orites*), Dogwood, Forest oak, Tree heath, Red ash, Wild may (*Leptospermum flavescens*), Lantana and regenerating *Eucalyptus* species.

At least 15% of the total numbers of trees in the upper strata of Community 1d (Tall open sclerophyll forest) are Forest red gum (*E. tereticornis*), a species listed under Schedule 2 of SEPP 44. This community covers a total area of approximately 2.58 hectares. Forest red gums are scattered throughout this community, and constitute at least 15% of the total number of trees in the upper strata. Around the edges of this community the lower strata is sparse, comprised of species including Camphor laurel, Sweet pittosporum, Umbrella cheese tree, Blunt-leaf bitter-pea, Geebung, various *Acacia* species, Tree heath, Red ash, Lantana and regenerating *Eucalyptus* species.

Tallowwoods, Swamp mahogany and Forest red gums over the remainder of the site are estimated to constitute less than 15% of the total number of trees in the upper and lower strata.

The NPWS online database was consulted for recent sightings and historical records of Koalas in the locality. The NPWS database (June 2010) contained ninety-eight (98) records of this species within 10 kilometres of the site.

The NPWS online database (June 2010) contained five hundred and seventy-four (574) sightings of this species in the Tweed LGA, the nearest of which was within 1kms of the Subject site.

Warren (1994) completed a detailed assessment of Koala habitat usage on the Subject site. Approximately 483 trees in the Scribbly gum/ Swamp mahogany community and the Blackbutt community were assessed for Koala activity. Most of the trees inspected were restricted to Grey gum, Tallowwood and Forest red gum as these are known to be

preferentially browsed by Koalas in the region. The analysis was based on scratch density on trees as well as the occurrence of faecal pellets around the base of the tree. Each tree was allocated a rating of 0-5 depending on the density of pellets or scratch marks. 0 indicated absence of Koala activity whilst 5 indicated a level of high activity. Only a very small number of trees showed any indication of activity and none of the trees showed an activity level greater than 2. In some cases it was difficult to ascribe the scratches to Koalas as there were no faecal pellets and it is known that Common Brushtail Possums and Lace monitors occur on the site.

More recently (December 2007), areas of the site containing preferred Koala food trees (i.e. Swamp mahogany, Forest red gum, Tallowwood, Grey gum, Scribbly gum) were searched for evidence of Koala activity (i.e. scats, scratches). Two (2) scientists spent approximately twelve (12) hours on this component of the assessment. A nocturnal survey was also completed including spotlighting and call playback techniques. Approximately eight (8) hours was spent on this component of the assessment. No conclusive evidence of Koala activity (scats) was recorded on the site. Whilst a number of trees contained scratch marks, this is not considered a conclusive method of identifying Koala activity when not accompanied by scats, as they may be attributed to other more common arboreal species. One (1) male Koala was heard calling approximately 200-300m north of the south-western corner of the Subject site.

No records of a resident population, evidenced by attributes such as breeding females, exist for the Subject site. It is considered that Koalas may occasionally disperse across the site whilst moving through the locality. It is considered that the site does not support core Koala habitat.

Whilst a number of areas of the site contain Primary Koala food trees as discussed above, these comprise less than 1% of the total number of trees on the Subject site. No further assessment under SEPP 44 is therefore required.

4.2.5.3 Impacts on Koala Habitat

As discussed within Section 4.2.5.2 above, JWA consider that vegetation communities 1a, 1d, 6 and 7 provide suitable habitat for the Koala due to the presence of preferred food tree species (**FIGURE 20**). Surveys for the Koala on the Subject site have revealed that a resident population is not present. However, it is considered that this species may occasionally utilise habitat on the Subject site as it disperses through the area. The potential impacts on Koala habitat from the proposed development are shown in **FIGURE 21**.

Suitable Koala habitat to be removed from the Subject site occurs within existing 2(c) zoned land (i.e. Urban Expansion), land proposed to be rezoned as 2(c), or land that may otherwise be cleared in accordance with existing use rights. A summary of the potential loss of suitable Koala habitats is shown in **TABLE 4**.