

Cobaki Estate Environmental Assessment Report

Southern Special Purpose Precinct
(SSPP) Bulk Earthworks

- Bulk Earthworks

Revision 1
July 2014



Project Name:	Cobaki Estate Development – SSPP
Project Number:	30031162
Report for:	LEDA Manorstead PTY LTD

PREPARATION, REVIEW AND AUTHORISATION

Revision #	Date	Prepared by	Reviewed by	Approved for Issue by
1	04/06/14	AM/KM	JA	Jon Alexander

ISSUE REGISTER

Distribution List	Date Issued	Number of Copies
LEDA Manorstead PTY LTD:	15/07/2014	1
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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 infill area located within the Southern Special Purpose Precinct 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 6km west of Tweed Heads/Coolangatta Town Centre and 1.5km west of the Gold Coast Airport and the Gold Coast Highway, and 500m 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 infill area located in the Southern Special Purpose Precinct, herein referred to as the SSPP. The SSPP occurs in the southern section of the site and consists of land described as Lot 55 DP755740 and Lot 1 DP570076. The SSPP covers a total area of approximately 4.3ha, sharing boundaries with Cobaki Parkway and the Central Open Space.

The location of the SSPP 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 3) for the extraction and placement of fill in the SSPP, including bulk earthworks. Fill is proposed to be taken from Precinct 9 to place the required 170,185m³ of fill in the SSPP.

This report details the potential environmental impacts of the proposed 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 and earthworks intent.

Figure 1: Site Locality



COORDINATE SYSTEM
GDA 1994 MGA Zone 56

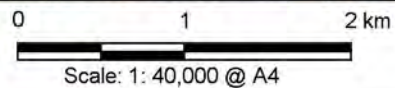


FIGURE 1 - Site Locality

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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:

- Construction Environmental Management Plan – Precincts 9,11,SSPP (SMEC, 2013a)
- Fauna Management Plan – Precincts 9,11,SSPP (SMEC, 2013b)
- Site Regeneration and Revegetation Plan – Precincts 9,11,SSPP (SMEC, 2013c)
- Vegetation Management Plan – Precincts 9,11,SSPP (SMEC, 2013d)
- Flora and Fauna Monitoring Program (SMEC, 2013e)
- Acid Sulphate Soils Management Plan (SMEC, 2013f)
- Noise and Vibration Management Plan – Central Open Space and Precincts 1,2 and 6 (SMEC, 2013g)
- Freshwater Wetland Compensatory Habitat Management Plan (SMEC, 2012)
- Revised Assessment of Significance (JWA, 2013a)
- Revised Ecological Assessment (JWA, 2013b)
- Revised Saltmarsh Rehabilitation Plan (JWA, 2012)
- Revised Fauna Management Plan (JWA, 2010)

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	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
	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 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.
Fisheries Management Act 1994	• Notification of dredging and/or reclamation works in waterways • Permit to obstruct fish passage • Permit to damage or remove aquatic vegetation	As the works proposed are being conducted under an existing part 3A approval, the requirements of the <i>Fisheries Management Act 1994</i> do not apply.
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").	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

Legislation	Details of Approvals/Permits Required	Relevance to the Project
	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).	OEH 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 1993	The Noxious Weeds Act 1993 defines the roles of government, councils, private landholders and public authorities in the management of noxious weeds, according to their potential to cause harm to the local environment.	Personnel and sub-contractors are to be made aware of correct 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 SSPP include:

- Site establishment including installation of exclusion fencing;
- Removal of saltmarsh and freshwater wetland communities;
- 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;
- Endangered Ecological Communities;
- Surface water quality;
- Acid sulphate soils and associated impacts;
- Air quality; and
- Cultural heritage.

3.1 Native fauna and habitat

Earthworks activities associated with the SSPP area will involve the removal of potential habitat for native fauna species. Furthermore, activities within the SSPP 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, filling of tidal land); and
- Habitat degradation due to altered natural hydrological regimes and increases in pollutants.

Three (3) threatened fauna species and/or their habitat have been recorded within or adjacent to the SSPP, as detailed in **Table 2**.

Table 2 Threatened fauna species and/or habitat within or adjacent to the SSPP

Common name	Scientific name	Status	Act
Wallum froglet	<i>Crinia tinnula</i>	Vulnerable	TSC Act
Osprey	<i>Pandion haliaetus</i>	Vulnerable	TSC Act
Black-necked stork	<i>Ephippiorhynchus asiaticus</i>	Endangered	TSC Act

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

Wallum froglet (*Crinia tinnula*)

Local wallum froglet populations exist within and surrounding the site, with core (breeding and/or refuge) habitat for the species provided in the Compensatory Habitat Area containing wet heathland and wetland communities east of the proposed Cobaki Parkway. The locations of wallum froglets recorded during surveys are shown in **Figure 2**.

Approximately 79.12 hectares of forage habitat is considered likely to occur on the whole development site during suitable conditions (i.e. after periods of heavy rainfall). Approximately 0.23 hectares (0.3%) will be removed from the SSPP. However, the loss of potential forage habitat is unlikely to significantly impact upon the local population of wallum froglets as the proposed works will not remove or modify any 'core' habitat areas. 'Core' habitat areas are defined as those containing physical and ecological characteristics suitable for breeding and/or refuge for the species.

Potential indirect impacts to this species include:

- Alteration of water quality in drainage lines due to runoff from the construction site;
- Alteration of hydrology of the drainage lines;
- Contamination or reduction of water quality in drainage lines due to runoff from chemicals or debris (fertilisers, etc.);
- Introduction of weed species into core habitat areas; and
- Increased competition from disturbance-adapted native, domestic and introduced fauna (such as Cane toads and *Gambusia*).

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 300m south-east of the SSPP (**Figure 3**), 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).

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). Storks usually forage in water 5-30cm deep for vertebrate and invertebrate prey and build large nests high in tall trees close to water. The territory of the Black-necked Stork in Cobaki is predicted at 4730 ha (Clancy and Andren, 2009). A pair was observed nesting at Piggabeen in 2005 with young on the nest, however the exact location of this nest has not been released (Clancy and Andren, 2009).

This species has been recorded foraging within the SSPP, Saltmarsh Rehabilitation Area and Central Open Space (WBM, 1990; Warren, 1993; Woodward-Clyde 1997; EcoPro 2004 & SMEC, 2014). Most recent sightings were of an individual within the western extent of the Saltmarsh Rehabilitation Area in April 2014 and a pair foraging in the Central Open Space in May 2014.

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 within the SSPP. Refer to **Figure 4** for Potential Habitat and recorded sightings of the Black-necked Stork.

Approximately 78.7 hectares (55%) of potential forage habitat will be removed from the site, of which 4 hectares occurs within the SSPP. The potential foraging habitat to be removed comprises Saltmarsh, dams and drainage lines within the SSPP. 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.

No breeding habitat will be impacted by the works.

Figure 2: Wallum Froglet Distribution and Habitat

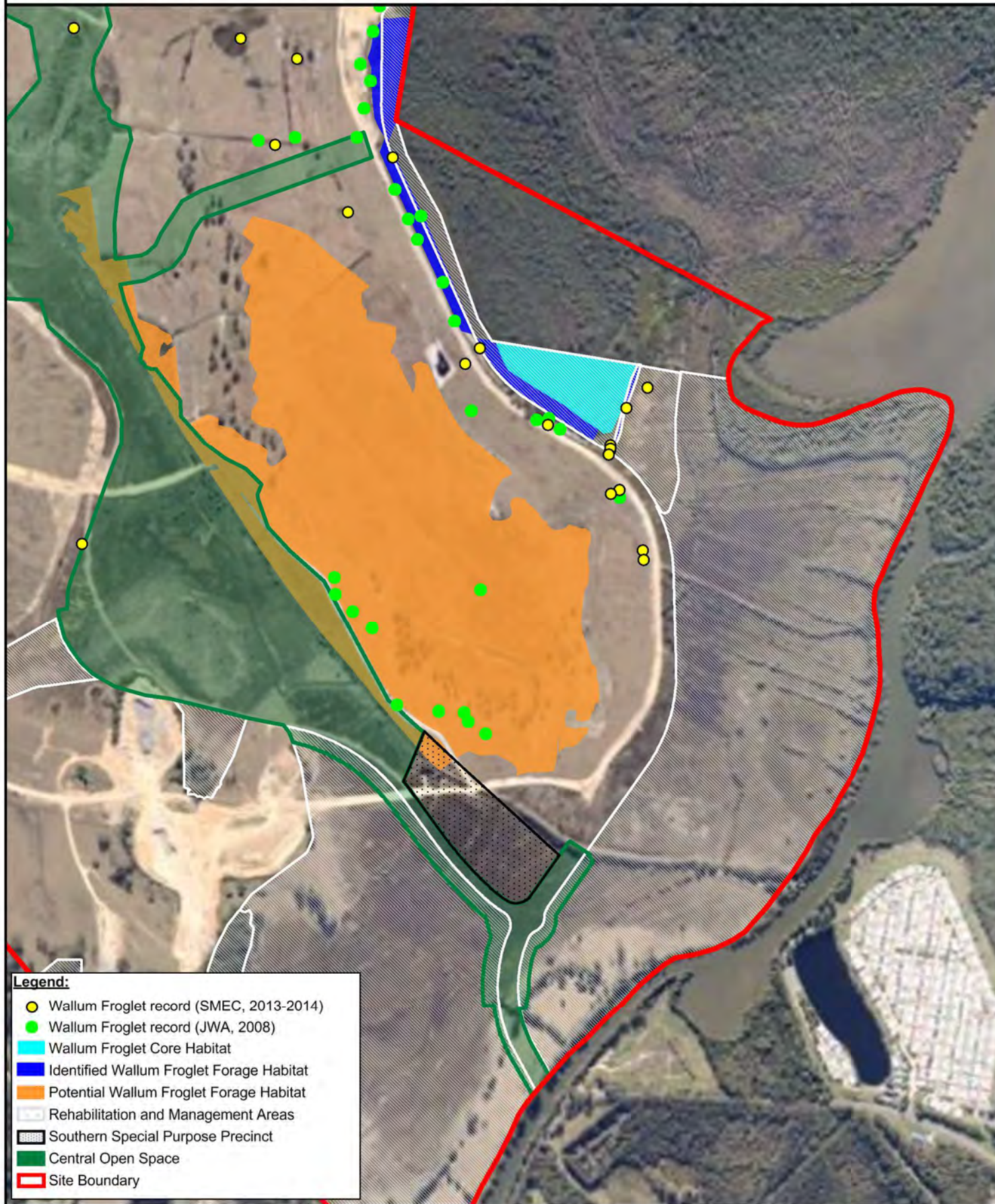


FIGURE 2: Wallum Froglet Distribution and Habitat

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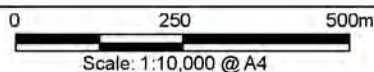
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Figure 3: Raptor Nesting Platforms and Nest Locations

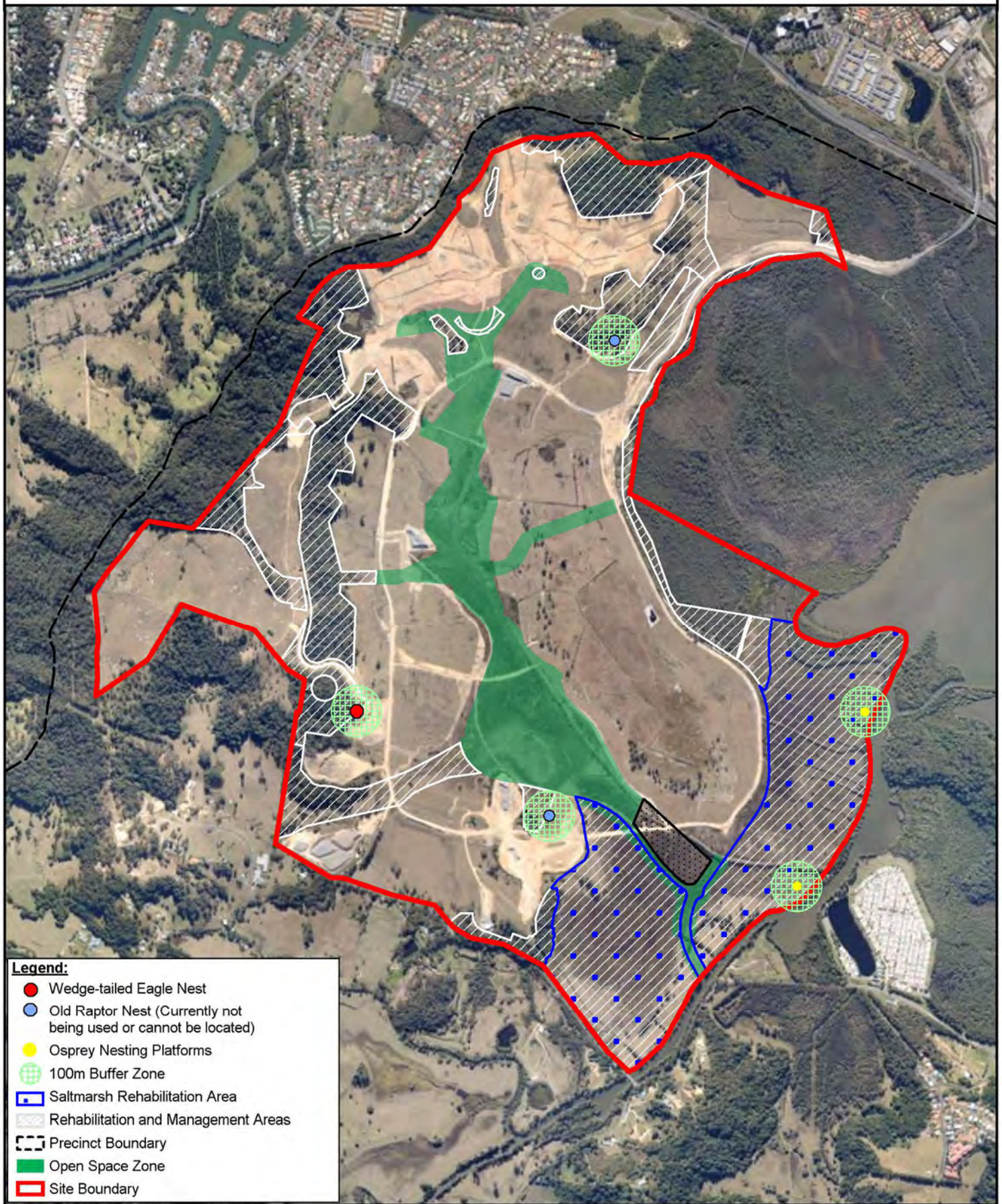


FIGURE 3: Raptor Nesting Platform Locations

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0 0.5 1km

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Figure 4: Black-necked Stork Records and Potential Habitat

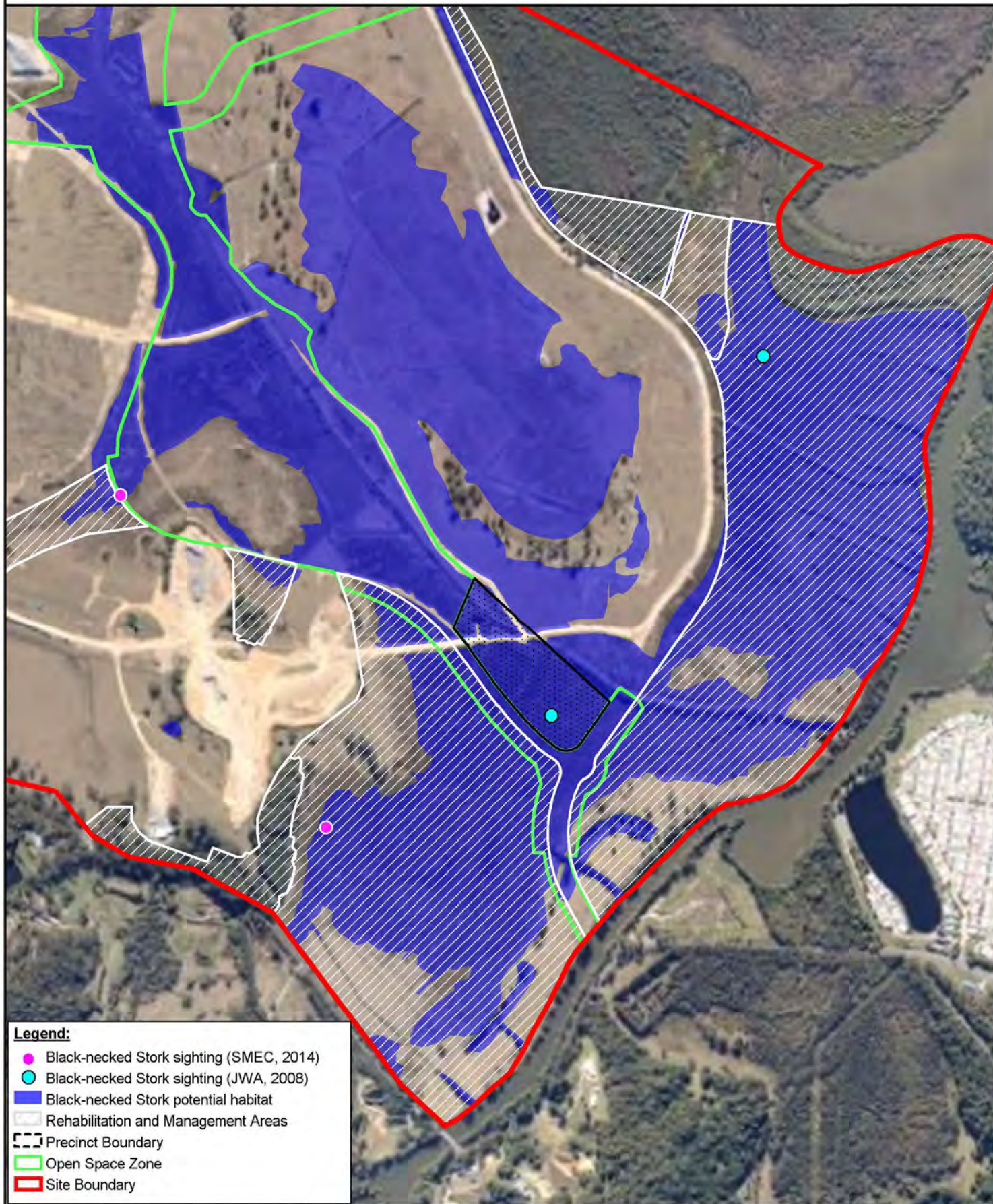


FIGURE 4: Black-necked Stork Records and Potential Habitat CREATED BY AM11482	REVISION 0 STATUS FINAL DATE 05/06/2014 ISSUED FOR INFORMATION	
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3.2 Native Vegetation

3.2.1 Vegetation Communities

Earthworks activities associated with construction of the SSPP 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 the SSPP. The location of these Vegetation Communities is shown in **Figure 5**.

Table 3 Vegetation Communities associated with the SSPP

Vegetation Community	Area removed/ to be removed from site	Area to be removed from SSPP
Community 11 – Low closed grassland (<i>Sporobolus virginicus</i> , <i>Triglochin striata</i> +/- <i>Casuarina glauca</i>)	9.69 (18%)	3.25 (6%)
Community 12 – rushland/sedgeland/grassland (mixed aquatic species)	24.12 (68%)	0.30 (0.8%)
Community 14 – Dams and drainage (mixed aquatic species)	0.77 ha (25%)	0.06 ha (1.9%)
Community 15 – Low open forest/woodland (<i>Casuarina glauca</i> +/- Mixed species)	0.73 ha (16%)	0.17 (3.7%)
Community 16 – Slashed grassland/heathland/sedgeland (Mixed species)	43.52 ha (99.6%)	0.23 (0.5%)

Community 11 - Low closed grassland (*Sporobolus virginicus*, *Triglochin striata* +/- *Casuarina glauca*)

Community 11 occurs across a large portion of the SSPP, covering a total area of approximately 3.25 ha.

Community 11 is comprised of a mixture of saltmarsh species, including Saltwater couch (*Sporobolus virginicus*), Streaked arrow-grass (*Triglochin striata*), Sampire (*Sarcocornis quinqueflora*) and Fimbristylis (*Fimbristylis ferruginea*). Some stands of Swamp oak (*Casuarina glauca*) occur along drainage lines throughout this community, approximately three (3) to four (4) metres tall.

The conservation status of the low closed grassland community has been discussed in the Regional Forestry Agreement which describes the community as Forest Ecosystem 125 – Saltbush. The Tweed Vegetation Management Strategy classifies this community as Estuarine complexes – 603 Saltmarsh (JWA, 2013).

This vegetation community represents the Endangered Ecological Community (EEC) 'Coastal Saltmarsh in the North Coast Bio-region' (DECC 2007). EECs are considered to be of high conservation value.

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

Community 12 occurs in a small patch of approximately 0.3 ha within the SSPP and 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 EEC 'Freshwater Wetland on Coastal Floodplains' (DECC 2008).

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

Community 14 occurs along the western edge of the SSPP, occupying an area of approximately 0.06ha.

Community 14 is comprised of aquatic and semi-aquatic vegetation. The vegetation in the constructed dam includes, Water lilly 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.

Community 15 - Low open forest/woodland (*Casuarina glauca* +/- Mixed species)

Community 15 occurs as a small patch of approximately 0.17 ha within the northern portion of the SSPP.

Community 15 comprises predominantly Swamp oak (*Casuarina glauca*). It occurs in low lying swamplands and along drainage lines within the project area that have few associated species. However, this is except the Grey mangrove, Tuckeroo, Umbrella Cheese Tree, Cottonwood and exotic species in the understorey.

The conservation status of this community is considered to be rare in the upper north-east section of the NSW North coast bioregion. This community is equivalent to the Forest Ecosystem 143 (Swamp she-oak) (NPWS, 1999).

The community is considered to represent the EEC 'Swamp oak floodplain forest of the NSW North Coast' which has high conservation value (JWA, 2013).

Community 16 - Slashed grassland/heathland/sedgeland (Mixed species)

Community 16 is located in the northern portion of the SSPP and occupies an area of approximately 0.23 ha.

This vegetation community is regularly slashed and is comprised only of commonly regenerating species. The groundcover includes grass, heath, sedge and fern species between ten (10) and fifty (50) cm tall. Species include Swamp seliginella, Bracken fern, Curly sedge, Foxtails, Sawsedge, Coral fern, Whisky grass, Nut grass, Mat rushes and Flax lily.

Community 16 is not considered to be of conservation significance.

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 Rehabilitation and Management Area 8, approximately 400m west of the SSPP. There are no records of any stems within the SSPP. The proposed works will not have any impact on any threatened flora species.

The location of this threatened flora species is shown in **Figure 6**.

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, three (3) of which occur within the vicinity of the SSPP:

- Freshwater wetlands – occurring in the central and eastern portions of the site;
- Coastal saltmarsh in the NSW North Coast bioregion – occurring in the south-east of the site; and
- Swamp Oak Floodplain Forest - occurring in association with drainage lines in the south-eastern side of the site.

The area of impacts for each EEC is shown in **Table 4** below. The location of these Endangered Ecological Communities is shown in **Figure 7**.

Table 4 Extent of impact of each Endangered Ecological Community

Endangered Ecological Community	Area of Existing EEC (ha)	Area cleared/ to be cleared from Entire Site (ha)	Area cleared/ to be cleared from SSPP (ha)
Freshwater wetland	35.39	24.12 (68%)	0.30 (0.8%)
Swamp Oak Floodplain forest	4.52	0.73 (16%)	0.17 (3.7%)
Coastal saltmarsh	54.63	9.69 (17.7%)	3.25 (6%)

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.

0.3 hectares (0.8%) of Freshwater Wetland occurs within the SSPP. 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 significantly impact the regional distribution of this community.

Coastal Saltmarsh

This EEC occurs adjacent to Cobaki Creek on the south-east side of the site and covers an area of approximately 54.63 hectares. This area is subject to tidal inundation. Cattle have previously had unimpeded access to this area which has also been subject to management through machine slashing. There is a minor incursion of introduced grasses and weeds. A total of 9.69 hectares of Coastal Saltmarsh is to be removed from the site, of which approximately 3.25 hectares is located in the southern portion of the SSPP.

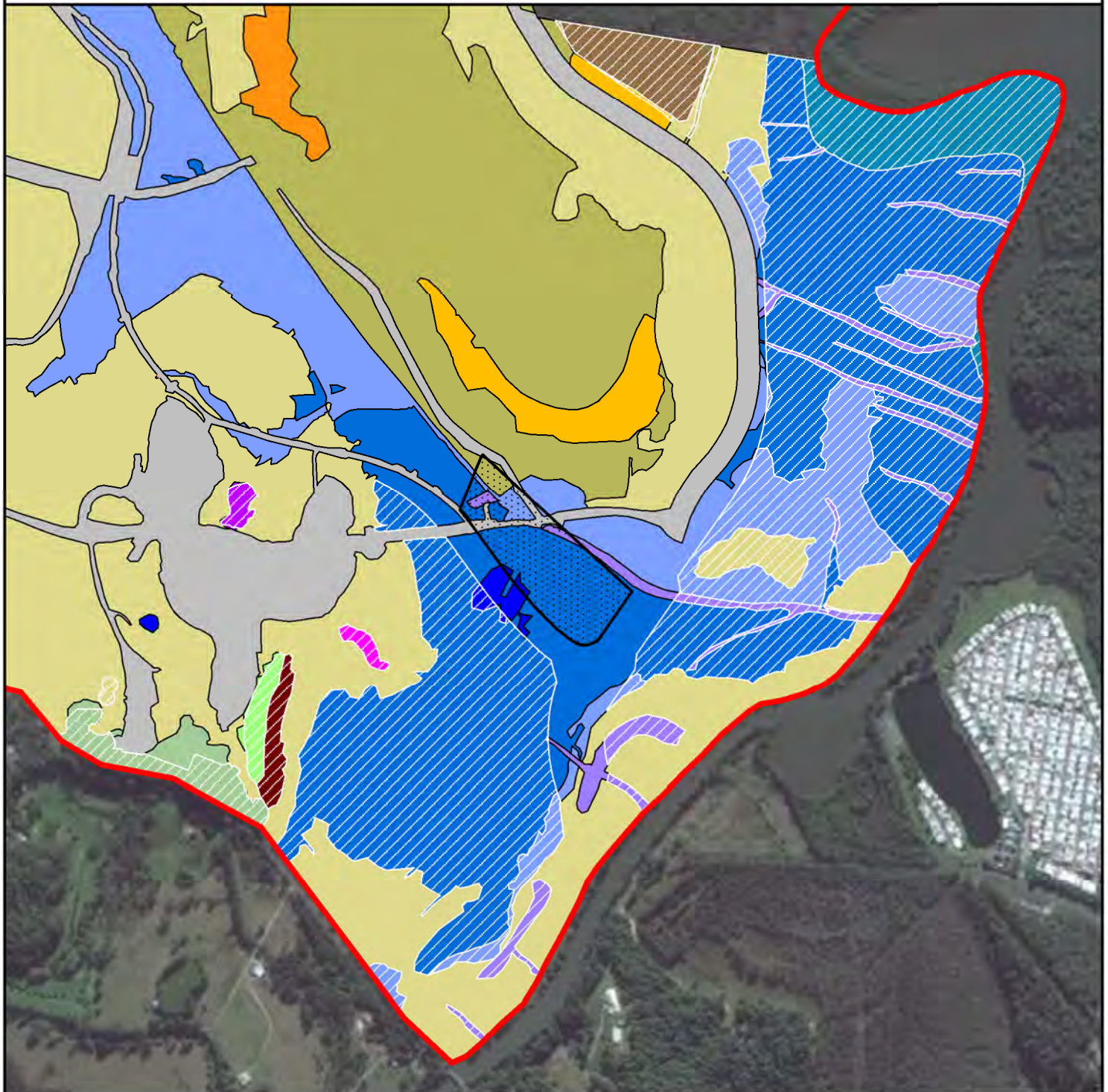
The area of impacts for each EEC is shown in **Table 4** above. These figures are based on baseline data (JWA, 2009) and may not be indicative of the current site, as some clearing has already occurred since 2010 under existing approvals. Therefore, the table describes the area of EEC that either has been cleared since 2010. The EEC areas to be cleared will be clearly delineated once accurate on-ground survey is complete.

Swamp Oak Floodplain Forest

This EEC occurs in association with drainage lines that flow into Cobaki Creek on the south-eastern site boundary and covers an area of approximately 4.5 hectares. 0.17 hectares of Swamp oak floodplain forest EEC (3.7%) will be removed from within the SSPP. It is worth noting that this community occurs along the edges of constructed drains and the area was previously actively grazed by cattle, resulting in introduced grasses and agricultural weeds in some areas.

As previously reported (JWA, 2012), the removal of 16% of the Swamp oak floodplain forest across the whole site is not considered to represent a significant impact on this community.

Figure 5: Vegetation Communities



LEGEND:

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

FIGURE 5 - Vegetation Communities

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COORDINATE SYSTEM

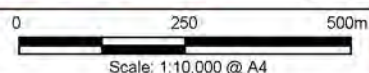
GDA 1994 MGA Zone 56

SOURCE

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Vegetation Communities from James Warren & Associates Pty Ltd

STATUS FINAL

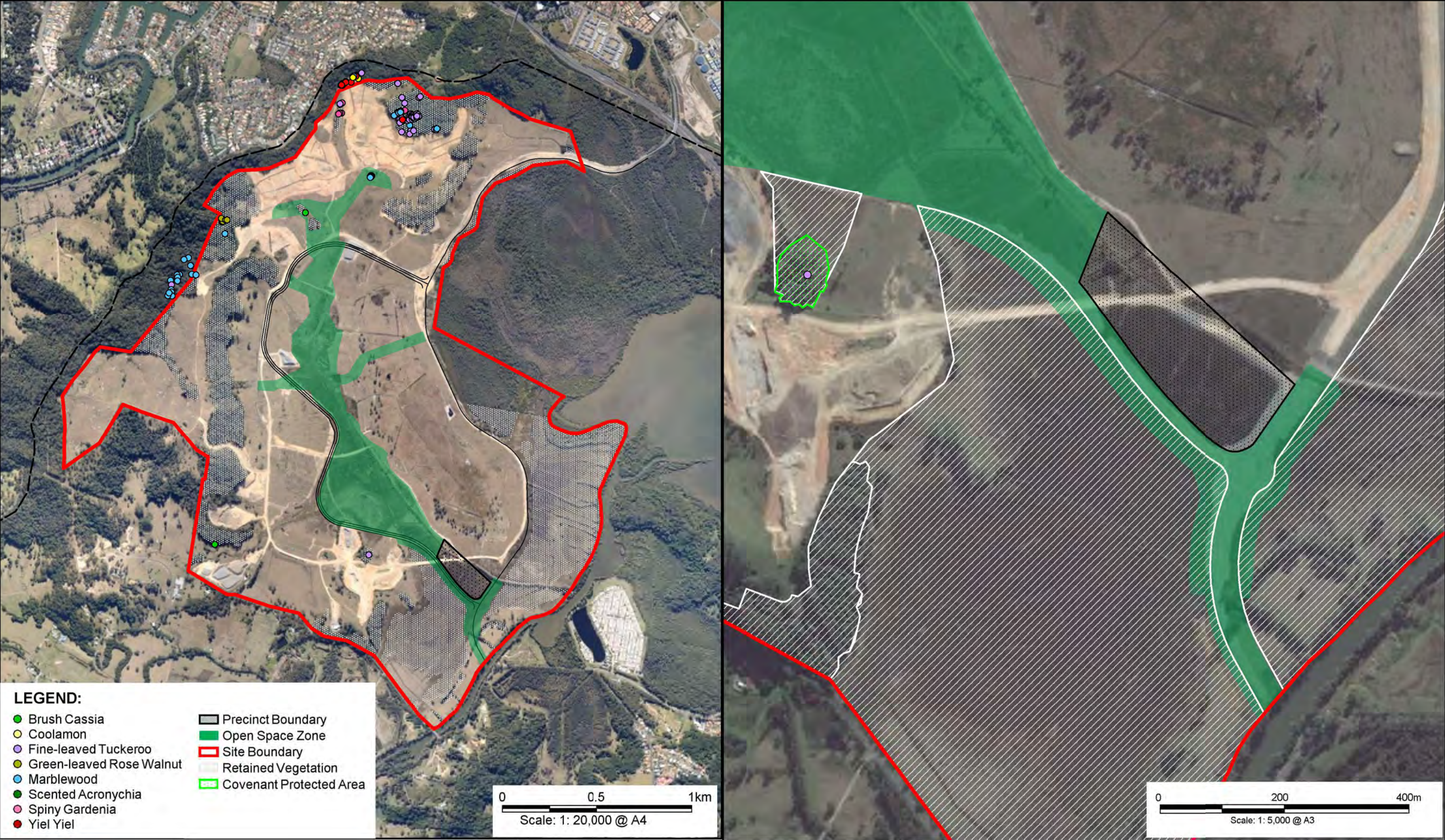
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Figure 6: Threatened Flora Records



COORDINATE SYSTEM GDA 1994 MGA Zone 56			FIGURE 6: Threatened Flora Records	REVISION 0	STATUS FINAL	CLIENT LEDA MANORSTEAD Pty Ltd	 CONSULTANT SMEC Australia
			CREATED BY AM11482	DATE 05/06/2014	ISSUE FOR INFORMATION		
PROJECT NO. 30031162	PROJECT TITLE Cobaki Estate Management Plans	SOURCE The State of Queensland (Department of Environment and Resource Management), Copyright 2010; Aerial Photography provided Microsoft Bing, copyright 2011 Flora records provided by James Warren & Associates Pty Ltd, 2010		Copyright SMEC Australia Pty Ltd. All Rights Reserved.			

Figure 7: Endangered Ecological Communities

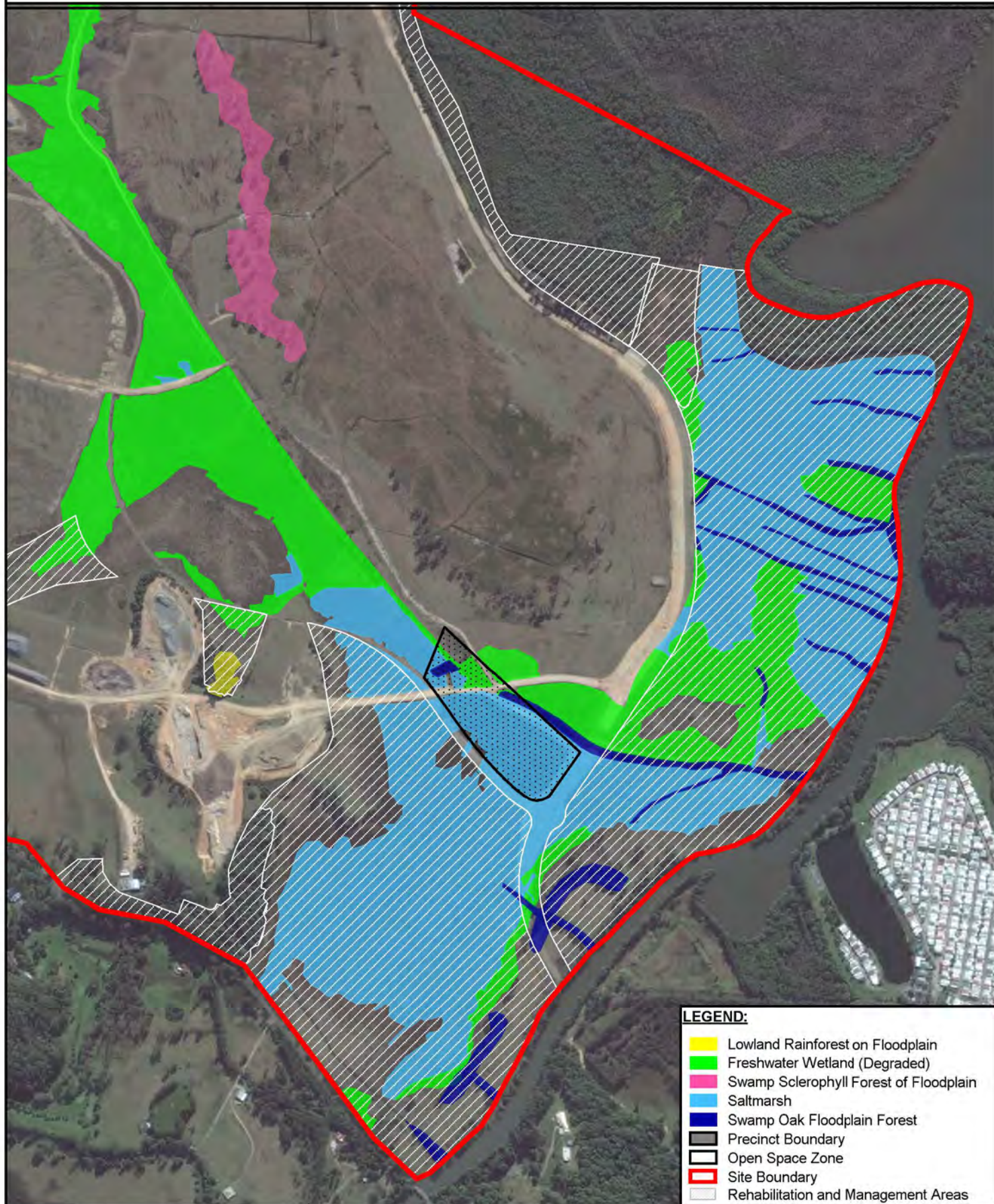


FIGURE 7: Endangered Ecological Communities

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COORDINATE SYSTEM

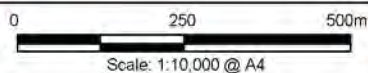
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3.3 Surface Water and Groundwater

An initial groundwater assessment was conducted by Gilbert and Sutherland in 2009 and a Groundwater Management Plan was subsequently prepared by SMEC (May, 2012) for the wider Cobaki site.

A Surface water monitoring board is located within the SSPP. This location is influenced by marine waters. Water is neutral to slightly acidic, brackish to saline with high chloride and sulfate concentrations, generally consistent with surrounding and upstream groundwater (SMEC, 2012). Water flows in a south-easterly direction, through the Saltmarsh Rehabilitation Area towards Cobaki Creek. The SSPP is also adjacent to Dunn's drain, the site's major outlet into Cobaki Creek. Without mitigation measures as detailed in Section 4.10, works within this area could potentially impact on water quality downstream.

The closest groundwater bores are located 50m north and 190m west of the SSPP. Based on this data, depth to groundwater within the SSPP is expected to be approximately 1 metre. Groundwater is expected to flow in a south-easterly direction from the area towards Cobaki Creek (SMEC, 2012).

Due to the earthworks involved, interception of groundwater is considered highly unlikely. Therefore, potential impacts on groundwater are considered negligible. The cut and fill extents are summarised in the plans in Appendix A.

3.3.1 Disturbance of Acid Sulfate Soils

Acid Sulfate Soils (ASS) are a characteristic feature of low lying coastal environments in eastern Australia, particularly where landform elevations are below 5 m AHD. ASS are comprised of iron sulfides generally in the form of pyritic material that is a product of the natural interaction between iron rich organic matter and sulfate rich seawater present in anaerobic low energy estuarine environments. Undisturbed, these soils are generally present in an anaerobic state within the subsurface profile (below the water table) of Holocene marine muds and sands in the form of potential acid sulfate soil (PASS). Actual acid sulfate soils (AASS) are the oxidised (disturbed) form, which may occur as the result of natural or anthropogenic disturbance from changes in groundwater levels and/or exposure to oxygen.

An Acid Sulfate Soils (ASS) Investigation was undertaken by Gilbert and Sutherland (2009) around the Cobaki Lake site and by SMEC (2013f) across the SSPP. Gilbert and Sutherland identified the presence of ASS south of the lake, surrounding the location of the SSPP. Much of the site is located below 5m AHD, generally around 0m AHD at the site of the SSPP, indicating the potential for ASS to exist at the site. Review of the qualitative screening test results, obtained during field investigations (SMEC, 2013f) indicated that pH_f values ranged between 3.7 and 8.2 and pH_{fox} values ranged between 1.6 and 8.3, where $pH_f < 4.0$ indicates Actual ASS (AASS) and $pH_{fox} < 3.0$ indicates Potential ASS (PASS). Reaction to hydrogen peroxide was rated as ranging from slight to very high. These results indicated that there were some Potential Acid Sulfate Soils (PASS) and Acid Sulfate Soils (ASS) on the site. The report produced recommended suitable lime application during fill placement.

ASS impacts are not likely to be significant in this area, as works will primarily involve the placement of clean fill material in a low-lying area. However, there is a chance that ASS will be encountered, given that its occurrence has been identified. In the event of ASS being encountered, management procedures have been proposed. These are detailed in the ASS management plan and also in Section 4.4 below.

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; and
- 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 the SSPP. 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 800m south west of SSPP, the Cobaki Broadwater over 50's Village located 750m east, and surrounding dwellings located on Piggabeen Road.

Earthworks for the SSPP will be limited to filling, which generates less noise than blasting and excavating as will be undertaken at other locations around the Cobaki Estate. A noise

assessment undertaken by CRG (2013) for precincts 9 and 11 concluded that the sensitive receptors were unlikely to experience an increase noise levels from during excavation, as they are located a minimum of 300m away. Activities in the SSPP will be quieter and are located a greater distance from sensitive receptors. It is therefore assumed that earthworks in this precinct will be undetectable offsite. Nonetheless, mitigation measures have been provided in Section 4.5.

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 4.5.

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 areas within the SSPP. Refer to **Figure 8 – 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 SSPP area. These are highly disturbed areas, and the likelihood of construction works impacting on Aboriginal objects is considered low.

Figure 8: Storage of Hazardous Goods

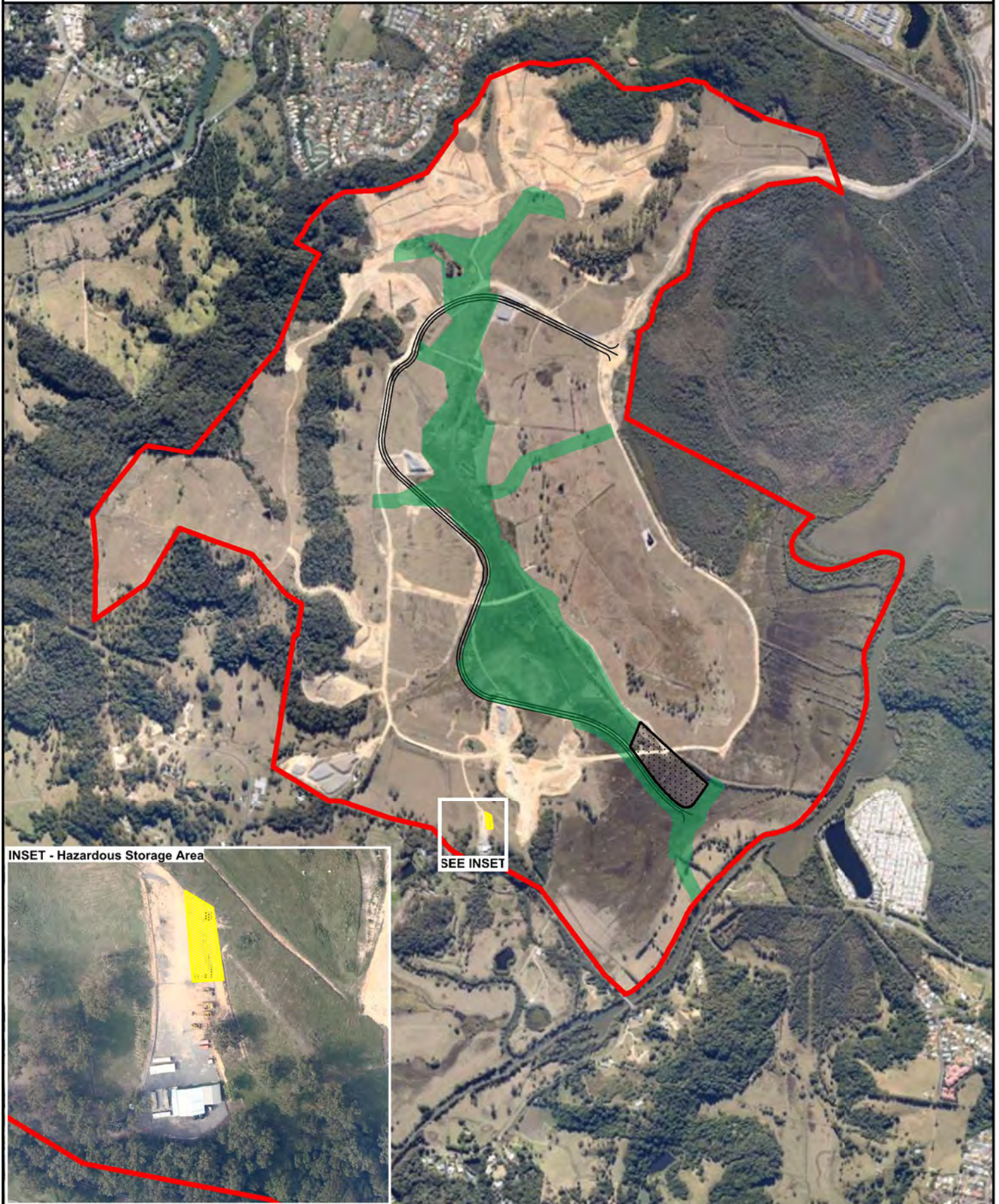


FIGURE Hazardous Goods CREATED BY AM11482 REVISION 0 STATUS FINAL DATE 05/06/2014 ISSUED FOR INFORMATION	PROJECT NO. 30031162 PROJECT TITLE Cobaki Estate Management Plans COORDINATE SYSTEM GDA 1994 MGA Zone 56 SOURCE Nearmap Hypertiles, Copyright 2012 PATH I:\Projects\30031162\007_Spatial\Workspaces\Noise&Vibration.wor	SCALE 0 400 800m Scale: 1:20,000 @ A4 Copyright SMEC Australia Pty Ltd. All Rights Reserved.	CONSULTANT SMEC Australia CLIENT LEDA Manorstead Pty Ltd	SMEC LEDA
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4 ENVIRONMENTAL MANAGEMENT ACTIVITIES AND CONTROLS

A detailed construction environmental management plan (CEMP) has 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 the SSPP are detailed below.

4.1 Fauna Management

Table 6: Fauna Management Procedures relevant to the SSPP

Mitigation Measure	Responsibility	Construction Phase		
		Prior	During	Post
Parawebbing around vegetation protection areas, as per Appendix C – Earthworks Fencing Plan.	Environmental Officer	X		
Flagging of any identified habitat features (hollows, nests, etc.)	Fauna Spotter Catcher (under direction of the 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		
Installation of sediment and erosion controls to protect drainage lines, Compensatory Habitat Area and Saltmarsh Rehabilitation Area to be retained	Construction Manager/Site Superintendent Sign off: 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		
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	Environmental Officer		X	

site/works				
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	
Adaptive pest management	Ecologist (under direction of the Environmental Officer)		X	X
Annual Fauna Monitoring	Ecologist (under direction of the Environmental Officer)		X	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 Fauna Management Plan (SMEC, 2013b); and
- Recommended remediation measures for any incursions into no-go zones.

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
Installation of sediment and erosion controls to protect drainage lines, freshwater wetland and saltmarsh wetland habitat to be retained	Construction Manager/Site Superintendent Sign off: Environmental officer	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	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 Groundwater Management

Table 8: Mitigations Measures for Groundwater Management

Mitigation Measure	Responsibility	Prior to Construction	During construction
Erosion and Sediment Control measures will be implemented and maintained during construction and operation in accordance with the approved Stormwater Management Plan and Erosion and Sediment Control Plan (Yeats, 2012).	Environmental Officer to authorise	X	X
Vehicles and machinery shall be maintained appropriately with no leaks.	Environmental Officer		X
Fill material shall be certified free from contaminants.	Environmental Officer		X
If required, mechanical dewatering of excavations shall be of short duration (hours/days) to minimise any alteration to natural groundwater regime	Site Superintendent / Environmental Officer		X
Works timed to avoid periods of high rainfall	Construction Manager		X
Possible re-use of water of suitable quality for dust suppression	Construction Manager / Site Superintendent		X
Discharge of water of suitable quality into constructed surface water bodies or local waterways	Construction Manager		X
Treatment or disposal of groundwater that exceeds water quality criteria, e.g.: - treatment of turbid water in settlement basins - application of lime to acidic water	Construction Manager / Environmental Officer		X
Containment of polluted water until appropriate collection and disposal to licensed facilities	Construction Manager / Environmental Officer		X
The Groundwater Monitoring Program (2012) shall be complied with.	Environmental Officer	X	X

Reporting;

The following documents shall be collected, maintained in the project files and made available for review by authorities if requested:

- Groundwater monitoring field sheets containing water level and field parameter data, and sampling, weather and well condition information
- Water quality meter calibration records
- Laboratory reports
- Up-to date data tables and figures (survey data, water level tables and contour figures, field parameter and laboratory analysis summary tables, etc)
- Corrective action notices
- Approvals/licenses for works, where required

- External consultants/contractor reports
- Contaminated water transport and disposal records

A monthly report collating and detailing all monitoring results, comparison to performance criteria and management/treatment procedures is to be prepared for TSC and the OEH. A copy will be maintained in the project file.

4.4 Contaminated Land Management

Table 9: 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; and
- Any changes to construction or management procedures.

4.5 Acid Sulphate Soils Management

Table 10: Mitigation Measures for Acid Sulphate Soils Management

Mitigation Measure	Responsibility	Prior to Construction	During Construction
Containment of ASS material stockpile and treatment areas (if required)	Construction Manager / Site Superintendent / Environmental Officer	X	X
No impacts to surface water or groundwater quality resulting from the disturbance storage, treatment or reuse of ASS material	Construction Manager / Site Superintendent / Environmental Officer		X
The leachate pH of the excavated material stockpile to range between 6.5 and 8.5 prior to release off site	Construction Manager / Site Superintendent / Environmental Officer		X
ASS material spills to be cleaned and /or neutralised within 12 hours of occurring	Construction Manager / Site Superintendent / Environmental Officer		X

Reporting:

In accordance with legislative requirements, the Director-General will be notified of any incident with actual or potential significant off-site impacts on people or the biophysical environment as soon as practicable after the occurrence of the incident. This will include details of the incident within seven days of the date on which the incident occurred.

An annual report will be prepared that reviews the performance of the Project against the ASSMP, provides an overview of environmental management actions and summarises monitoring results over the 12 month period.

4.6 Noise and Vibration Management

Table 11: 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

Mitigation Measure	Responsibility	Prior to Construction	During Construction
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
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
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

Mitigation Measure	Responsibility	Prior to Construction	During Construction
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.

4.7 Air Quality and Dust Control

Table 12: 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
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.

4.8 Waste Management

Table 13: 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 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.

4.9 Cultural Heritage Management

Table 14: 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
The Activity Response Hierarchy in Section 12.3 of the CHMP (Everick, 2010) should be adhered to.	Site Superintendent / Environmental Officer	X	X

Mitigation Measure	Responsibility	Prior to Construction	During Construction
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 Cultural Heritage Management Plan (Everick, 2010) must be followed.	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.

4.10 Erosion and Sediment Control

Table 15: Mitigation Measures for Sediment and Erosion Control Management

Mitigation Measure	Responsibility	Prior to Construction	During Construction
Erosion and sediment control measures shall be installed and maintained	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
Surface water and groundwater monitoring, as detailed in the GMP (SMEC, 2012), shall be conducted monthly.	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.

4.11 Construction Traffic and Pedestrian Management

Table 16: 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 of 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** below outlines the monitoring frequencies from each Management Plan relevant to the construction activities proposed for the SSPP.

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 17 Monitoring relevant to the construction activities within the SSPP

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 & Groundwater Quality	Boards 1-4 & groundwater monitoring bores	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, 2012).
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 3.5
Waste	Work Areas	Daily inspection of receptacles.	Waste register is accurate and complete with all waste types (generated) identified	Environmental Officer	Refer to Section 4.7.

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.		
Saltmarsh Rehabilitation Plan	Within Rehabilitation and Regeneration Areas adjacent to SSPP.	Every three (3) months after primary weeding and revegetation works until criteria has been achieved. After this, the removal of weed re-growth and other general maintenance tasks will only be completed every six (6) months for the duration of the five (5) year project.	- Canopy closure has been achieved within the revegetation areas; or - Saltmarsh or another appropriate vegetation community has adequately colonised within the natural regeneration areas.	Rehabilitation contractor	Refer to Revised Saltmarsh Rehabilitation Plan (JWA, 2012)

Note: While no fauna survey is proposed within the SSPP 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, 2013e).

REFERENCES

Clancy and Andren. 2009. The habitat distribution and population size of the Black-necked Stork *ephippiorhynchus asiaticus australis* in New South Wales. Corella, 2010, 34(4): 81-91

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

DECC 2007. Identification Guidelines for Endangered Ecological Communities. Coastal Saltmarsh. Department of Environment and Climate Change.

DECC 2008. Identification Guidelines for Endangered Ecological Communities. Freshwater Wetlands on Coastal Floodplains (Freshwater Wetlands). Department of Environment and Climate Change.

Everick Heritage Consultants. 2010. Cultural Heritage Management Plan

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

Gilbert and Sutherland. 2009. Acid Sulphate Soil Assessment and Management Plan – Central Open Space Area, Cobaki Lakes

James Warren and Associates. 2008. Response to Director General's Environmental Assessment Requirements – Cobaki Lakes. Volume 1 – Ecological Assessment.

James Warren and Associates. 2009. Vegetation Management Plan. Cobaki Lakes – Preferred Project Report.

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

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

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

Leda Manorstead Pty Ltd 2009. Conceptual Groundwater Assessment – Cobaki Lakes Open Space.

SMEC. 2013a. Cobaki Estate Construction Environmental Management Plan – Precincts 9, 11 and Southern Special Purpose Precinct.

SMEC. 2013b. Cobaki Estate Fauna Management Plan – Precincts 9, 11 and Southern Special Purpose Precinct.

SMEC. 2013c. Cobaki Estate Site Regeneration and Revegetation Management Plan – Precincts 9, 11 and Southern Special Purpose Precinct.

SMEC. 2013d. Cobaki Estate Vegetation Management Plan – Precincts 9, 11 and Southern Special Purpose Precinct.

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

SMEC 2013f. Cobaki Estate Acid Sulfate Soils Management Plan

SMEC 2013g. Cobaki Estate Noise and Vibration Management Plan – Central Open Space and Precincts 1,2 and 6

SMEC 2012. Cobaki Estate Groundwater Management Plan, Revision 2

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	D
YC0229-1E1-D02	INDEX SHEET	H
YC0229-1E1-D03	SCOPE OF WORKS & KEY SHEET PLAN	G
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	G
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	H
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	F
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	C
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	E
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	D
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-DL04	MINOR OPEN DRAIN 4 LONGITUDINAL SECTION	D
YC0229-1E1-XS11	MINOR OPEN DRAIN 4 CROSS SECTIONS SHEET 1 OF 2	D
YC0229-1E1-XS12	MINOR OPEN DRAIN 4 CROSS SECTIONS SHEET 2 OF 2	D
YC0229-1E1-DL05	MINOR OPEN DRAIN 5 LONGITUDINAL SECTION	E
YC0229-1E1-XS13	MINOR OPEN DRAIN 5 CROSS SECTIONS SHEET 1 OF 1	C
YC0229-1E1-XS14	MINOR OPEN DRAIN 5 CROSS SECTIONS SHEET 2 OF 3	C
YC0229-1E1-XS15	MINOR OPEN DRAIN 5 CROSS SECTIONS SHEET 3 OF 3	C
YC0229-1E1-DL06	MINOR OPEN DRAIN 6 LONGITUDINAL SECTION	D
YC0229-1E1-XS16	MINOR OPEN DRAIN 6 CROSS SECTION SHEET 1 OF 2	D
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	E
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		
STATUS	FOR APPROVAL	
H	ADDITIONAL FILL ZONE TO SSPP (MP08_0200 Mod 3)	C.S. 30.06.14
G	RESPONSE TO TSC COMMENTS (RE: MP08_0200 Mod 2)	C.S. 10.03.14
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(FI)	M.G. 15.02.13
C	RESPONSE TO 3rd PARTY SWMP REVIEW	H.W. 04.05.12
REV	DESCRIPTION	DRAWN DATE

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SCALE	(AT ORIGINAL SHEET SIZE)
N/A	

CLIENT	
LEDA MANORSTEAD Pty Ltd	
LED A	
ORIGINAL SHEET SIZE	A1

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
REVIEW	CS		18.03.11		
DESIGN	CJE		18.03.11		
DRAWN	GS		18.03.11		
DRAWING NUMBER				YC0229-1E1-D02	REVISION
					H

