

Cobaki Estate Environmental Assessment Report

Precincts 9 & 11 Borrow Areas -
Bulk Earthworks

Revision 1
December 2013



Project Name:	Cobaki Estate Development – Precincts 9 & 11
Project Number:	30031162
Report for:	LEDA Manorstead PTY LTD

PREPARATION, REVIEW AND AUTHORISATION

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1 INTRODUCTION

This Environmental Assessment has been prepared by SMEC Pty Ltd for LEDA Manorstead Pty Ltd and relates to the proposed borrow areas located within Precincts 9 and 11 of the Cobaki Estate development.

1.1 Location

The Cobaki Development is located west of the Tugun Bypass and Gold Coast Airport, Tweed Heads. The proposed development is bound by the Queensland and New South Wales border to the north and west and Piggabean Road to the south. The site adjoins Cobaki Creek and Cobaki Broadwater to the east. It is located approximately 6 km west of Tweed Heads/Coolangatta Town Centre and 1.5 km west of the Gold Coast Airport and the Gold Coast Highway, and 500 m west of the Pacific Motorway (Tugun Bypass). Access is currently off Piggabean Road. Future access will be off Boyd Street from the north and linking to Piggabean Road via the proposed Cobaki Parkway.

The site exists in its current state as a large portion of cleared land, which was previously cleared for agricultural purposes (cattle grazing), and scatterings of native vegetation communities.

This report specifically pertains to the borrow areas located in Development Precincts 9 and 11. Precincts 9 and 11 occur in the south-western portion of the Cobaki site and consist of land described as Lot 2 DP 566529, Lot 1 DP 562222, Lot 1 DP 570077, Lot 1 DP 823679, Lots 46, 228 & 305 DP 755740. Precinct 9 covers a total area of approximately 22.6 ha and Precinct 11 covers an area of approximately 15.6 ha.

The location of Development Precincts 9 and 11 with respect to the Cobaki site is shown in Figure 1.

1.2 Scope

LEDA Manorstead are seeking a modification application for the Cobaki Estate Central Open Space Project Approval (08_0200 Mod 1) for the winning of fill from Precincts 9 and 11 for construction of the Central Open Space (as approved under 08_0200), including:

- Precinct 9 - Quarrying of approximately 500,000m³ of fill material sufficient to complete bulk earthworks in Stage 1 of the Central Open Space.
- Precinct 11 – Quarrying of approximately 100,000m³ of fill material to complete bulk earthworks in the Central Open Space (Stage 2 and 3).

This report details potential environmental impacts of the proposed borrow earthworks and a description of environmental management, mitigation and monitoring measures to minimise these potential impacts.

Refer to Drawing YC0229-1E1-D03 of Appendix A for Scope of Works.

Figure 1: Site Locality



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GDA 1994 MGA Zone 56

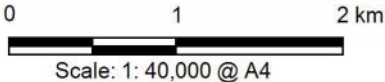


FIGURE 1 - Site Locality

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PROJECT NO. 30031162 **PROJECT TITLE** Cobaki Estate Management Plans

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1.3 Previous Studies

A number of previous studies have been undertaken and management plans prepared as part of the various stages of development approval for this proposed development. These have been reviewed as part of this assessment.

Studies and Plans reviewed as part of this report include, but are not limited to:

- Environmental Noise Impact Report. Proposed Earthworks for Central Open Spaces Stages 9 and 11, Cobaki Parkway (CRG Acoustical Consultants, 2013)
- Flora and Fauna Monitoring Program (SMEC, 2013a)
- Wallum Froglet Compensatory Habitat Management Plan (SMEC, 2012a)
- Freshwater Wetland Compensatory Habitat Management Plan (SMEC, 2012b)
- Revised Assessment of Significance (JWA, 2013a)
- Revised Ecological Assessment (JWA, 2013b)
- Revised Regeneration and Revegetation Plan (JWA, 2012a)
- Revised Saltmarsh Rehabilitation Plan (JWA, 2012b)
- Revised Fauna Management Plan (JWA, 2010a)
- Environmental Assessment Report Part 3A Concept Plan (JBA Urban Planning, 2008)

The various management plans have specific management measures, monitoring and reporting requirements that must be implemented as per the various conditions of approval relating to this proposed development.

2 APPROVALS AND LICENSING

The legislative requirements, policies, guidelines and standards relevant to the project are summarised in Table 1.

Table 1: Environmental Legislation Relevant to the Project

Legislation	Details of Approvals/Permits Required	Relevance to the Project
Commonwealth		
Environmental Protection and Biodiversity Act 1999 (EPBC)	The EPBC Act requires that actions that are proposed to be taken which are likely to have a significant impact on matters of national environmental significance (NES) are referred to the Minister for a decision on if it will be subject to a rigorous assessment and approval process. The EPBC Act also applies to actions that are likely to have a significant impact on the environment of Commonwealth land and to actions taken by the Commonwealth that will have a significant impact on the environment anywhere.	The Minister of SEWPaC provided approval of the development on 13 th October 2011, subject to a list of conditions.
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	The Aboriginal and Torres Strait Islander Heritage Protection Act 1984 is the principal Commonwealth legislation for the protection of areas and objects of particular significance to Indigenous Australians.	The Act applies in addition to any State requirements. Persons who discover anything that they have reasonable grounds to suspect to be Aboriginal remains are required to report their discovery to the Minister (s.20).
Native Title Act 1993	The Native Title Act (1993) was developed by the Federal Government in recognition of the outcomes of the <i>Mabo versus Queensland</i> High Court decision in 1992 which found that the common law of Australia could authorise the rights of Aboriginal and Torres Strait Islander people to lands and waters according to their laws and customs (refer HCA₂₃ 1992). The Act aims to authorise and protect Aboriginal peoples' and Torres Strait Islanders' common law native title rights and interests with specifically to: - provide for the recognition and protection of native title; - establish ways in which future activities affecting native title may proceed; - establish a mechanism for determining applications for the recognition of native title; and - provide for, or permit, the validation of certain acts carried out before 1 January 1994 that were made invalid because of the existence of native title. The Act was substantially amended in 1998. The	Under the Native Title Act 1993 (Cwlth), the valid grant of a freehold estate on or before 23 December 1996 is known as a 'previous exclusive possession act' (PEPA). This means that native title has been extinguished over the area in question tenured as freehold. The area over which the Cobaki Development is proposed is tenured as freehold and therefore meets the definition of a PEPA.

Legislation	Details of Approvals/Permits Required	Relevance to the Project
	amended <i>Native Title Act (1993 (Cwlth))</i> allows for confirmation that native title rights and interests have been extinguished (removed) outright by providing a list of the kinds of acts or activities that extinguish native title rights and interests, and provides for, or permits, the validation of certain acts carried out between 1 January 1994 and 23 December 1996.	
New South Wales		
Environmental Planning and Assessment Act 1979 and Environmental Planning and Assessment Regulations 2000 (EP&A Act)	Development in NSW is regulated principally through the EP&A Act. It establishes a system of identifying development requiring consent, and the applicable assessment and approval processes. The Act makes provision for the development of Environmental Planning Instruments including State Environmental Planning Policies (SEPPs) and Local Plans.	On February 1 2007, the Director General, as delegate of the Minister of Planning, advised the applicant that the proposal for Cobaki Lakes Estate is a 'major' project to which Part 3A of the EP&A Act applies and requires the Minister's approval, and authorizes the submission of the Concept Plan.
Threatened Species Conservation Act 1995	The Threatened Species Act 1995 identifies and protects threatened and endangered species, populations and ecological communities.	As several threatened species and endangered ecological communities will be impacted by the proposed development a number of management plans have been conditioned as part of MP06_0316 and MP08_0200 to ensure the long term protection of such species/communities.
National Parks and Wildlife Act 1974	The NPW Act provides for the reservation and dedication of national parks, nature reserves, historic sites etc and protection of certain native flora and fauna. It is also the principal legislation for the protection of Aboriginal objects and places of significance ("Aboriginal places"). It is an offence to disturb or move any Aboriginal objects without a permit (s.86). Similarly, it is an offence to destroy, deface or damage an Aboriginal place or Aboriginal object without consent from the D-G NPWS (s.90).	Section 84 and 90 of the National Parks and Wildlife Act 1974 (NPW Act) provides the primary basis for the legal protection and management of Aboriginal sites and relics within NSW. The Act requires amongst other things: • Consultation with the OEHS prior to development to determine the existence of items of Aboriginal heritage; • Consultation with local Aboriginal groups; and • Consent to disturb Aboriginal heritage sites/items. In the case of a Part 3A Concept Plan, approval under the NPW Act is not required.
Noxious Weeds Act	The Noxious Weeds Act 1993 defines the roles of government, councils, private landholders and	Personnel and sub-contractors are to be made aware of correct

Legislation	Details of Approvals/Permits Required	Relevance to the Project
1993	public authorities in the management of noxious weeds, according to their potential to cause harm to the local environment.	procedures of removal and treatment of noxious weeds if they are identified in the work area.
Water Management Act 2000	The WMA consolidates the Water Act 1912 and the Rivers and Foreshores Improvement Act. It deals with surface and ground water management. Approval is required to undertake water supply works, drainage works, or floodplain works. The WMA provides a scheme for the transitional recognition of permits granted under the Water Act 1912.	Condition AN2 of the Project Approval requires water licensing.

3 POTENTIAL ENVIRONMENTAL IMPACTS

Construction activities associated with the Precinct 9 and 11 borrow areas include:

- Site establishment including installation of exclusion fencing;
- Vegetation Clearing;
- Temporary erosion, sediment and water quality control measures;
- Topsoil stripping and management;
- Drainage construction; and
- Bulk earthworks (Refer to Appendix A for Bulk earthworks drawings)

Works could potentially impact on the following environmental aspects:

- Native Fauna and habitat;
- Native flora;
- Threatened flora and Endangered Ecological Communities (indirectly);
- Surface water quality;
- Air quality; and
- Cultural heritage.

3.1 Impacts to native fauna and habitat

Earthworks activities associated with Precincts 9 and 11 borrow area will involve the removal of potential habitat for native fauna species. Further, activities associated with bulk earthworks within Precincts 9 and 11 have the potential to indirectly affect fauna and habitats through:

- Mortality and loss of habitat (foraging, breeding, and roosting/nesting) due to changes in land use (vehicle strike, trampling, spills, dumping of waste); and
- Habitat degradation due to altered natural hydrological regimes and increases in pollutants.

Eleven (11) threatened fauna species and/or their habitat have been recorded within or adjacent to Precincts 9 and 11, as detailed in **Table 2**.

Table 2: Threatened fauna species and/or habitat within or adjacent to Precincts 9 and 11.

Common name	Scientific name	Status	Act	Precinct location	
				9	11
Powerful owl	<i>Ninox strenua</i>	Vulnerable	TSC Act	X	X
Masked owl	<i>Tyto novaehollandiae</i>	Vulnerable	TSC Act	X	X
Black-necked stork	<i>Ephippiorhynchus asiaticus</i>	Endangered	TSC Act	X	X
Osprey	<i>Pandion haliaetus</i>	Vulnerable	TSC Act	X	
Grey-headed flying fox	<i>Pteropus poliocephalus</i>	Vulnerable	EPBC Act	X	X
Little bent-wing bat	<i>Miniopterus australis</i>	Vulnerable	TSC Act	X	X
Common bent-wing bat	<i>Miniopterus schreibersii</i>	Vulnerable	TSC Act	X	X
Yellow-bellied sheath-tail bat	<i>Saccolaimus flaviventris</i>	Vulnerable	TSC Act	X	X
Greater broad-nosed bat	<i>Scoteanax rueppelli</i>	Vulnerable	TSC Act	X	X
Eastern free-tail bat	<i>Mormopterus norfolkensis</i>	Vulnerable	TSC Act	X	X
Koala	<i>Phascolarctos cinereus</i>	Vulnerable	TSC Act	X	X

Specific potential impacts to threatened fauna and habitat are detailed below.

Powerful Owl (*Ninox strenua*)

The powerful owl is endemic to eastern and south-eastern Australia, inhabiting a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest from Mackay to south-western Victoria (DECC, 2012).

The Powerful owl was recorded within a patch of vegetation at the far northern end of the site in 1994 (Warren 1994). Further spotlighting and call playback surveys of the subject site have failed to record this species (JWA, 2008).

Approximately 70 hectares of suitable forage habitat occurs on the site, of which 0.08 hectares (0.1%) will be removed from the Precinct 9 and 11 borrow areas (0.03 ha and 0.05 ha, respectively) (**Figure 2**).

Masked owl (*Tyto novaehollandiae*)

The masked owl is widely distributed from the coast to the western plains, where it inhabits dry eucalypt forests and woodlands. Pairs have a home range between 500 and 1000 hectares and they roost and breed within large tree hollows in moist eucalypt gullies (DECC, 2012). The species was recorded in a patch of vegetation at the far northern end of the site in 1994 (Debus 1994). Further spotlighting and call playback surveys of the subject site have failed to record this species (JWA, 2008).

Approximately 70 hectares of suitable forage habitat occurs on the site, of which 0.08 hectares (0.1%) will be removed from the Precinct 9 and 11 borrow areas (0.03 ha and 0.05 ha, respectively) (**Figure 2**).

The masked owl will persist in disturbed environments as long as existing and potential nest trees are retained, and suitable areas of forested or woodland areas are conserved so as to conserve prey species (Woodward-Clyde 1997). It is considered that the proposed development is highly unlikely to result in the local extinction of this species.

Black-necked stork (*Ephippiorhynchus asiaticus*)

The black-necked stork inhabits wetlands, such as floodplains of rivers with large shallow swamps and pools, freshwater meadows, wet heathland, farm dams, shallow floodwaters and adjacent grasslands, paddocks and open savannah woodlands in coastal and sub-coastal northern and eastern Australia (DECC, 2012). Approximately 142 hectares of potential forage habitat for the species exists within the low-lying eastern and south eastern portions of the site, and the species has been identified foraging approximately 200 metres east of Precinct 9. Refer to **Figure 3** for Potential Habitat for the Black-necked Stork.

Approximately 0.07 hectares (0.05%) of potential habitat for the black-necked stork occurs within a dam in Precinct 9. The proposed bulk earthworks within the Precinct 9 borrow area will not involve the removal of this dam, however mitigation measures such as sediment and erosion control, as detailed in Section 4, will be required to minimise impacts of nearby earthworks on this habitat. Given the high mobility of this species, the loss of potential foraging habitat is not considered significant in relation to the regional distribution of habitat for this species.

Osprey (*Pandion haliaetus*)

The osprey occupies coastal areas, especially the mouths of large rivers, lagoons and lakes throughout most of Australia (excluding Tasmania and Victoria).

Three ospreys and a stick nest were observed by SMEC on the southern nesting platform in the Saltmarsh Rehabilitation Area in June 2013. This nest site is approximately 1 kilometre south-east of Precinct 9 (**Figure 4**), and human disturbance near the nest site is not expected. The proposed development is considered highly unlikely to result in significant impacts on this species (JWA, 2010a).

Wedge-tailed eagle (*Aquila audax*)

A pair of wedge-tailed eagles was identified nesting in a tree stag on the boundary of Precinct 9 and Rehabilitation and Management Area 8 during the 2011 breeding season. This nest no longer exists, however, SMEC have identified a wedge-tailed eagle utilising a stick nest on the boundary of Precinct 11 and Rehabilitation and Management Area 6 (June & November, 2013) (see **Figure 4** for location). While the wedge-tailed eagle is not listed as threatened on mainland Australia, the occurrence of a nesting pair which may be utilizing this tree for breeding is considered significant for the local Tweed area.

It is expected that impacts of the proposed development will be limited to noise and dust related impact in the vicinity of the nest site. It is not likely that the proposed development will result in significant impacts on the wedge-tailed eagle.

Koala (*Phascolarctos cinereus*)

Although no evidence of a resident koala population exists on the site (JWA, 2008), given the observation of faecal pellets and a low density of scratches on Grey gums and Tallowwoods throughout the site, it is considered that koalas utilise the site as they commute between areas of primary use habitat.

SMEC conducted four Koala Spot Assessment Technique (KSAT) Surveys on the site in 2013, including one on the boundary of Precinct 9 and Rehabilitation and Management Area 9. Koala pellets were only detected within the northern end of Rehabilitation and Management Precinct 5, 1 km north of Precinct 11.

Potential habitat for the species exists in the sclerophyll forest (mostly *E. microcorys*) located within and adjacent to Precincts 9 and 11. 0.08 hectares (0.2%) of suitable Koala habitat will be removed from the Precinct 9 and 11 borrow areas (0.03 ha and 0.05 ha, respectively). Refer to **Figure 5**.

Potential impacts of the proposed works on transient koalas include:

- Death, injury or loss of habitat due to earthworks
- Increased risk of death or injury from vehicle strike; and
- Risk of harassment, death or injury from dogs.

Fauna management measures, as detailed in Section 4.1 will reduce these risks.

Grey-headed flying fox (*Pteropus poliocephalus*)

The grey-headed flying-fox forages in rainforest, wet and dry sclerophyll forest, mangroves, fruit crops and fruiting trees in parks and urban areas. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy (DECC, 2012). The species has been recorded foraging in various locations on and adjacent to the site, including within a dry sclerophyll community located approximately 250 metres north of Precinct 11. No flying-fox roosting camps have been identified on or adjacent to the site (JWA, 2008).

Approximately 72 hectares of potential forage habitat occurs on the site for this species. Approximately 0.08 hectares of potential forage habitat will be removed from the Precinct 9 and 11 borrow areas. Refer to **Figure 6** for potential habitat on site.

Given the high mobility of this species (up to 50 km), this loss of foraging habitat is not considered significant. The grey-headed flying-fox is likely to continue foraging within retained areas of vegetation on the site. Clearing works on the site are not likely to affect this species.

Little bent-wing bat (*Miniopterus australis*) & Common bent-wing bat (*Miniopterus schreibersii*)

The little bent-wing bat and common bent-wing bat forage on insects in forested habitats, and roost in caves, tunnels or similar structures located nearby.

Approximately 72 hectares of potential forage habitat occurs on the site, of which approximately 0.08 hectares of potential forage habitat will be removed from Precinct 9 and 11 borrow areas. Refer to **Figure 6** for potential habitat on site.

Given the high mobility of these species, the loss of potential foraging habitat is not considered significant in relation to the regional distribution of habitat for this species. The extent of impacts to these species due to loss of roost habitat is currently unknown and will be determined based on the number of suitable hollows and fissures identified during pre-clearing surveys. Any loss of roost sites will be mitigated by the installation of nest-boxes within retained vegetation.

Eastern free-tail bat (*Mormopterus norfolkensis*), Yellow-bellied sheath-tail bat (*Saccolaimus flaviventris*) & Greater broad-nosed bat (*Scoteanax rueppellii*)

Potential habitat impact for eastern freetail bat, yellow-bellied sheath-tail bat and greater broad-nosed bat within the current development precincts is limited to approximately 0.08 hectares from the Precinct 9 and 11 borrow areas. Refer to **Figure 6** for potential habitat on site.

Given the high mobility of these species, the loss of potential foraging habitat is not considered significant. There may be a minor loss of potential roost sites (e.g. hollow-bearing trees and fissures) for these species however the installation of bat boxes within retained vegetation (in accordance with the Fauna Management Plan – JWA, 2010a) will increase roosting opportunities for these species. Potential roost sites will be identified during pre-clearing surveys in order to determine the extent of the resulting impact to these species. It is considered that these species will continue to utilise retained vegetation for foraging and retained habitat trees for roosting.

Figure 2: Potential Habitat for the Powerful Owl and Masked Owl

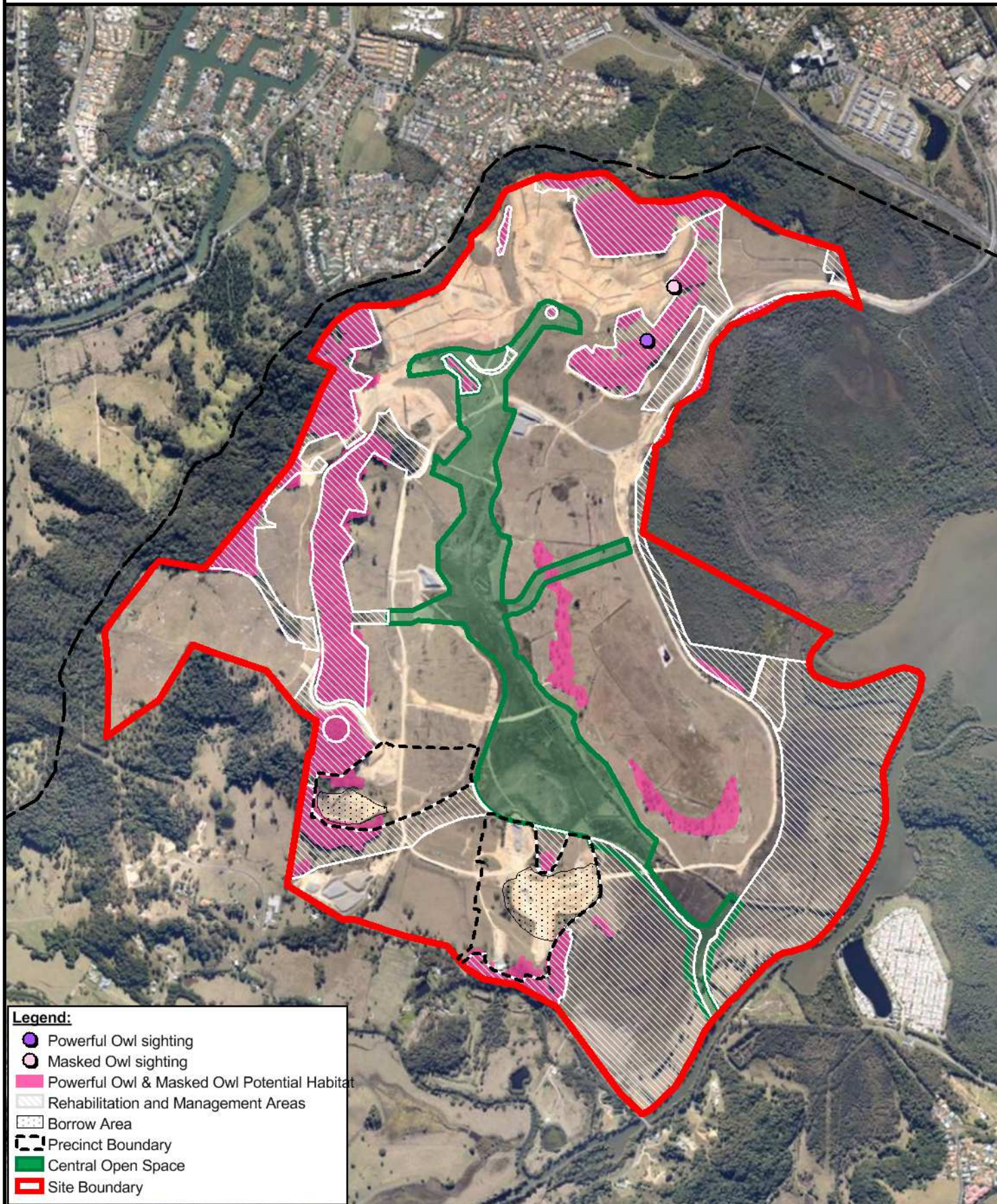


FIGURE 2: Potential Habitat for the Powerful Owl and Masked Owl

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Figure 3: Black-necked Stork Records and Potential Habitat

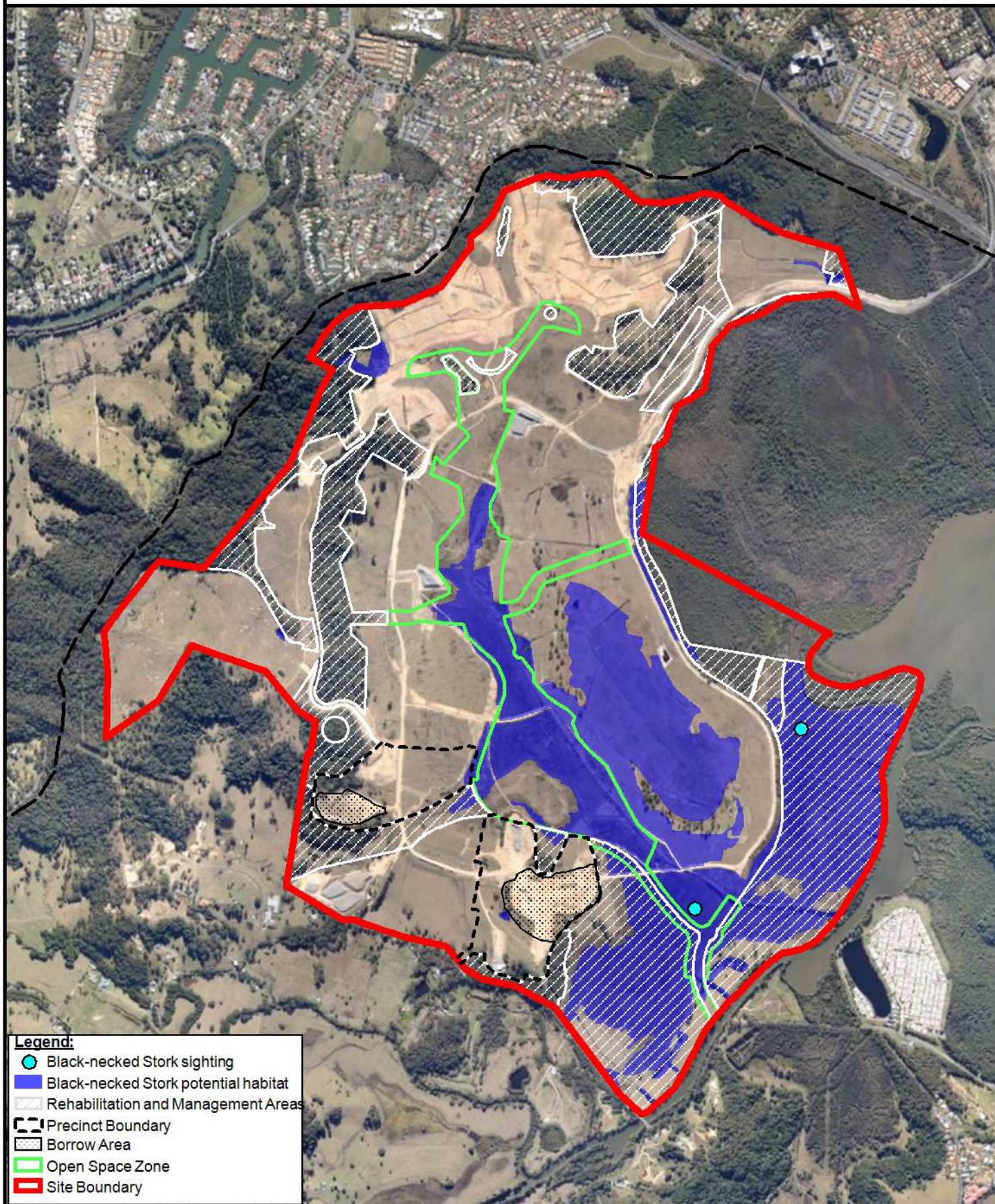


FIGURE 3: Black-necked Stork Records and Potential Habitat

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Figure 4: Raptor Nesting Platforms and Nest Locations

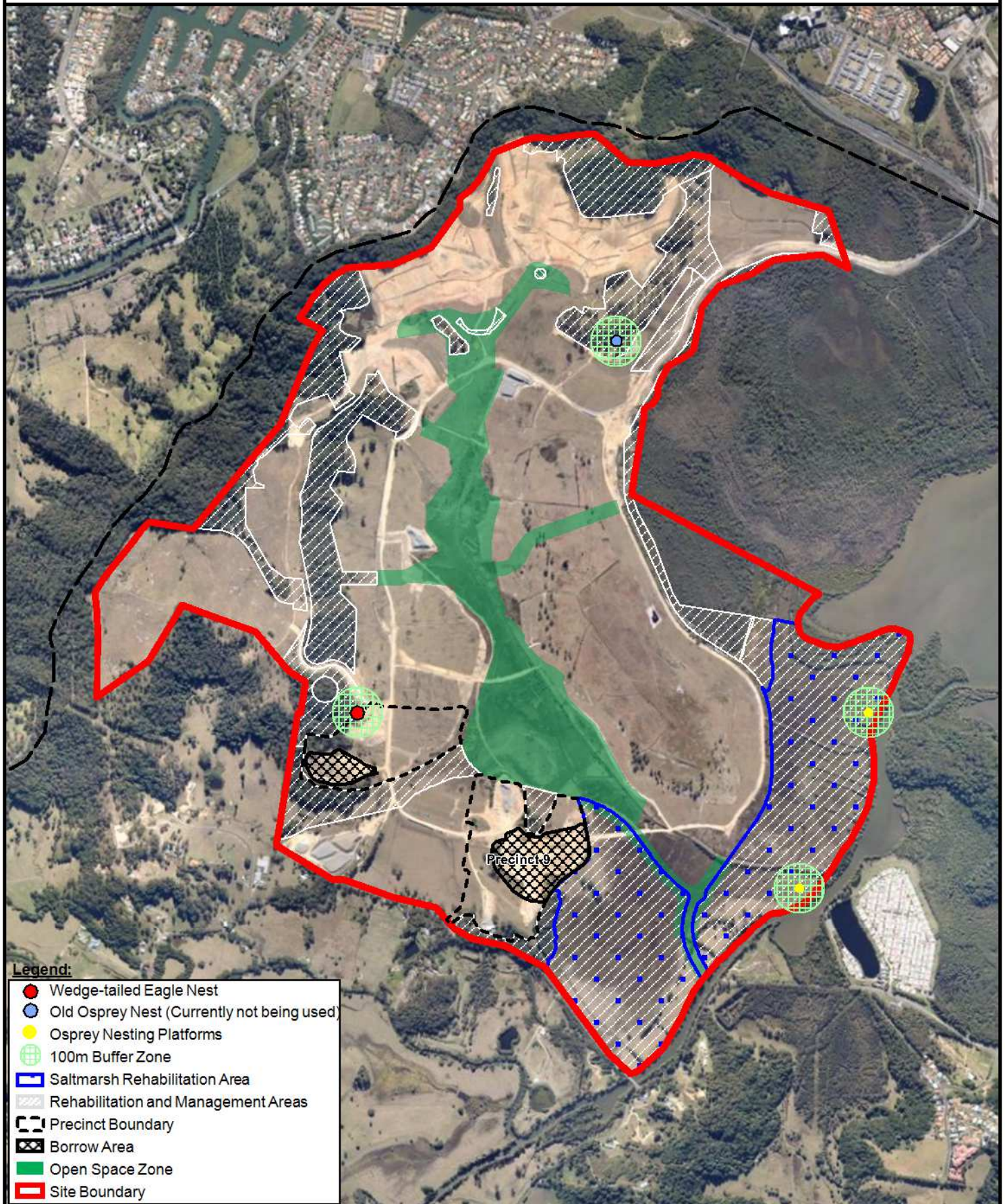


FIGURE 4: Proposed Raptor Nesting Platform Locations

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Figure 5: Potential Habitat for the Koala

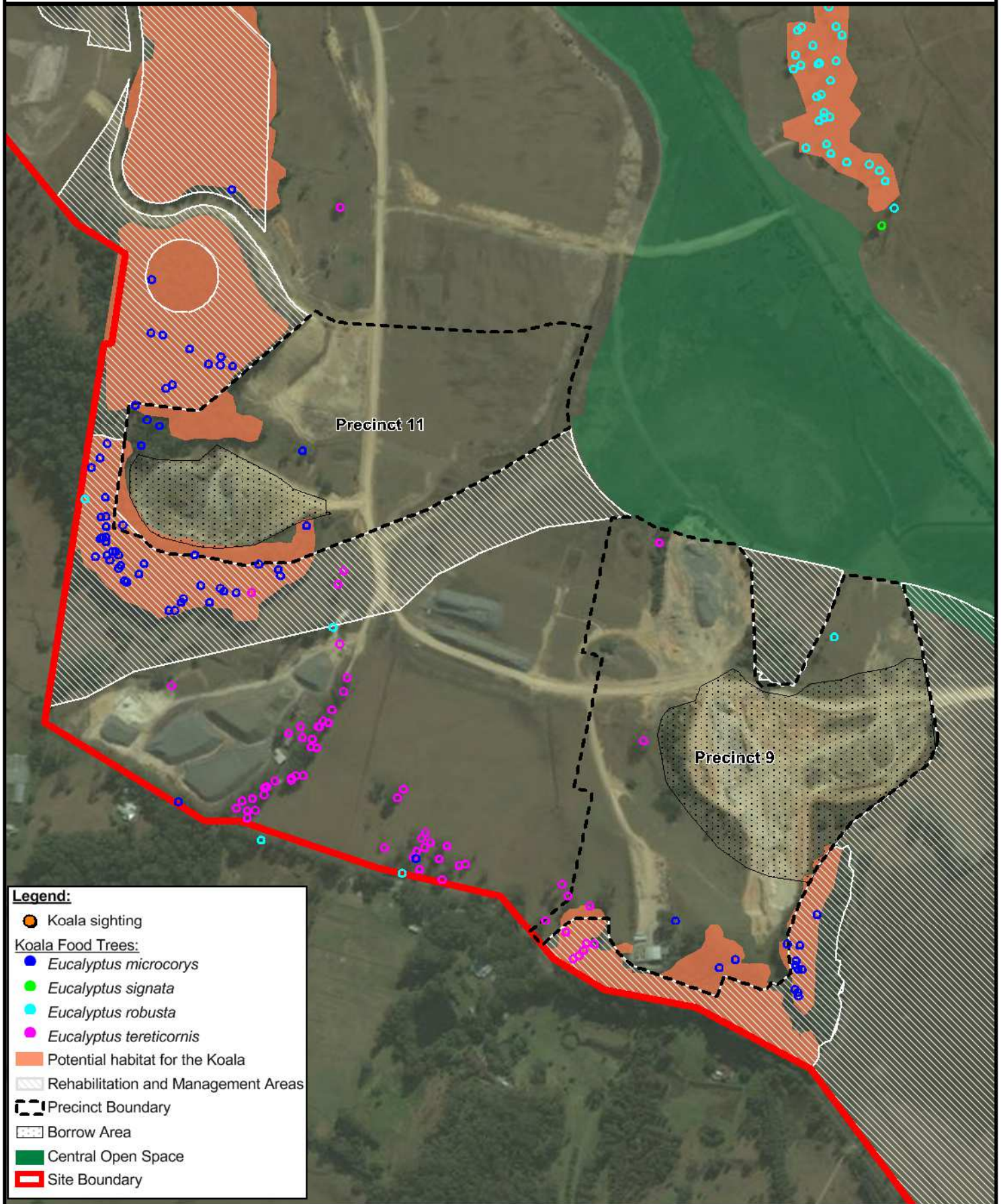


FIGURE 5: Potential Habitat for the Koala

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Figure 6: Grey-headed Flying Fox and Micro-bats

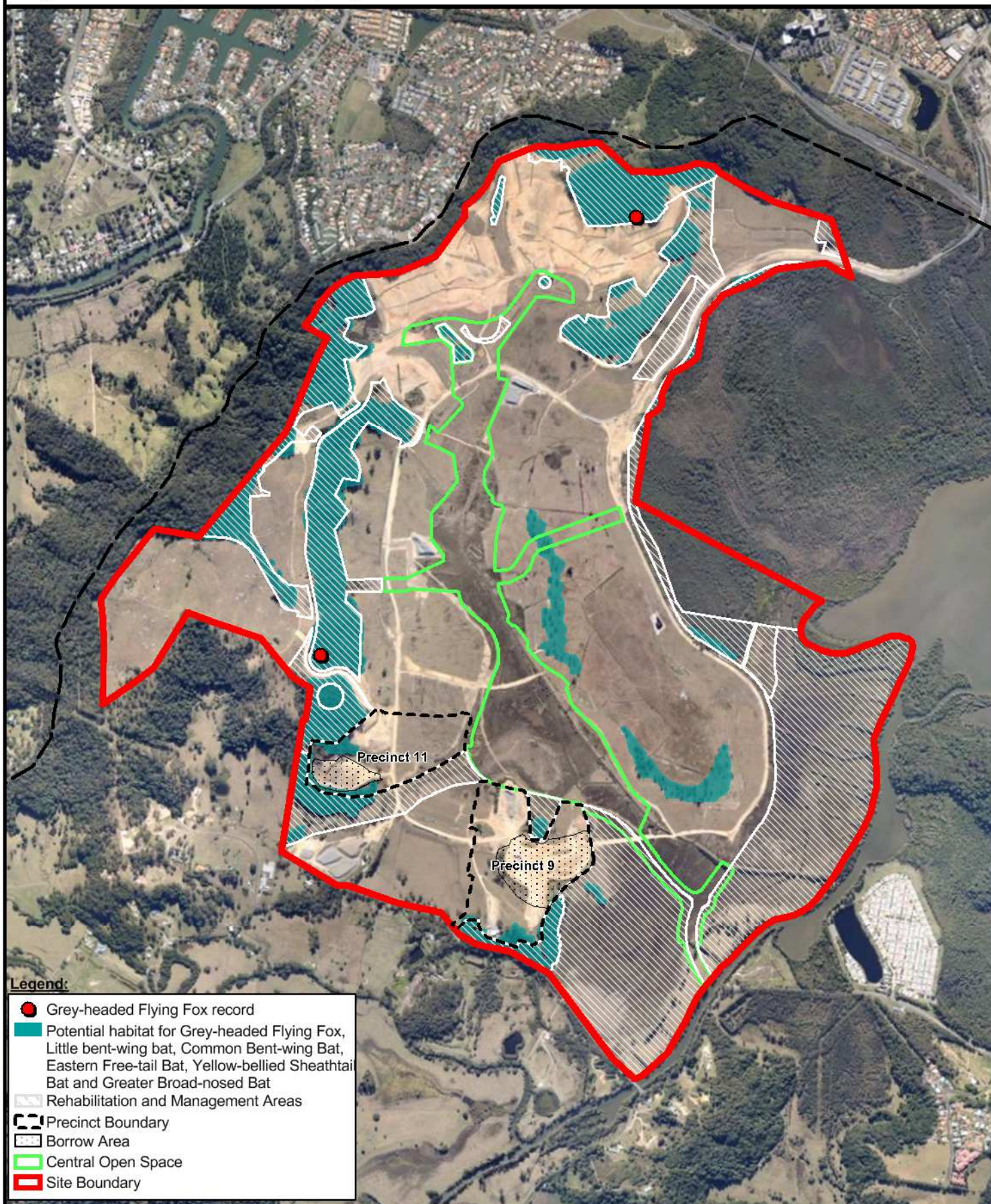


FIGURE 6: Grey-headed Flying Fox and Micro-bats

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3.2 Impacts to Native Vegetation

3.2.1 Vegetation Communities

Earthworks activities associated with the borrow area in Precincts 9 and 11 will involve the removal of some native vegetation. Further, activities have the potential to indirectly affect adjacent native vegetation through the introduction of weeds, sediment flow and alteration of hydrology regimes.

Vegetation surveying (JWA, 2013) mapped twenty-two (22) vegetation communities on the Cobaki site. **Table 3** lists the vegetation communities recorded within precincts 9 and 11. The location of these Vegetation Communities is shown in **Figure 7**.

Table 3 – Vegetation Communities associated with Precincts 9 and 11.

Vegetation Community	Precinct	Area removed/ to be removed from site	Area to be removed from Precinct 9 & 11 Phase 1 Borrow Areas
Community 1a – very tall open/closed sclerophyll forest (<i>Eucalyptus pilularis</i> +/- <i>Corymbia intermedia</i>)	9 & 11	3.08 ha (9.6%)	0.08 ha (0.3%)
Community 1d – Tall open sclerophyll forest (e. <i>pilularis</i> +/- <i>E. siderophloia</i> +/- <i>E. teriticornis</i>)	9	0.78 (30.2%)	0 ha (0%)
Community 2b – Tall open forest (<i>Archontophoenix cunninghamii</i>)	9	0 (0%)	0 ha (0 %)
Community 10 – Low closed grassland with scattered trees (pastoral grasses - /- mixed species)	9 & 11	215 ha (86%)	1.51 ha (0.6%)
Community 12 – rushland/sedgeland/grassland (mixed aquatic species)	9 & 11	24.12 (68%)	0 ha (0%)
Community 14 – Dams and drainage (mixed aquatic species)	9	0.77 ha (25%)	0 ha (0%)

Community 1a - Very Tall Open/Closed Sclerophyll forest (*Eucalyptus pilularis* +/- *E. microcorys* +/- *E. propinqua* +/- *Corymbia intermedia*)

This community occurs in the western portion of Precinct 11 and the south-eastern portion of Precinct 9 covering a total area of approximately 1.57 hectares. Winning of fill from the proposed borrow areas will result in the removal of approximately 0.08 hectares from Precincts 9 and 11 (0.03 ha and 0.05 ha, respectively).

The canopy is dominated by mature Blackbutt standing approximately 25-30m in height. The condition of the midstorey is variable, with the sparse vegetation around the edges of this community mostly comprised of dry Sclerophyll species. The ground cover is comprised of grasses, rushes and sedges (JWA, 2013).

The conservation status of this community is considered to be moderate to high due to the diverse species composition, a relative high abundance of large tree hollows and mature native trees.

Community 1d - Tall Open Sclerophyll Forest (*E. pilularis*, +/-, *E. siderophloia*, +/- *E. tereticornis*)

This community occurs along the southern boundary of Precinct 9 and covers an area of approximately 0.78 hectares. The proposed earthworks within the borrow area will not involve the removal of this community.

The canopy is dominated by Blackbutt standing approximately fifteen 15 -20 metres in height. Other species commonly occurring in the canopy include Northern grey Iron bark, and Forest red gum.

The condition of the midstorey is variable. Around the edges of this community the midstorey vegetation is sparse, and 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. The ground cover is dominated by grasses, ferns and weeds amongst leaf litter, barks and twigs (JWA, 2013).

The CRA classification for this community is Low Relief Coastal Blackbutt and is considered to be Rare. The conservation status of this community is considered to be low to moderate due to the occurrence of exotic species and the reduced structural complexity.

Community 2b - Tall Open Forest (*Archontophoenix cunninghamiana*)

Community 2b occurs adjacent to the northern boundary of Precinct 9. An area of approximately 0.04 hectares occurs within the boundary of Precinct 9. This area is covered by a covenant area and will not be cleared.

The canopy of this community is dominated by Bangalow palms reaching a height of approximately twelve (12) – fifteen (15) metres. Broad-leaved paperbark is present as a minor occurrence.

The midstorey is sparse in the north of this community, with only Bangalow palm trunks occurring. The ground cover is uneven, muddy and degraded by cattle. The midstorey is dense in the south of this small patch of vegetation and consists of Common lilly pilly, Whalebone, Umbrella cheese trees, Pink euodia, Bolwarra, Creek sandpaper fig, Fine-leaved tuckeroo, Hard quandong, Camphor laurel, Lantana and Blackwood wattle and common climbers.

The ground cover vegetation is dominated by ferns and grasses including amongst decomposing Bangalow palm fronds. Two (2) stems of the Threatened Fine-leaved tuckeroo (*Lepiderema pulchella*) occur within this community (JWA, 2013). Under the CRA classification, this community is best described as Rainforest (CRA 1999).

This community is considered to be representative of the Endangered Ecological Community 'Lowland Rainforest on Floodplain' which has a high conservation value.

The conservation value of this community is reduced due to its small size, degradation by cattle, fragmentation and a reduced structure. The conservation status of this community is considered to be moderate.

Individual Threatened species have an elevated conservation value.

Community 10 - Low Closed Grassland with Scattered Trees (Pastoral grasses +/- Mixed species)

Community 10 occurs over much of Precincts 9 & 11, and covers an area of approximately 15.73 hectares. Of this, approximately 1.51 hectares lies within the Precinct 9 and 11 borrow areas (1.49 and 0.02 ha, respectively).

The grassland is dominated by a mixture of species that vary with location. The foot slopes and grassy areas adjacent to the forests and woodlands are dominated by species including Kangaroo grass, Blady grass, Bracken fern, Broad leaved paspalum and Setaria (JWA, 2013).

The flat areas east of Sandy Lane have been consistently slashed, and consist of introduced pasture species. Several species of trees are scattered within this community, including Northern grey iron bark, Scribbly gum, Figs, Camphor laurel, Blackwood wattle, Blackbutt, Tallowwood, Pink bloodwood, Grey gum and Swamp oak (JWA, 2013).

The conservation status of this community is considered to be low.

Community 12 - Rushland/sedgeland/grassland (Mixed aquatic species)

Community 12 occurs along the eastern boundary of Precinct 11 (0.20 ha). A Patch of approximately 0.026 ha occurs in the northern portion of Precinct 9. Earthworks within the proposed borrow areas will not involve the removal of this community.

Community 12 is comprised of aquatic and semi-aquatic vegetation such as Mangrove Fern, *Cyperus sp*, sedges and rushes.

The conservation status of Sedgeland/Rushland/Grassland communities has not been specifically discussed in the Regional Forestry Agreement document. The most appropriate analogue is NFE 141 Swamp (JWA, 2013). It is noted that Swamp ecosystems are Rare in the upper north east section of the NSW North Coast Bioregion.

This vegetation community is considered to represent the Endangered Ecological Community (EEC) 'Freshwater Wetland on Coastal Floodplains' (DECC 2008). Endangered Ecological Communities (EEC) are considered to be of high conservation value.

Community 14 - Dams & Drainage Lines (Mixed aquatic species)

Community 14 occurs as a constructed dam in the central portion of Precinct 9. The proposed bulk earthworks within the Precinct 9 borrow area will not involve the removal of this dam.

Community 14 is comprised of aquatic and semi-aquatic vegetation. The vegetation in the constructed dam includes, Water lily and *Cyperus sp*.

Several Drainage lines occur across the site, with several species of sedges and rushes commonly occurring.

The conservation status of this community has not been specifically discussed in the Regional Forestry Agreement document. The most appropriate analogue is NFE 141 Swamp. It is noted that Swamp ecosystems are Rare in the upper north east section of the NSW North Coast Bioregion.

The conservation value of this community is considered to be low.

With implementation of the actions contained within Section 4.2, the likelihood of significant impacts on adjacent native vegetation is considered low.

3.2.2 Threatened Flora Species

Flora surveys undertaken by James Warren & Associates (2008) recorded the presence of one Threatened flora species, Fine-leaved tuckeroo (*Lepiderema pulchella*), within close proximity to Precincts 9 and 11. Further, a single individual of Brush Cassia (*Cassia brewsteri* var. *marksiana*) species was detected during a recent rehabilitation assessment (SMEC, 2013), approximately 100 m south of the southern boundary of Precinct 11.

The location of these threatened flora species is shown in **Figure 8**.

Table 4. Threatened Flora within or adjacent to Precincts 9 and 11

Common name	Species name	Conservation Status		Adjacent to Precinct
		TSC	EPBC	
Fine-leaved Tuckeroo	<i>Lepiderema pulchella</i>	Vulnerable	-	9
Brush Cassia	<i>Cassia brewsteri</i> . <i>marksiana</i>	Endangered	-	11

Fine-leaved Tuckeroo (*Lepiderema pulchella*)

Fine-leaved Tuckeroo is a small rainforest tree, found north of Brunswick Heads, and in Queensland. Most records in NSW are from the Tweed Valley, and the majority of known populations are on private land. The species is listed as Vulnerable under the *TSC Act 1995*.

The NPWS database (October 2011) contains ninety-five (95) records of this species within 10 km of the Subject site. One hundred and sixteen (116) records occur within the Tweed LGA. A total of thirty-nine (39) stems of Fine-leaved tuckeroo have been recorded on the subject site, the majority of which occur within the rainforest communities associated with Mt. Woodgee, in the north of the Site. One (1) stem has been identified within a patch of vegetation on the northern boundary of Precinct 9. This stem is located within Rehabilitation and Management Area 8 and will be protected by a minimum 5-metre buffer.

It is worth noting that this species is particularly common within the locality with several hundred having been recorded at Terranora and Bilambil (JWA, 2008). It is considered that the proposed development is highly unlikely to result in the local extinction of this species (JWA, 2013).

Brush Cassia (*Cassia brewsteri* var. *marksiana*)

Brush Cassia is found in littoral and riverine rainforest and in regrowth vegetation on farmland and along roadsides north from Brunswick Heads, around Murwillumbah. It is listed as Endangered under the *TSC Act 1995*.

The NPWS database (October 2011) contains nineteen (19) records of this species within 10 km of the Subject site. Eighty-seven (87) records occur within the Tweed LGA. A single individual of this species was detected during a recent rehabilitation assessment (SMEC, 2013), approximately 100 m south of the southern boundary of Precinct 11. This stem is located within Rehabilitation Area 7 and will be protected by a further 5-metre buffer.

3.2.3 Endangered Ecological Communities (EEC's)

Six (6) Endangered Ecological Communities (EEC) listed under Schedule 1 of the TSC Act have been recorded on the site, two (2) of which occur within the vicinity of Precincts 9 and 11. These communities include:

- Lowland rainforest on floodplain – occurring at various locations generally in associations with drainage lines and depression.
- Freshwater wetlands – occurring in the central and eastern portions of the site.

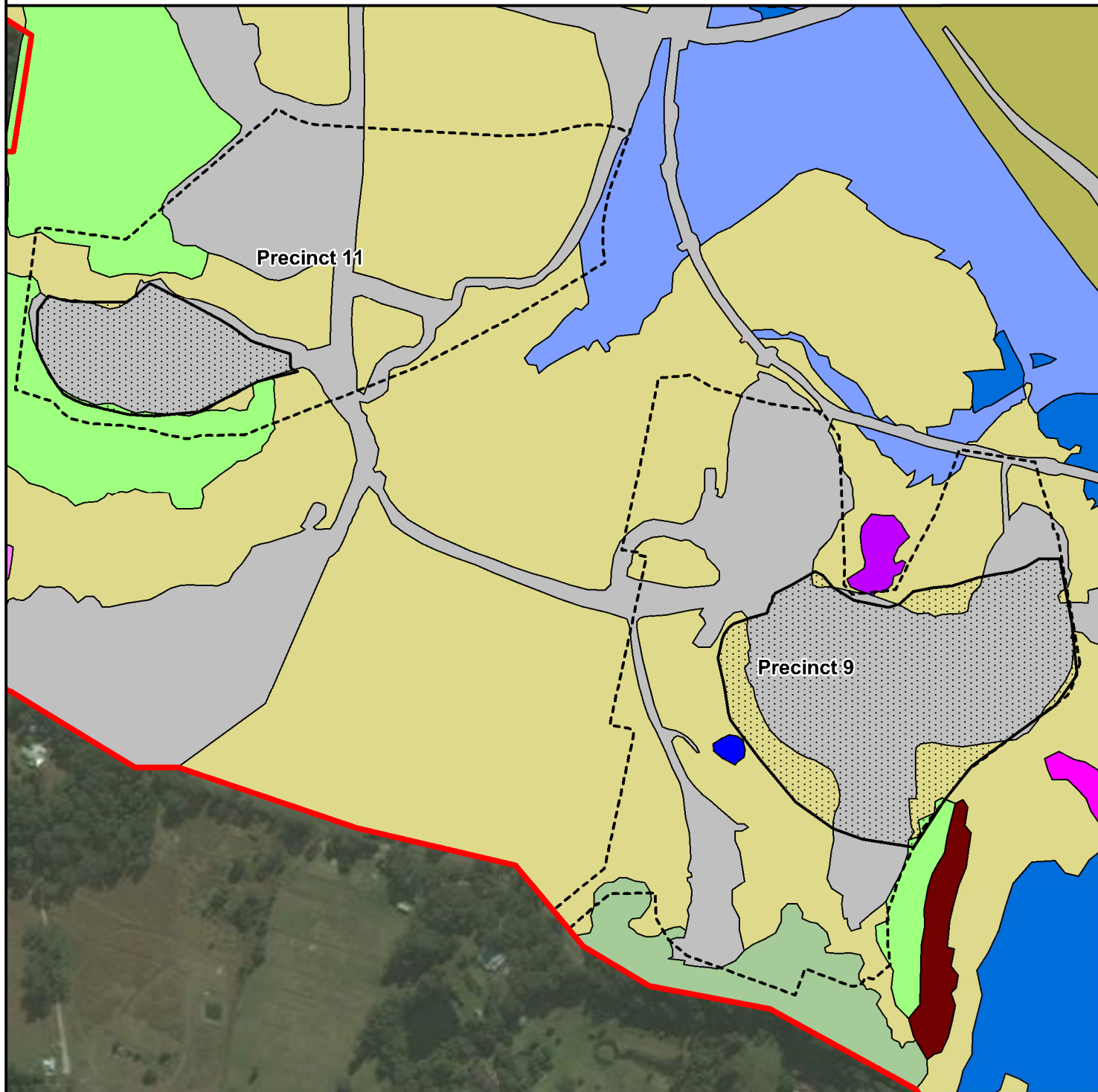
The area of impacts for each EEC is shown in Table 5 below.

Table 5. Extent of impact of each Endangered Ecological Community

Endangered Ecological Community	Precinct	Area of Existing EEC (ha)	Area cleared/ to be cleared from Entire Site (ha)	Area cleared/ to be cleared from P9 and 11 (ha)
Freshwater wetland	9 and 11	35.39	24.12 (68%)	0 (0%)
Lowland rainforest on floodplain	9	1.75	0.04 (2%)	0 (0%)

The location of these Endangered Ecological Communities is shown in **Figure 9**.

Figure 7: Vegetation Communities



LEGEND:

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

CREATED BY AM11482

PROJECT NO. 30031162

PROJECT TITLE
Cobaki Estate Management Plans

REVISION 2

DATE 17/12/2013

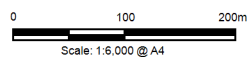
COORDINATE SYSTEM
GDA 1994 MGA Zone 56

SOURCE

The State of Queensland (Department of Environment and Resource Management), Copyright 2010
Aerial Imagery from Microsoft Bing, Copyright 2013
Vegetation Communities from James Warren & Associates Pty Ltd

STATUS FINAL

ISSUED FOR INFORMATION



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CLIENT
LEDA MANORSTEAD Pty Ltd

Figure 8: Threatened Flora Records

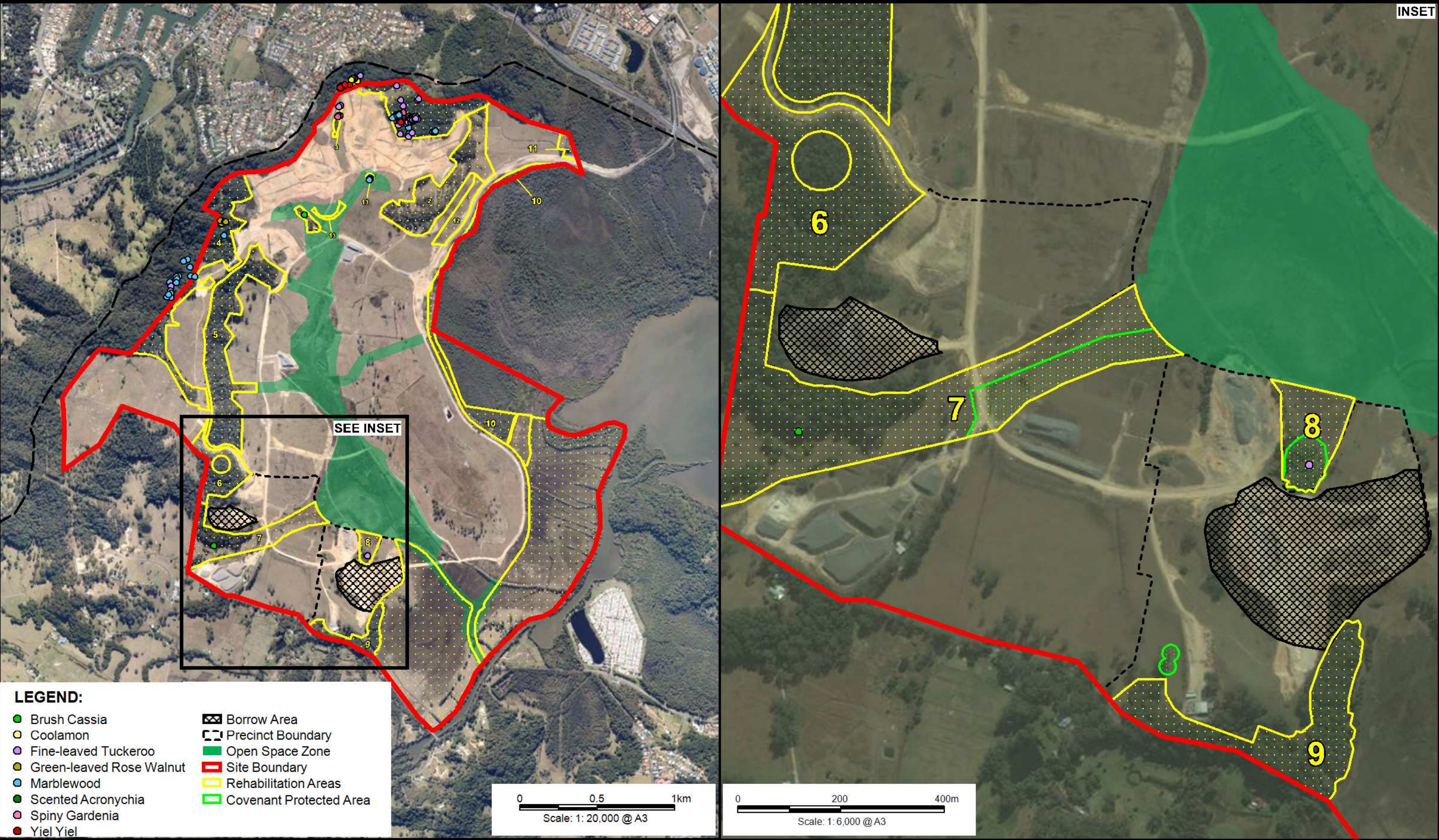
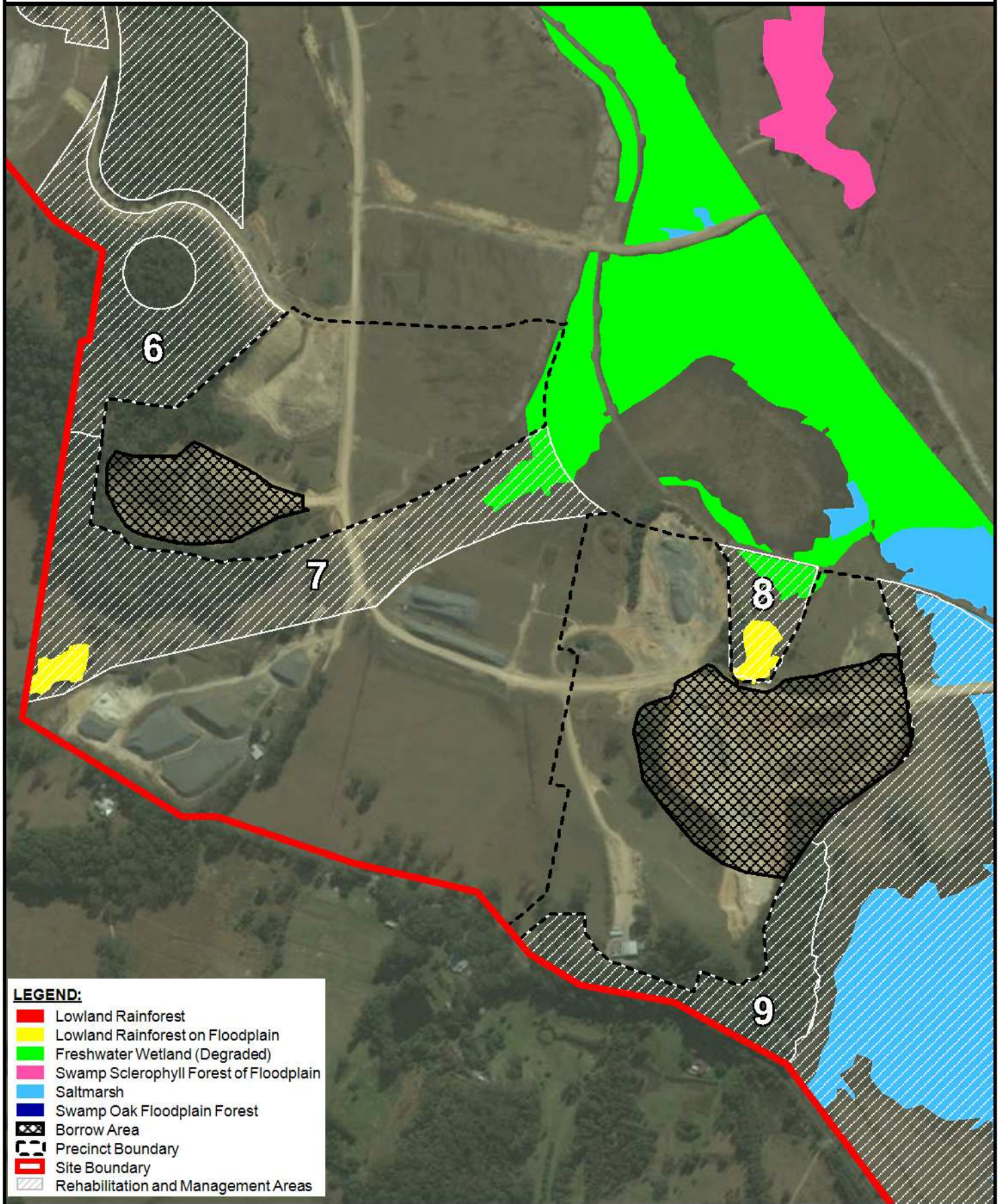


Figure 9: Endangered Ecological Communities



Lowland Rainforest on Floodplain

This EEC covers approximately 1.75 hectares of the site and occurs as several small, isolated and highly degraded patches on the southern and northern ends of the site which also contain Threatened flora. This vegetation type generally occurs in association with drainage lines and depressions (i.e. riparian forest).

The conservation significance of this vegetation type on the site has been compromised by historical clearing activities and ongoing grazing activities resulting in fragmentation and degradation, especially within the isolated patches and edges of more extensive areas.

A 0.35-hectare patch is located in Rehabilitation and Management Area 8 on the northern boundary of Precinct 9. An area of approximately 0.04 hectares occurs within the boundary of Precinct 9. This area is covered by a covenant area and will not be cleared

Freshwater Wetland

The Freshwater Wetland EEC on the site is comprised of vegetation community 12 - rushland/ sedgeland/ grassland (mixed aquatic species) and covers a total area of approximately 35.39 hectares.

0.23 hectares (0.6%) of Freshwater Wetland occurs within Precincts 9 and 11 (0.03 ha and 0.20 ha, respectively). Earthworks within the proposed borrow areas will not involve the removal of this community. Further, these areas of Freshwater wetland have been heavily degraded due to historical and existing land use including drain construction and maintenance, grazing and slashing. As such the proposed works are not considered to represent a significant impact in relation to the regional distribution of this community.

3.3 Impacts on Groundwater

A Groundwater Management Plan was prepared by SMEC (May, 2012) for the wider Cobaki site. However, due to the elevations of the proposed earthworks interception of groundwater is considered highly unlikely, therefore potential impacts on groundwater is considered negligible. The cut and fill extents are summarised in the plans in Appendix A.

3.3.1 Disturbance of Acid Sulfate Soils

An Acid Sulfate Soils Investigation was undertaken by SMEC (2013) for the full extent of precinct 9 and 11. However, geotechnical investigation shows that Acid Sulfate Soils (ASS) are not relevant to the proposed borrow areas as works will only involve the excavation of rock at higher elevations with no potential to intercept ASS material. In the unlikely event of ASS being encountered management procedures have been proposed.

3.3.2 Contamination

A preliminary Contamination Assessment of the entire Cobaki Estate was undertaken by Gilbert and Sutherland, Environmental Scientists in May 2008. The assessment identified several potentially contaminating activities within the site including:

- An abandoned cattle dip that has been capped and has an approved (by Tweed Shire Council) Remediation Action Plan.
- Cattle yards, crush, spray race, sump and pumping station.
- Farm sheds used for miscellaneous machinery, grease, oil and fuel storage.
- Asbestos building products and lead-based paints associated with the construction and maintenance of an on-site residential dwelling.
- Site construction (quarry) office and compound area containing workshops, miscellaneous grease and oil storage, workers' amenity hut and related infrastructure.
- On site effluent treatment systems associated with dwellings.

The areas where the potentially contaminating activities have been undertaken within Cobaki are well documented, and are not within the immediate locality of the land within Precincts 9 and 11 and the borrow areas, therefore the risk from contaminating activities in these areas is considered very low.

3.3.3 Dewatering

No dewatering is planned as part of the proposed bulk earthworks.

3.4 Noise and Vibration

Construction activities may produce some level of noise emissions causing disturbance to local residents and other land users.

Due to the nature of construction work, noise levels will vary and are dependent on:

- the location and proximity of plant equipment to each other and to sensitive receptors; and
- the type of work being undertaken at any given time and whether work involves all machinery operating at the maximum sound power levels.

The nearest sensitive receptors to the proposed works are the Woodlands Lakeside Golf Club, located 300m south of Precinct 9, the Cobaki Broadwater over 50's Village located 1km east of Precinct 9, and surrounding dwellings located on Piggabeen Road.

A Noise Assessment of the works associated with the borrow area in precinct 9 and 11 was prepared by CRG (2013). The full CRG (2013) report is provided under a separate cover within the application documentation. CRG (2013) predicted noise impact levels at receiving locations based on the location of the proposed earthworks activities. Based upon the assessed earthworks winning locations for both Precincts 9 and 11, predicted noise impacts at the nearest assessed offsite noise sensitive receiver locations are within 2 dB of the adopted external noise criterion of 48 dB(A). As the average person cannot typically detect a 3 dB variation in sound pressure level, a 2 dB rise is unlikely to be detectable and is typically considered an acceptable outcome (CRG, 2013). Nonetheless, mitigation measures to reduce noise impact are outlined in Section 4.6.

3.5 Air Quality

Dust issues may result from construction activities. Key impacts could include release of pollutants, greenhouse gas emissions, odour emissions, and temporary reduction in amenity to the sensitive receptors discussed in Section 3.4. Mitigation Measures for air quality management are outlined in Section 4.7.

3.6 Fuel and Chemical Storage

Storage of fuels, chemicals, cleaning products, solvents, oil and other lubricants may be required on site during construction. Impacts associated with fuel and chemical storage include contamination of soil and water, safety hazards to personnel and the public, and odour/air emissions. On-site fuel storage will be restricted to the appropriate areas at the site compound in accordance with relevant legislation, manufacturer's instructions, the MSDS and Australian Standard 1940, and will therefore not impact on the borrow areas within precincts 9 and 11. Refer to Figure 10 – Hazardous Goods Storage Area.

3.7 Cultural Heritage

A Cultural Heritage Management Plan (CHMP, Appendix B) was prepared for the site (Everick, 2010) and approved by the Department of Planning under Part 3A of the Environmental Planning and Assessment Act 1979 (NSW).

Under the terms of the approved CHMP, no specific cultural heritage impact mitigation works are required in the Precincts 9 and 11 borrow areas. These are highly disturbed areas, and the likelihood of construction works impacting on Aboriginal objects is considered low.

Figure 10: Storage of Hazardous Goods

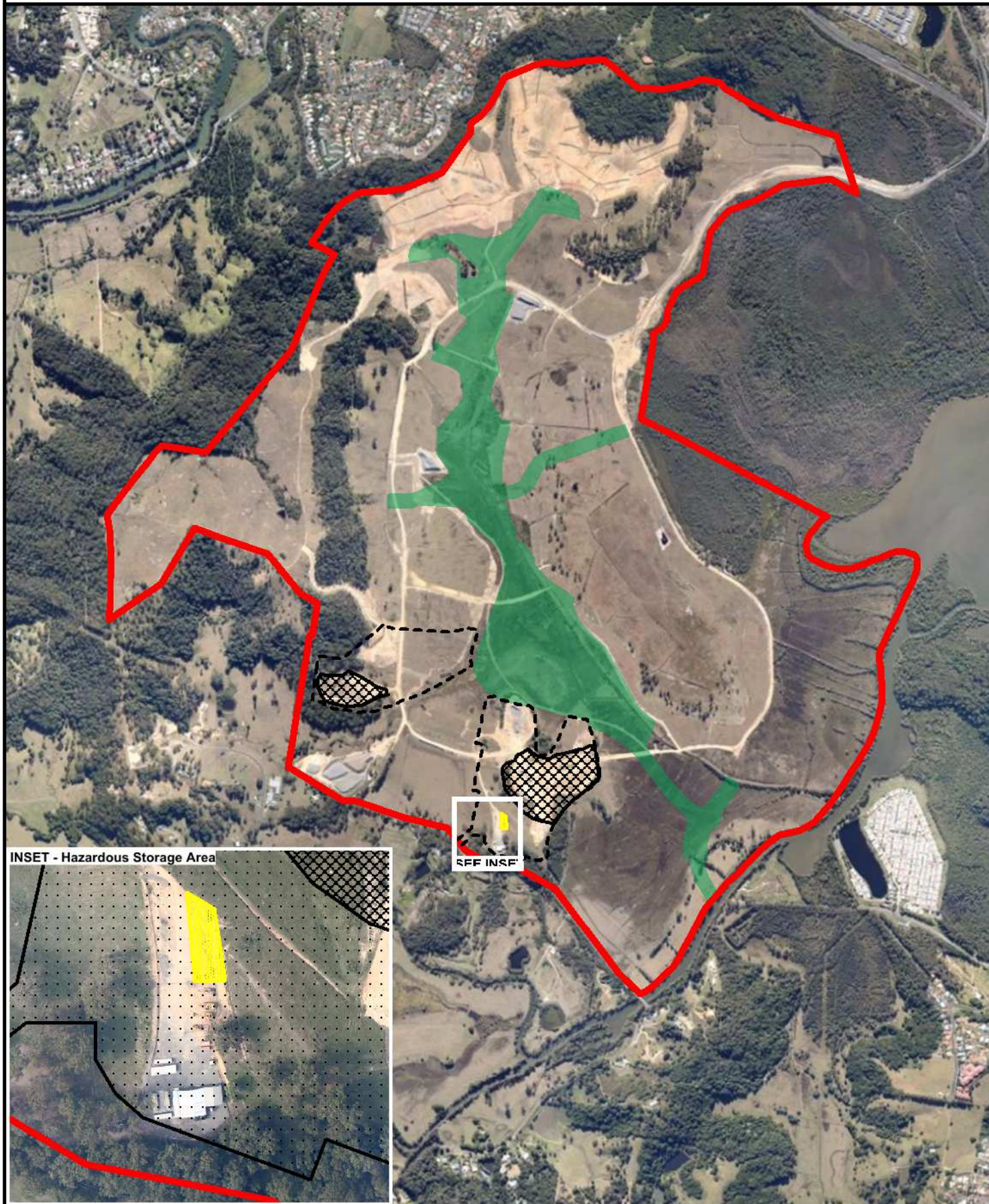


FIGURE Hazardous Goods CREATED BY AM11482 REVISION 1 STATUS FINAL DATE 17/12/2013 ISSUED FOR INFORMATION	PROJECT NO. 30031162 PROJECT TITLE Cobaki Estate Management Plans	SCALE 0 400 800m Scale: 1:20,000 @ A4	N	CONSULTANT SMEC Australia SMEC CLIENT LEDA Manorstead Pty Ltd LED A
	COORDINATE SYSTEM GDA 1994 MGA Zone 56 SOURCE Nearmap Hypertiles, Copyright 2012 PATH I:\Projects\30031162\007_Spatial\Workspaces\Noise&Vibration.wor			Copyright SMEC Australia Pty Ltd. All Rights Reserved.

4 ENVIRONMENTAL MANAGEMENT ACTIVITIES AND CONTROLS

A detailed construction environmental management plan (CEMP) have been prepared for the construction phase of the project. This plan contains mitigation measures relevant to the pre-construction and construction stages of the project. The mitigation measures relevant to the proposed earthworks within precincts 9 and 11 are detailed below.

4.1 Fauna Management

Table 6: Fauna Management Procedures relevant to Precincts 1 and 2

Mitigation Measure	Responsibility	Construction Phase		
		Prior	During	Post
Parawebbing around vegetation protection areas, as per Appendix C – Earthworks Fencing Plan.	Environmental Officer	X		
If contractors are to utilise Boyd Street overpass for site entry, installation of signage at the site entry and along Cobaki Parkway to notify staff, particularly plant operators, of the possible occurrence of potoroo.	Construction Manager/Site Superintendent Sign off: Environmental officer	X		
Site-specific threatened species inductions for all site staff. Induction will cover issues relating to threatened species, designated and restricted areas of access and waste disposal	Environmental Officer	X		
Ongoing education of site staff through 'toolbox talks', ensuring important information relating to the protection of fauna are reiterated regularly. To be signed off by all attendees.	Environmental Officer		X	
Fencing inspections	Environmental Officer/ Site Superintendent		X	
Post-earthworks report to Tweed Shire Council	Environmental Officer		X	
Weekly inspection of construction site/works (Weekly Construction Checklist – Appendix D)	Environmental Officer		X	
Inspection to ensure that operations are leaving the site free draining with no ponding of stormwater.	Environmental Officer		X	
Maintenance of protection fencing and monitoring to ensure that non permitted activities do not occur within protected areas	Environmental Officer		X	

Monitoring compliance with the <i>Companion Animals Act 1998</i> (That no unrestrained dogs are allowed on site during construction)	Environmental Officer		X	
Contact details for the ecologist/fauna specialist, Wildlife Relocation and Management Services (07 5590 4301) and the Local Veterinary Hospital (Billinudgel: 02 6680 3480) must be kept at all times in the site offices and with the on-site Environmental Officer.	Environmental Officer	X	X	
Notification of any additional threatened species identified to DECCW (NPWS)	Environmental Officer	X	X	
No works within 100m of the raptor nests (subject to confirmation of usage)	Project Manager/ Environmental Officer		X	

Earthworks Report

A post-earthworks report will be prepared, detailing:

- Information on earthworks operations, dates, procedures, areas
- Detailed information about any incursion into no-go zones.
- Detailed information regarding any fauna mortality or injury.
- Assessment against the performance criteria detailed in Section 9 of the FMP (SMEC, 2013b).
- Recommended remediation measures for any incursions into no-go zones.

Final reports will be submitted to TSC at the completion of Earthworks.

4.2 Vegetation Management

Table 7: Mitigation Measures for Vegetation Management

Mitigation Measure	Responsibility	Prior to Construction	During Construction
Pre-clearing survey of habitat trees, including flagging and GPS recording	Fauna Spotter Catcher	X	
Parawebbing/exclusion fencing installation around vegetation protection areas/ threatened flora species as per Earthworks Fencing Plan (Appendix C)	Site Superintendent Sign off: Environmental officer	X	
Primary weed control within rehabilitation and management areas at commencement of earthworks in adjacent Development Precincts	Rehabilitation contractor	X	
Installation of erosion and sediment controls to protect vegetation protection areas	Site Superintendent Sign off: Environmental Officer	X	X
Maintenance of protection fencing	Environmental Officer/ Site Superintendent		X
Fencing inspections	Environmental Officer and Site Superintendent	X	X
Notification of additional threatened species to DECCW (NPWS)	Environmental Officer	X	X
Ongoing education of site staff through 'toolbox talks', ensuring important information relating to vegetation protection are reiterated regularly. To be signed off by all attendees.	Environmental Officer and Site Superintendent	X	X
Completion of the weekly construction checklist (Appendix D)	Environmental Officer		X
Post-earthworks report to Tweed Shire Council	Environmental Officer		X
Inspection for weed species on a six monthly basis	Environmental Officer		X
Monitoring of stockpiled materials to ensure weed infested topsoil is stockpiled separately	Environmental Officer		X

4.3 Contaminated Lands Management

Table 8: Mitigation Measures for Contaminated Lands Management

Mitigation Measure	Responsibility	Prior to Construction	During Construction
Any unidentified or accidental potential contamination encountered during construction will be documented, investigated by a specialist and remedial action applied before works continue in that area	Construction Manager / Site Superintendent / Environmental Officer		X
Storage, use and accidental spillage of chemicals, fuel and dangerous goods shall be reported	Construction Manager / Site Superintendent / Environmental Officer		X
Vehicles and machinery shall be maintained appropriately with no leaks	Site Superintendent		X
Imported fill material shall be certified free from contaminants	Site Superintendent		X

Reporting:

Permanent records of the following activities will be kept on-site and updated regularly to enable audit/review by means of a simple check list or similar method:

- Locations of contaminated soil
- Records of field tests and visual assessments
- Records of sampling locations, chain of custody forms and laboratory reports
- Records of regulatory correspondence
- Quantities of material disposed of offsite and waste disposal locations
- Requests for corrective actions lodged
- Any changes to construction or management procedures

4.4 Noise and Vibration Management

Table 9: Mitigation Measures for Noise and Vibration Management

Mitigation Measure	Responsibility	Prior to Construction	During Construction
Hours of Work must be adhered to: - Between 7am and 5pm, Mondays to Saturdays - No work is permitted on Sundays and public holidays.	Construction Manager / Site Superintendent		X
Unless previously approved/agreed with relevant authorities, rock breaking, rock hammering, sheet piling, pile driving and any similar activity are only permitted between the following hours: 9am to 12pm, Monday to Saturday 2pm to 5pm, Monday to Saturday	Construction Manager / Site Superintendent		X
Where possible, earthworks should move in a southwest to northeast direction so that a southwest working face provides physical screening to the offsite dwellings to the south.			X
The crusher and screen should be located behind an earth mound/berm where possible to provide acoustical screening of noise emissions.	Construction Manager / Site Superintendent		X
Ensure that workers are trained to manage the use of noise producing plant or equipment in a way that noise is minimised.	Construction Manager / Site Superintendent	X	
Ensure all plant is maintained in good condition, with all reasonable and feasible acoustic treatments installed.	Construction Manager / Site Superintendent		X
Ensure that wherever practical, and where sensitive receivers may be affected, piling activities are completed using bored piles.	Construction Manager / Site Superintendent		X
Plant and equipment should be turned off when not in use or throttled down to a minimum.	Construction Manager / Site Superintendent		X
Vibration levels must not exceed the Criteria presented in the <i>Environmental Noise Management – Assessing Vibration: A Technical Guide (DEC, 2006)</i>	Construction Manager / Site Superintendent		X

Mitigation Measure	Responsibility	Prior to Construction	During Construction
All reasonable steps shall be undertaken to muffle and acoustically baffle all plant and equipment.	Construction Manager / Site Superintendent		X
The use of vibratory compaction equipment (other than hand held devices) within 100m of any dwelling house, building or structure is strictly prohibited.	Construction Manager / Site Superintendent		X
Identify nearby residents and other sensitive land uses and notify of vibration generating activities if required.	Construction Manager / Site Superintendent / Environmental Officer	X	X
In the event of complaints from nearby residents, which Council deem to be reasonable, the noise from the construction site is not to exceed the following: A. Short Term Period (4 weeks) – $L_{Aeq, 15min}$ noise level measured over a period of not less than 15 minutes when the construction site is in operation, must not exceed the background level by more than 20dB(A) at the boundary of the nearest likely affected residence. B. Long term period (the duration) – $L_{Aeq, 15min}$ noise level measured over a period of not less than 15 minutes when the construction site is in operation, must not exceed the background level of more than 15dB(A) at the boundary of the nearest affected residence.	Construction Manager/Site Superintendent		X
Safety inductions prior to the commencement of construction, including awareness of commitments, directives, working hours and managing equipment to minimise vibration impacts.	Site Superintendent / Environmental Officer	X	
Ensure that all site workers have suitable personal protective equipment (PPE) to be worn at all times when near or operating plant and equipment making noise.	Site Superintendent		X

Reporting:

- The daily site diary will be used to record auditory observations during site works when necessary.
- Where required, noise and/or vibration monitoring results will be reviewed by the Environmental Officer and kept on file on site.
- Monitoring results will be checked on a regular basis and recorded on the weekly environmental checklist in addition to periodic reporting to Project Managers.
- In the event of receipt of a noise complaint the following timeframes for response will be provided:
 - The complaints register will be updated within the same work day with timeframe for response/action noted
 - Responses to resident complaints will be completed within two business days
 - Complaints will be submitted to TSC weekly and include details of the complaint and actions carried out to close out the complaint.

4.5 Air Management and Dust Control

Table 10: Mitigation Measures for Air and Dust Control Management

Mitigation Measure	Responsibility	Prior to Construction	During Construction
Areas disturbed by earthworks: • Disturb only the minimum area necessary for earthworks of the construction footprint • Remove topsoil and rehabilitate disturbed areas as soon as practicable after the completion of earthworks	Site Superintendent / Environmental Officer		X
Topsoil stripping: • Tracks used by topsoil stripping scrapers during their loading and unloading cycle will be watered • Stripping will occur preferably in damp conditions of practical and during favourable wind conditions	Site Superintendent / Environmental Officer		X
Topsoils stockpiling: • Long terms stockpiles, not used for over six months, will be sown with cover crops • Drawings of temporary stockpiles including spoil and topsoil will be marked up as earthworks progress	Site Superintendent / Environmental Officer		X

Mitigation Measure	Responsibility	Prior to Construction	During Construction
Haul roads: - All unsealed roads and frequently trafficked areas will be watered using water carts or sprays to minimise the generation of dust and particulate - All haul roads will have edges clearly defined with marker posts or equivalent to control their locations Dust suppressant will be used when necessary	Site Superintendent / Environmental Officer		X

Reporting:

Air quality management reporting is designed to comply with the Project Approval and Development Assessment conditions, and provide stakeholder access to relevant air quality information and data.

Regular monitoring data will be reported in the Annual Monitoring report for the project. Such reporting will include:

- Air quality monitoring results and comparison to performance criteria;
- Air quality related complaints and management/mitigation measures undertaken;
- Management/mitigation measures undertaken in the event of any confirmed non-compliance with performance criteria; and
- Review of the performance of management measures and the monitoring program.

4.6 Waste Management

Table 11: Mitigation Measures for Waste Management

Mitigation Measure	Responsibility	Prior to Construction	During Construction
Soil, topsoil and mulch are to be stockpiled in allocated areas	Construction Manager / Site Superintendent		X
Hazardous wastes are to be stored in appropriate containers (as shown in Figure 4 of the CEMP) and transported by a licensed waste transporter	Construction Manager / Site Superintendent / Environmental Officer		X
Concrete wash out areas located in designated locations and cleaned out on a regular basis.	Construction Manager / Site Superintendent		X
All other recyclable or non-recyclable wastes are to be stored in covered bins/skips at appropriate locations on site and emptied on a regular basis	Environmental Officer		X

Reporting:

Waste Management protocols for the site will be subject to review and the performance of such protocols will be described in annual environmental reporting. Within the annual reports, registers of waste will be analysed and presented.

4.7 Cultural Heritage Management

Table 12: Mitigation Measures for Cultural Heritage Management

Mitigation Measure	Responsibility	Prior to Construction	During Construction
All construction staff engaged in undertaking initial subsurface disturbance will undergo a Cultural Heritage Induction prior to working on site	Site Superintendent / Environmental Officer	X	X
The Cultural Heritage Protection Areas are Zoned Environmental Protection Areas within the Development Concept Plan, and as such, mitigation measures detailed in Sections 4.1 and 4.2 of this plan will apply, including the installation and maintenance of exclusion fencing as per Earthworks Fencing Plan (Appendix C).	Site Superintendent / Environmental Officer	X	X
In the event that a suspected Aboriginal Object is identified during construction, work in the immediate area should cease, and a qualified archaeologist should verify the cultural origins of the find. Should the object be of Aboriginal origin, the Find Procedure in Section 11 of the CHMP (Everick, 2010) must be followed.	Site Superintendent / Environmental Officer	X	X
The Activity Response Hierarchy in Section 12.3 of the CHMP (Everick, 2010) should be adhered to.	Site Superintendent / Environmental Officer	X	X

Reporting:

- A progress report shall be provided to the Registered Aboriginal Stakeholders every six months.
- A report shall be generated where a find has occurred and been investigated.

4.8 Erosion and Sediment Control

Table 13: Mitigation Measures for Sediment and Erosion Control Management

Mitigation Measure	Responsibility	Prior to Construction	During Construction
Erosion and sediment control measures, as detailed in Appendix A, installed and operational	Construction Manager / Site Superintendent	X	X
No soil, sand, gravel, clay or other material shall be disposed of off the site without the prior written approval of Tweed Shire Council General Manager or his delegate	Construction Manager / Site Superintendent		X
The surrounding carriageways are to be kept clean of any material carried onto the roadway by construction vehicles	Construction Manager / Site Superintendent		X
Regular inspections are to be carried out to ensure adequate erosion control measures are in in good working order and in place	Environmental Officer		X
Additional inspections after each storm event by the Supervising Engineer to ensure the erosion control devices are intact, and no sediment has left the site or is deposited on public land or in waterways. The inspection program will be carried out until the site is fully rehabilitated to Councils satisfaction	Environmental Officer		X

Reporting:

Results of the monitoring program, the effectiveness of established water management structures, sediment control devices and the particulars of any remedial measures undertaken in instances where uncontrolled erosion or heavy sediment deposition occurred will be reported in annual reports.

4.9 Construction Traffic and Pedestrian Management

Table 14: Mitigation Measures for Traffic and Pedestrian Management

Mitigation Measure	Responsibility	Prior to Construction	During Construction
Existing access tracks on site will be utilised.	Construction Manager / Site Superintendent		X
Ingress and egress of all vehicles will be via Piggabeen Road and Boyd Street	Site Superintendent / Environmental Officer		X
Rock shake down or rumble grids will be installed at the exit points, to ensure sediment will not be dragged onto the road pavement.	Construction Manager / Site Superintendent	X	X
Work zone speed limit of 40km/hr is to be obeyed at all times.	Construction Manager / Site Superintendent		X
All material will be loaded and unloaded wholly within the site via excavators and truck and dog trailers.	Construction Manager / Site Superintendent	X	X
In order to make others aware of the on-going activity signs such as Entry to Authorized Personnel Only, Personal Protective Equipment must be worn, etc will be prominently displayed.	Construction Manager / Site Superintendent		X
Under no circumstances shall an employee answer an incoming or make an outgoing phone call whilst operating machinery or a vehicle.	Construction Manager / Site Superintendent		X
Any personnel controlling construction traffic should do so with the aid of portable two-way radios.	Site Superintendent		X
Surrounding road carriageways are to be kept clean of any material carried onto the roadway by construction vehicles.	Construction Manager / Site Superintendent		X
The work site shall be suitably protected and free of hazards which could result in tripping or falling by workers and road users. Hazards which cannot be removed shall be suitably protected to prevent injury to workers and road users, including sight impairment.	Construction Manager / Site Superintendent		X
Where works extend beyond daylight hours and adjacent lighting is insufficient to illuminate hazards to workers and non-motorised road users, appropriate temporary lighting shall be installed.	Construction Manager / Site Superintendent		X
Where level differences are significant, suitable barriers which prevent access shall be used.	Construction Manager / Site Superintendent		X

5 MONITORING

The timing of installation of control measures will be critical to ensuring that environmental obligations are met within the required timeframe and that controls are effective in achieving their purpose. A program of routine monitoring will be conducted on environmental controls.

Inspections of work areas by the site Environmental Officer will provide a means for monitoring effectiveness or maintenance requirements before potential environmental impact occurs.

All post-construction monitoring will be undertaken in accordance with the approved specific management plans. Refer to the specified management plan for details.

Environmental monitoring will involve collecting and interpreting data to verify the compliance of the CEMP, and environmental mitigation measures employed for the construction phase of the project. The monitoring program will assist in the auditing of safeguard measures to ensure they achieve their objectives and to facilitate modification where necessary.

Monitoring results will be used to identify existing or potential problems and where practical, the results will be obtained at the time of the assessment. Where monitoring results do not meet the outlined criteria or accepted levels, a corrective action will be raised and followed up accordingly. All monitoring results and checklists will be filed and stored at the site office and recorded on the monitoring register, and where necessary sent to the according authority.

The methodology, frequency, timing and responsibilities for the proposed environmental monitoring programs are specified in each respective Management Plan. Where practical, a number of requirements from each Management Plan have been incorporated into the Weekly Site Inspection Checklist. Table 15 below outlines the monitoring frequencies from each Management Plan relevant to the construction activities proposed for Precincts 9 and 11.

All inspection reports and non-conformances will be recorded in a centralised register and acted on within two weeks, detailing the action taken or proposed to address the issue.

Table 15: Monitoring relevant to the construction activities within Precincts 9 and 11.

Monitoring Issue	Location	Frequency	Criteria	Person Responsible	Further Detail
Pre- Construction					
Fauna	Overall site	Prior to the commencement of earthworks.	Fauna protection fencing, erosion and sediment control and all other construction environment controls 100% intact and functional prior to clearing and construction (Appendix C).	Environmental Officer/Site Foreman	Refer to FMP within CEMP
Flora	Work Areas	Once, prior to earthworks	High visibility exclusion netting, erosion and sediment control and all other construction environment controls remain 100% intact and functional prior to and during clearing and construction for effective protection of trees/vegetation/habitat/buffers to be retained.	Ecologist/Site Foreman	Refer to VMP within CEMP
		Prior to earthworks	Vegetation protection measures included in the Environmental Induction and all workers inducted.	Environmental Officer	Refer to VMP within CEMP
Construction					
Fauna	Work areas	Daily	Erosion and sediment control and all other construction environment controls 100% intact and functional during construction.	Environmental Officer /Site foreman	Refer to FMP within CEMP
	Work areas	Daily	Environmental Protection Areas and buffers are clearly marked and maintained for the duration of clearing and construction	Environmental Officer	Refer to FMP within CEMP
	Work Areas	During all earthworks activities.	No injury or death of identified fauna during clearing and earthworks	Fauna Spotter Catcher	Refer to FMP within CEMP
	Work Areas	Weekly	A general inspection completed for fencing associated with fauna. Rectifications reported and completed.	Environmental Officer	Refer to FMP within CEMP
Flora	Work Areas	During construction	All threatened flora and retained EEC's are buffered in accordance with the VMP.	Environmental Officer	Refer to VMP within CEMP
	Work Areas	During construction	- No earthworks outside nominated clearing zones. - No clearing of or damage to threatened flora during construction. - No clearing of or damage to retained Endangered Ecological Communities.	Environmental Officer/Ecologist	Refer to VMP within CEMP

Monitoring Issue	Location	Frequency	Criteria	Person Responsible	Further Detail
	Work Areas	During all earthworks activities	No alterations in drainage impacting on retained vegetation.	Environmental Officer	Refer to VMP within CEMP
Surface Water Quality	Boards 1 to 4	Monthly	Water quality results are in compliance with the specified ANZECC guideline values for prescribed monitoring parameters.	Environmental Officer	Refer to Section 9.2 of the GMP (SMEC, 2012c).
Stormwater	Stormwater retention basis	Weekly/ 12 hourly during rainfall events (>25 mm)/ when pH is recorded < 6.5.	Water is of suitable quality that discharging runoff complies with the provisions of Council's Design Specification D7-Stormwater Quality, before being released.	Environmental Officer	Refer to Stormwater Management Plan.
Noise	Nearest possible location to likely affected residence or boundary of.	Reactive (complaint based)	Short term (4 weeks), LAeq, 15min, over a period of 15min. When construction is in operations must not exceed the background level by more than 20dB(A) at the boundary of the nearest likely affected residence. Long term (the duration) – LAeq, 15min, over a period of not less than 15min when construction is in operation, must not exceed the background level by more than 15dB(A) at the boundary of the nearest affected residence.	Environmental Officer	Refer to Section 3.4.
Cultural Heritage	Entire site	As detected	Detection of Aboriginal objects or Aboriginal human remains reported and addressed.	Cultural Heritage Consultant	Refer to Cultural Heritage Management Plan (Everick, 2009).
Erosion and Sediment Control	Work Areas	Daily	Erosion and sediment controls are clean and functioning effectively, according to design.	Environmental Officer/ Site foreman	Refer to Stormwater Management Plan.
Air Quality	Work Areas	Daily	Visual observations for dust assessed, reported and managed. Zero complaints related to air quality.	Environmental Officer	Refer to Section 3.10
Waste	Work Areas	Daily inspection of receptacles.	Waste register is accurate and complete with all waste types (generated) identified	Environmental Officer	Refer to Section 4.8 of this plan.

Monitoring Issue	Location	Frequency	Criteria	Person Responsible	Further Detail
		Monthly volumes of waste streams monitored.	Receptacles maintained at >75% capacity. No harm to environmental receptors.		
Revegetation and Regeneration Areas	Within Rehabilitation and Management Areas adjacent to Precincts 9 and 11.	Initial monitoring event no more than 6 weeks after primary weed control or planting preparation. Ongoing monitoring annually.	• All Declared noxious weeds effectively and appropriately controlled. • <5% cover of all weeds at the end of the 5 year maintenance period. • Negligible evidence of herbicide damage to native ground covers and native species regeneration. • Sufficient seed collected for propagation requirements of the current project only. • Revegetation areas planted out in general accordance with approved revegetation lists. • At least 1 established woody native plant per square meter throughout revegetation areas. • Increase in the cover of native groundcovers at each annual monitoring event. • For planted rainforest species, an average growth of >1 m after three (3) years, >1.5 m and >70% canopy cover after 5 years. • For planted sclerophyll species, >50% cover after 3 years and >70% cover after 5 years. • >85% survival of stems planted. • Presentable mulch to finish at 100–150 mm deep along visible edges of high profile areas subject to establishment of buffers through revegetation.	Rehabilitation contractor	Refer to SRRMP.

Note: While no fauna survey is proposed within the borrow areas of Precincts 9 and 11 for the earthworks phase of the project, annual fauna monitoring is proposed over the entire site, as detailed in the Flora and Fauna Monitoring Program (SMEC, 2013a).

REFERENCES

CRG Acoustical Consultants. 2013. Environmental Noise Impact Report. Proposed Earthworks for Central Open Spaces Stages 9 and 11, Cobaki Parkway.

Department of Environment and Conservation (NSW), 2006, Environmental Noise Management – Assessing Vibration: A Technical Guide

Gilbert and Sutherland. 2008. Stage 1 Preliminary Site Contamination Assessment – Cobaki Lakes Concept Plan

Everick Heritage Consultants. 2010. Cultural Heritage Management Plan

JBA Urban Planning. 2008. Environmental Assessment Report Part 3A Concept Plan

JBA Urban Planning. 2009. Environmental Assessment Report Part 3A Project Application

James Warren and Associates. 2010a. Revised Fauna Management plan. Cobaki Lakes Preferred Project Report.

James Warren and Associates. 2013. Revised Assessment of Significance (7-Part Test).

James Warren and Associates. 2012a. Revised Site Regeneration & Revegetation Plan. Cobaki Lakes Preferred Project Report.

James Warren and Associates. 2012b. Revised Saltmarsh Rehabilitation Plan. Cobaki Lakes

James Warren and Associates. 2013b. Revised Ecological Assessment. Cobaki Lakes., Tweed Heads.

SMEC. 2013a. Flora and Fauna Monitoring Program. Unpublished report prepared for Tweed Shire Council

SMEC. 2013b. Cobaki Estate Fauna Management Plan – Precincts 9 and 11

SMEC. 2013c. Cobaki Estate Site Regeneration and Revegetation Management Plan – Precincts 9 and 11.

SMEC. 2013d. Cobaki Estate Vegetation Management Plan – Precincts 9 and 11.

SMEC. 2013e. Cobaki Estate Construction Environmental Management Plan – Precincts 9 and 11.

SMEC 2013f. Cobaki Estate Acid Sulfate Soils Management Plan

SMEC 2012. Cobaki Estate Groundwater Management Plan

SMEC. 2012. Freshwater Wetland Compensatory Habitat Management Plan.

APPENDIX A - BULK EARTHWORKS DRAWINGS

DRAWING INDEX		
DWG. No.	DESCRIPTION	REVISION
YC0229-1E1-D01	COVER SHEET & LOCALITY PLAN	B
YC0229-1E1-D02	INDEX SHEET	F
YC0229-1E1-D03	SCOPE OF WORKS & KEY SHEET PLAN	F
YC0229-1E1-D04	MISSING LINK CONSTRUCTION STAGING PLAN	C
YC0229-1E1-A01	ALIGNMENT DETAILS - SHEET 1 OF 2	D
YC0229-1E1-A02	ALIGNMENT DETAILS - SHEET 2 OF 2	C
YC0229-1E1-E01	EROSION & SEDIMENT CONTROL PLAN - SHEET 1 OF 2	F
YC0229-1E1-E02	EROSION & SEDIMENT CONTROL PLAN - SHEET 2 OF 2	E
YC0229-1E1-E03	SEDIMENT BASIN SETOUT DETAILS - SHEET 1 OF 3	C
YC0229-1E1-E04	SEDIMENT BASIN SETOUT DETAILS - SHEET 2 OF 3	C
YC0229-1E1-E05	SEDIMENT BASIN SETOUT DETAILS - SHEET 3 OF 3	A
YC0229-1E1-EC01	BULK EARTHWORKS CUT / FILL PLAN - SHEET 1 OF 2	F
YC0229-1E1-EC02	BULK EARTHWORKS CUT / FILL PLAN - SHEET 2 OF 2	F
YC0229-1E1-EW01	BULK EARTHWORKS LAYOUT PLAN - SHEET 1 OF 8	F
YC0229-1E1-EW02	BULK EARTHWORKS LAYOUT PLAN - SHEET 2 OF 8	E
YC0229-1E1-EW03	BULK EARTHWORKS LAYOUT PLAN - SHEET 3 OF 8	E
YC0229-1E1-EW04	BULK EARTHWORKS LAYOUT PLAN - SHEET 4 OF 8	E
YC0229-1E1-EW05	BULK EARTHWORKS LAYOUT PLAN - SHEET 5 OF 8	E
YC0229-1E1-EW06	BULK EARTHWORKS LAYOUT PLAN - SHEET 6 OF 8	E
YC0229-1E1-EW07	BULK EARTHWORKS LAYOUT PLAN - SHEET 7 OF 8	E
YC0229-1E1-EW08	BULK EARTHWORKS LAYOUT PLAN - SHEET 8 OF 8	E
YC0229-1E1-EW09	PRECINCT 1 & 2 BORROW AREA EARTHWORKS PLAN - SHEET 1 OF 4	C
YC0229-1E1-EW10	PRECINCT 1 & 2 BORROW AREA EARTHWORKS PLAN - SHEET 2 OF 4	C
YC0229-1E1-EW11	PRECINCT 1 & 2 BORROW AREA EARTHWORKS PLAN - SHEET 3 OF 4	C
YC0229-1E1-EW12	PRECINCT 1 & 2 BORROW AREA EARTHWORKS PLAN - SHEET 4 OF 4	C
YC0229-1E1-EW13	PRECINCT 9 BORROW AREA EARTHWORKS PLAN	A
YC0229-1E1-EW14	PRECINCT 11 BORROW AREA EARTHWORKS PLAN	A
YC0229-1E1-ES01	BULK EARTHWORKS SECTIONS - SHEET 1 OF 2	D
YC0229-1E1-ES02	BULK EARTHWORKS SECTIONS - SHEET 2 OF 2	D
YC0229-1E1-ES03	BULK EARTHWORKS TYPICAL SECTIONS	D
YC0229-1E1-ES04	PRECINCT 1 & 2 BORROW AREA EARTHWORKS SECTIONS - SHEET 1 OF 4	D
YC0229-1E1-ES05	PRECINCT 1 & 2 BORROW AREA EARTHWORKS SECTIONS - SHEET 2 OF 4	D
YC0229-1E1-ES06	PRECINCT 1 & 2 BORROW AREA EARTHWORKS SECTIONS - SHEET 3 OF 4	D
YC0229-1E1-ES07	PRECINCT 1 & 2 BORROW AREA EARTHWORKS SECTIONS - SHEET 4 OF 4	D
YC0229-1E1-ES08	PRECINCT 9 BORROW AREA EARTHWORKS SECTIONS	A
YC0229-1E1-ES09	PRECINCT 11 BORROW AREA EARTHWORKS SECTIONS	A
YC0229-1E1-DL01	MAJOR CENTRAL OPEN DRAIN LONGITUDINAL SECTION - SHEET 1 OF 3	D
YC0229-1E1-DL02	MAJOR CENTRAL OPEN DRAIN LONGITUDINAL SECTION - SHEET 2 OF 3	D
YC0229-1E1-DL03	MAJOR CENTRAL OPEN DRAIN LONGITUDINAL SECTION - SHEET 3 OF 3	D
YC0229-1E1-XS01	MAJOR CENTRAL OPEN DRAIN CROSS SECTIONS - SHEET 1 OF 10	D
YC0229-1E1-XS02	MAJOR CENTRAL OPEN DRAIN CROSS SECTIONS - SHEET 2 OF 10	D
YC0229-1E1-XS03	MAJOR CENTRAL OPEN DRAIN CROSS SECTIONS - SHEET 3 OF 10	D

YC0229-1E1-XS04	MAJOR CENTRAL OPEN DRAIN CROSS SECTIONS - SHEET 4 OF 10	D
YC0229-1E1-XS05	MAJOR CENTRAL OPEN DRAIN CROSS SECTIONS - SHEET 5 OF 10	D
YC0229-1E1-XS06	MAJOR CENTRAL OPEN DRAIN CROSS SECTIONS - SHEET 6 OF 10	D
YC0229-1E1-XS07	MAJOR CENTRAL OPEN DRAIN CROSS SECTIONS - SHEET 7 OF 10	D
YC0229-1E1-XS08	MAJOR CENTRAL OPEN DRAIN CROSS SECTIONS - SHEET 8 OF 10	D
DRAWING INDEX		
DWG. No.	DESCRIPTION	REVISION
YC0229-1E1-XS09	MAJOR CENTRAL OPEN DRAIN CROSS SECTIONS - SHEET 9 OF 10	D
YC0229-1E1-XS10	MAJOR CENTRAL OPEN DRAIN CROSS SECTIONS - SHEET 10 OF 10	D
YC0229-1E1-BIS04	MINOR OPEN DRAIN 4 CROSS SECTIONS SHEET 1 OF 3	D
YC0229-1E1-XS15	MINOR OPEN DRAIN 5 CROSS SECTIONS SHEET 3 OF 2	D
YC0229-1E1-BIS08	MINOR OPEN DRAIN 4 CROSS SECTIONS SHEET 2 OF 2	D
YC0229-1E1-BIS05	MINOR OPEN DRAIN 6 CROSS SECTIONS SHEET 1 OF 2	B
YC0229-1E1-XS17	MINOR OPEN DRAIN 6 CROSS SECTION SHEET 2 OF 2	D
YC0229-1E1-DL07	MINOR OPEN DRAIN 7 LONGITUDINAL SECTION	D
YC0229-1E1-XS18	MINOR OPEN DRAIN 7 CROSS SECTION SHEET 1 OF 3	D
YC0229-1E1-XS19	MINOR OPEN DRAIN 7 CROSS SECTION SHEET 2 OF 3	D
YC0229-1E1-XS20	MINOR OPEN DRAIN 7 CROSS SECTION SHEET 3 OF 3	D
YC0229-1E1-DL08	MINOR OPEN DRAIN 1 LONGITUDINAL SECTION	C
YC0229-1E1-CL01	COBAKI PARKWAY LONGITUDINAL SECTION	C
YC0229-1E1-CX01	COBAKI PARKWAY CROSS SECTIONS - SHEET 1 OF 7	C
YC0229-1E1-CX02	COBAKI PARKWAY CROSS SECTIONS - SHEET 2 OF 7	C
YC0229-1E1-CX03	COBAKI PARKWAY CROSS SECTIONS - SHEET 3 OF 7	C
YC0229-1E1-CX04	COBAKI PARKWAY CROSS SECTIONS - SHEET 4 OF 7	C
YC0229-1E1-CX05	COBAKI PARKWAY CROSS SECTIONS - SHEET 5 OF 7	C
YC0229-1E1-CX06	COBAKI PARKWAY CROSS SECTIONS - SHEET 6 OF 7	C
YC0229-1E1-CX07	COBAKI PARKWAY CROSS SECTIONS - SHEET 7 OF 7	C
YC0229-1E1-SL01	SANDY ROAD LONGITUDINAL SECTION - SHEET 1 OF 2	D
YC0229-1E1-SL02	SANDY ROAD LONGITUDINAL SECTION - SHEET 2 OF 2	D
YC0229-1E1-SX01	SANDY ROAD CROSS SECTIONS - SHEET 1 OF 7	D
YC0229-1E1-SX02	SANDY ROAD CROSS SECTIONS - SHEET 2 OF 7	D
YC0229-1E1-SX03	SANDY ROAD CROSS SECTIONS - SHEET 3 OF 7	D
YC0229-1E1-SX04	SANDY ROAD CROSS SECTIONS - SHEET 4 OF 7	D
YC0229-1E1-SX05	SANDY ROAD CROSS SECTIONS - SHEET 5 OF 7	D
YC0229-1E1-SX06	SANDY ROAD CROSS SECTIONS - SHEET 6 OF 7	C
YC0229-1E1-SX07	SANDY ROAD CROSS SECTIONS - SHEET 7 OF 7	C
YC0229-1E1-TS01	COBAKI PARKWAY & SANDY ROAD TYPICAL CROSS SECTIONS	C
YC0229-1E1-SW01	CULVERT 'A' LOCATION & DETAILS - SHEET 1 OF 2	C
YC0229-1E1-SW02	CULVERT 'A' LOCATION & DETAILS - SHEET 2 OF 2	C
YC0229-1E1-SW03	CULVERT 'B' LOCATION & DETAILS	C
YC0229-1E1-SW04	CULVERT 'C' LOCATION & DETAILS	C
YC0229-1E1-SW05	LOW FLOW DIVERSION BUND LAYOUT PLAN	C
YC0229-1E1-SW06	CENTRAL OPEN SPACE DRAINAGE INTERSECTION DETAILS - SHEET 1 OF 2	D
YC0229-1E1-SW07	CENTRAL OPEN SPACE DRAINAGE INTERSECTION DETAILS - SHEET 2 OF 2	D

T.S.C. REFERENCE DRAWINGS	
DWG. No.	DESCRIPTION
S.D.501	EROSION & SILTATION PREVENTION DEVICES SHEET 1
S.D.502	EROSION & SILTATION PREVENTION DEVICES SHEET 2

INSTITUTION OF ENGINEERS, AUSTRALIA GUIDELINES	
DESCRIPTION	
SOIL EROSION & SEDIMENT CONTROL - ENGINEERING GUIDELINES FOR QUEENSLAND CONSTRUCTION SITES - JUNE 1996	

ROADS AND TRAFFIC AUTHORITY, NSW	
DWG. No.	DESCRIPTION
MD.R11.A01.A.2	INSTALLATION, BEDDING AND FILLING/BACKFILLING AGAINST/OVER CONCRETE PIPE CULVERTS

QUEENSLAND GOVERNMENT DEPARTMENT OF TRANSPORT AND MAIN ROADS		
DWG. No.	CATEGORY	DESCRIPTION
1131	RC SLAB DECK CULVERT - 2500 SPAN	CONSTRUCTION OF FOUNDATIONS, APRONS WALLS AND WINGS
1303	RC BOX CULVERTS & SLAB LINK BOX CULVERTS	CONSTRUCTION OF REINFORCED CONCRETE WINGWALLS AND HEADWALLS
1305	ENDS TO PIPE CULVERTS	GENERAL ARRANGEMENT AND INSTALLATION OF WINGWALLS, HEADWALLS AND APRONS
1318	RC BOX CULVERTS & SLAB LINK BOX CULVERTS	CONSTRUCTION OF BASES WITH RECESSES AND APRONS
1319	RC BOX CULVERTS & SLAB LINK BOX CULVERTS	CONSTRUCTION OF UNREINFORCED WINGWALLS AND RC HEADWALLS H = 750 - 2400

CONSTRUCTION CERTIFICATE			
FOR APPROVAL		THIS DESIGN AND PLAN IS COPYRIGHT AND IS NOT TO BE USED OR REPRODUCED WHOLLY OR IN PART OR TO BE USED ON ANY PROJECT WITHOUT THE WRITTEN PERMISSION OF YEATS CONSULTING PTY LTD	
F	PRECINCT 9 AND PRECINCT 11 BORROW AREAS ADDED	M.B.	11.12.13
E	MINOR OPEN DRAIN 5 ADDED TO DRAWING SET	T.W.	02.10.13
D	BULK EARTHWORKS CONSTRUCTION CERTIFICATE	M.G.	15.02.13
C	RESPONSE TO 3rd PARTY SWMP REVIEW	H.W.	18.10.12
B	RESPONSE TO TSC REQUEST FOR INFORMATION (RFI)	H.W.	04.05.12
A	ORIGINAL ISSUE	G.S.	18.03.11
REV	DESCRIPTION	DRAWN	DATE

DRAWING IS NOT TO BE SCALED	
SCALE	(AT ORIGINAL SHEET SIZE)
N/A	
ORIGINAL SHEET SIZE	A1

CLIENT	LEDA MANORSTEAD Pty Ltd
	

PROJECT	COBAKI, TWEED HEADS WEST CENTRAL OPEN SPACE BULK EARTHWORKS CONSTRUCTION CERTIFICATE CIVIL ENGINEERING DRAWINGS
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INDEX SHEET					
TASK	BY	INITIAL	DATE	APPROVED	RPEQ No 7817
REVIEW	CS		18.03.11	DRAWING NUMBER YC0229-1E1-D02	REVISION F
DESIGN	CJE		18.03.11		
DRAWN	GS		18.03.11		

YEATS: 18.03.11 - INDEX SHEET.dwg 18.03.11 AND 18.03.11 E:\1111\Drawings\Main\Index Sheet.dwg