



# Subdivision and Urban Development at Catherine Hill Bay

## Flora and Fauna Management Plan

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Report Number: 24619  
Version / Date: Final January 2014

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Document Status

Version	Purpose of Document	Orig	Review	Review Date
A	Flora and Fauna Management Plan	LW	MD	10-12-2013
B	Flora and Fauna Management Plan	LW	MD	16-12-2013
C	Final for Submission	LW	MD	17-01-2014

Approval for Issue

Name	Signature	Date
Matt Doherty		17-01-2014

# Contents

<b>1.0</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	Project Description	1
1.2	Environmental Assessment	1
1.3	Purpose and Objectives	1
1.4	Conditions of Approval	2
1.5	Structure of this Plan	2
1.6	Definitions	3
<b>2.0</b>	<b>STATUTORY REQUIREMENTS</b>	<b>5</b>
2.1	Relevant Legislation	5
2.2	Guidelines and Standards	5
2.3	Approvals, Licences and Permits	5
2.4	Related Documents	5
<b>3.0</b>	<b>IMPACTS ON FLORA AND FAUNA</b>	<b>6</b>
3.1	Summary of Impacts	6
3.2	Biodiversity Values occurring in the Project Area	8
3.2.1	Threatened Species	8
3.2.2	Native Vegetation	10
3.2.3	Fauna Habitat	11
<b>4.0</b>	<b>FLORA AND FAUNA MANAGEMENT MEASURES</b>	<b>13</b>
4.1	Objectives	13
4.2	Pre-Construction Management Actions	13
4.3	Construction Management Actions	14
<b>5.0</b>	<b>TRAINING, MONITORING AND REVIEW</b>	<b>20</b>
5.1	Training	20
5.2	Monitoring	20
5.3	Review	21
<b>6.0</b>	<b>REFERENCES</b>	<b>22</b>

## Tables

Table 1 Department of Environment Conditions of Approval .....	2
Table 2 Flora and Fauna Management Plan Structure .....	2
Table 3 Likely impacts of the Project.....	6
Table 4 Threatened flora and fauna species known or that may occur in the Project Area.....	8
Table 5 Vegetation communities in the development footprint to be cleared.....	10
Table 6 Fauna habitat values occurring in the Project Area.....	11
Table 7 Pre-construction activities.....	13
Table 8 Construction Management Actions.....	15
Table 9 Monitoring actions to be undertaken .....	20
Table 10 Fauna species previously recorded in the study area .....	26

## Figures

Figure 1 The Project Area at CHB.....	4
Figure 2 Ecological Features.....	12

## Appendices

Appendix 1	Fauna Species Inventory
Appendix 2	Vegetation Clearing Protocol

## 1.0 Introduction

### 1.1 Project Description

Coastal Hamlets Pty Ltd is undertaking a residential subdivision and development at Catherine Hill Bay [CHB] (the Project). The Project occurs within the Lake Macquarie Local Government Area (LGA), on the New South Wales central coast, approximately 29 kilometres south of Newcastle.

The Project Area covers 72 hectares and involves the subdivision of land and construction of 549 dwellings on the site of the former Moonee Colliery. The Project comprises seven stages, with works to begin in Stage One (Figure 1). Associated works include the construction of an internal road network and installation of utilities including electricity and water.

### 1.2 Environmental Assessment

An Environmental Assessment was prepared for the Project by RPS for Rose Group Pty Ltd in September 2010. The Environmental Assessment was a collation of ecological assessments undertaken of the Project between 2004 and 2010 (Wildthing 2004a, Wildthing 2004b, Wildthing 2004c, EcoBiological 2006a, EcoBiological 2006b, RPS 2007, RPS 2008a, 2008b).

The Minister for Planning approved the Major Project (10-0204), Residential Subdivision at Gwandalan under part 75J (1) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 3 May 2011, subject to the Minister's Conditions of Approval (MCoA) being met.

The Department of Environment approved the Residential Subdivision at CHB (2012/6382) under sections 130 (1) and 133 of the *Environment Protection and Biodiversity Conservation Act 1999*, on 29 October 2013, subject to the Conditions of Approval (CoA) being met.

### 1.3 Purpose and Objectives

The Flora and Fauna Management Plan (FFMP) is a component of the Environmental Management Plan (EMP) for the Project at CHB. The EMP provides for the management of ecological values, monitoring and reporting requirements to minimise environmental impacts

This FFMP has been developed to identify potential impacts of construction on flora and fauna, and detail mitigation measures that will be adopted to minimise these impacts. This FFMP has been developed in accordance with the Condition of Approvals issued by the Commonwealth Department of Environment.

The objectives of the Plan are:

- Identify the legislative requirements, Condition of Approvals issued by the Department of Environment and any other guidelines that have been considered in the development of this Plan;
- Identify significant ecological values in the Project, such as threatened species, native vegetation and fauna habitat that will be impacted as a result of construction activities;
- Provide specific safeguards and procedures to avoid, minimise or mitigate impacts on these ecological values; and
- Prescribe a monitoring and reporting framework to assess the effectiveness of the controls implemented, and outline the responsibilities of those involved in management control.

## 1.4 Conditions of Approval

Conditions of the EPBC Approval (2012/6382) (CoA) from the Department of Environment (29 October 2013) relevant to this Plan have been considered in its preparation (Table 1).

Table 1 **Department of Environment Conditions of Approval**

Condition of Approval	Condition Requirements
5	<i>The person taking the action must submit for approval by the Minister an Environmental Management Plan for each of the two development sites (Catherine Hill Bay and Gwandalan) that provides for the management of ecological values, monitoring and reporting requirements to minimise environmental impacts. The Environmental Management Plan must include as a minimum the following sub-plans:</i>
5 (a)	<p><i>Flora and Fauna Management sub-plan. The sub-plan must:</i></p> <ul style="list-style-type: none"> <li><i>-Be prepared by a suitably qualified and experienced ecologist,</i></li> <li><i>-Provide a practical guide for the management and protection of Black-eyed Susan and Leafless Tongue-orchid within the study area and development footprint, detailing how potential impacts on ecological values will be minimised and managed.</i></li> <li><i>-Detail mitigation measures, procedures and work practices to minimise the potential for damage to Black-eyed Susan and Leafless Tongue-orchid; and</i></li> <li><i>-Apply to the development prior to, during and after undertaking the action.</i></li> </ul>
5 (b)	<p><i>Weed Management sub-plan. This sub-plan must:</i></p> <ul style="list-style-type: none"> <li><i>-Include methods and controls for the effective management of <i>Phytophthora cinnamomi</i>.</i></li> <li><i>-Be prepared by a suitably qualified and experienced ecologist.</i></li> </ul>

## 1.5 Structure of this Plan

The structure of this FFMP is outlined in Table 2.

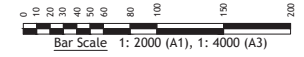
Table 2 **Flora and Fauna Management Plan Structure**

Chapter	Content
1	Provides an overview of the Project, previous environmental assessments of the Project, and the purpose and scope of this plan.
2	Details the statutory requirements for the Plan as outlined in the Conditions of Approval issued by the NSW Planning Commission, Department of Environment and other legislative requirements.
3	Identifies biodiversity that may be impacted as a result of construction of the Project.
4	Details the actions to be implemented to avoid or minimise impacts on flora and fauna
5	Describes the training, monitoring and review requirements relating to this plan

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## 1.6 Definitions

- Construction Footprint: As the Project is staged, the construction footprint generally comprises one stage at any one time.
- Project: the residential subdivision and development at CHB.
- Project Area: the 72 hectare footprint in which residential subdivision and development will occur.
- Stage: The Project comprises seven stages, with works commencing in Stage One.
- Threatened Species: a plant or animal species listed under the *NSW Threatened Species Conservation Act 1995* and/or the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*.



**SUBSTAGING WITHIN THE EXISTING STAGES IS PERMITTED WITHOUT SEEKING ADDITIONAL APPROVAL.**

(F) EASEMENT TO DRAIN WATER 3.05 WIDE (K382897)

- NOTES**  
 1. PROPOSED EASEMENTS FOR SERVICES & DRAINAGE NOT SHOWN & WILL BE SUBJECT TO FINAL DESIGN.

AC	18/09/2012	Remove Pages, Add Heritage Lots
AB	6/08/2012	Drafting Amendments
AA	17/07/2012	Drafting Amendments
Z	14/02/2012	Contours Added
Ver.	Date	Comment



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## 2.0 Statutory Requirements

### 2.1 Relevant Legislation

Key environmental legislation relating to flora and fauna management includes:

- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *NSW Threatened Species Conservation Act 1995* (TSC Act)
- *NSW Fisheries Management Act 1994* (FM Act)
- *NSW Environment Planning and Assessment Act 1979* (EP&A Act)
- *NSW National Parks and Wildlife Act 1974* (NPW Act)
- *NSW Noxious Weeds Act 1993* (NW Act)
- *NSW Native Vegetation Act 2003* (NV Act)
- *NSW Water Management Act 2000* (WM Act)

### 2.2 Guidelines and Standards

- *Hygiene Protocol for the control of Disease in Frogs* (DECC 2008).
- *Code of Practice for Injured, Sick and Orphaned Protected Fauna* (OEH 2011).
- *Code of Practice for injured, sick and orphaned flying foxes* (OEH 2012).
- *Code of Practice for injured, sick and orphaned koalas* (OEH 2011).
- *Guidelines for the rehabilitation of birds of prey* (DECCW 2011).
- *Prevention of Cruelty to Animals Act 1979*.
- *Florabank Native Seed Collection Code of Practice (Greening Australia NSW 1999)*.
- *Guidelines for the Translocation of Threatened Plants in Australia – Second Edition (Australian Network for Plant Conservation 2004)*.

### 2.3 Approvals, Licences and Permits

The Project Ecologist must conduct all works under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence.
- Animal Research Authority issued by NSW Agriculture.
- Certificate of Accreditation of a Corporation as an Animal Research Establishment issued by NSW Agriculture.
- Animal Care and Ethics Committee Certificate of Approval issued by NSW Agriculture.

### 2.4 Related Documents

This Flora and Fauna Management Plan is a sub-plan of the Environmental Management Plan (EMP), Beneath the Flora and Fauna Management Plan sits the Weed Management Plan. This document should be used in conjunction with the EMP to ensure compliance with Project environmental objectives and goals, and to ensure consistency in approach to monitoring and reporting.

## 3.0 Impacts on Flora and Fauna

### 3.1 Summary of Impacts

Impacts on flora and fauna were assessed under the Environmental Assessment Report (RPS 2010) in accordance with the provisions of the EPBC Act and TSC Act.

A summary of potential impacts that may result from the Project is provided in Table 3. The extent, or scale, of the impact generally refers to areas of a number of individuals that are located within the development footprint of the proposed action, unless stated otherwise. Table 3 also specifies in which stage each impact will occur.

Table 3 Likely impacts of the Project

Impact	Details	Extent/scale	Stage in which impact will occur
Loss of native vegetation	A diversity of woodland, forest, heath, estuarine and wetland vegetation communities.	35.76 hectares across all seven stages	All stages
Loss of threatened species	<i>Tetratheca juncea</i> (Black-eyed Susan)	All 189 clumps occurring in the Project Area	Stage 4 Stage 5 Stage 6
	<i>Cryptostylis hunteriana</i> (Leafless Tongue Orchid)	10 stems will be translocated	10 stems will be translocated from Stage 6
Loss of fauna habitat	Woodland, forest, heath, estuarine and wetland habitats offer habitat to a diversity of reptiles, amphibians, birds and mammals.	35.76 hectares across all seven stages  17 hollow bearing trees support 19 tree hollows	All stages
			Stage One: No tree hollows to be cleared
			Stage 2: 17 tree hollows to be cleared.
			Stage 3: No tree hollows to be cleared
			Stage 4: No tree hollows to be cleared
Stage 5: One tree hollow to be cleared			

Impact	Details	Extent/scale	Stage in which impact will occur
			Stage 6: One tree hollow to be cleared
			Stage 7: No tree hollows to be cleared
Fauna fragmentation	May reduce the capacity of some less mobile fauna to move within and between patches of remaining habitat.	Clearing is unlikely to result in a loss of any existing connectivity with large areas of vegetation.	All stages
Fauna mortality	May result from collisions with vehicles or plant, or accidental entrapment in plant, trenches or other earthworks.	Most likely during clearing activities and early stages of construction.	All stages
Alteration to the natural flow regimes of rivers and streams, floodplains and wetlands	Caused by changes in runoff, redirection of flows, influences to groundwater, infiltration, pollution, sedimentation and erosion.	Stages 2, 4 and 5 of the Project area located upslope of the SEPP 14 wetland, located approximately 50 metres from the construction footprint.	Stages 2, 4 and 5 which are closest to SEPP 14 wetland boundary
Edge effects and weed invasion	Vehicles and plant may transport weed propagules into the study area. Creation of new edges will increase fragmentation and vulnerability of native vegetation to weed incursions.	New edges, areas of soil disturbance, areas in proximity to existing weed infestations are most likely to be susceptible to weed invasion.	All stages
Alteration to air quality and noise environments	May impact upon the roosting, breeding and foraging activities of locally occurring fauna.	Temporary and localised scale impacts during construction. Potential longer-term impacts during operation.	All stages
Infection of native plants by <i>Phytophthora cinnamomi</i>	May be transported with infected soil or plant material adhering to vehicles, people (clothes or shoes), animals, or by percolating through the soil, in creeks or storm runoff.	Potential for fungus to be introduced to study area during construction phase, when there is frequent movement of machinery, contractors, vehicles or tools.	All stages

## 3.2 Biodiversity Values occurring in the Project Area

### 3.2.1 Threatened Species

The Project will directly and indirectly impact threatened flora species and habitat for threatened fauna species. Threatened species previously identified in the Project Area, or assessed as being Moderately or Highly likely to occur in the Project Area, are listed in Table 4. A detailed description of these species, their habitat requirements and photographs are provided in the Wildlife Management Strategy (RPS 2013a). Figure 2 shows the ecological features of the Project Area along with development staging. A full list of all fauna species previously identified in the Project Area are listed in Appendix 1.

Table 4 **Threatened flora and fauna species known or that may occur in the Project Area**

Issue	Significance under TSC Act	Significance under EPBC Act	Comment
<b>Threatened Flora Species</b>			
<i>Cryptostylis hunteriana</i> (Leafless Tongue-orchid)	Vulnerable	Vulnerable	<i>Cryptostylis hunteriana</i> was recorded in the Project Area: 10 stems will be translocated from Stage 6.
<i>Tetraloche juncea</i> (Black-eyed Susan)	Vulnerable	Vulnerable	189 <i>T. juncea</i> clumps occur in Stages 4, 5 and 6 that will be removed
<b>Threatened Amphibian Species</b>			
<i>Crinia tinnula</i> (Wallum Froglet)	Vulnerable	-	Recorded within SEPP 14 wetland in Munmorah SCA adjoining the Project Area to the south
<b>Threatened Bird Species</b>			
<i>Anthochaera Phrygia</i> (Regent Honeyeater)	Critically Endangered	Endangered	May occur in Project Area on occasion. Potential foraging habitat occurs in Project
<i>Calyptorhynchus lathami</i> (Glossy Black Cockatoo)	Vulnerable	-	Known to occur in the locality. May forage throughout Project Area.
<i>Daphoenositta chrysoptera</i> (Varied sittella)	Vulnerable	-	Potential foraging and nesting habitat occurs in Project.
<i>Glossopsitta pusilla</i>	Vulnerable	-	Potential foraging and nesting habitat occurs in Project.

Issue	Significance under TSC Act	Significance under EPBC Act	Comment
(Little Lorikeet)			
<i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)	-	Migratory	This species is known to nest in the offset area adjoining the Project Area to the south.
<i>Lathamus discolor</i> (Swift Parrot)	Endangered	Endangered	Likely to occur within the site intermittently.
<i>Ninox strenua</i> (Powerful Owl)	Vulnerable	-	Known to occur in the locality. May hunt prey in Project Area.
<i>Rhipidura rufifrons</i> (Rufous fantail)	-	Migratory	Recorded during field surveys
<i>Tyto novaehollandiae</i> (Masked Owl)	Vulnerable	-	Recorded during field surveys. May hunt prey in Project Area.
<b>Threatened Mammal Species</b>			
<i>Falsistrellus tasmaniensis</i> Eastern False Pipistrelle	Vulnerable	-	Known to occur in the locality. May roost in tree hollows or forage throughout Project Area
<i>Miniopterus australis</i> (Little Bentwing-bat)	Vulnerable	-	Recorded during field surveys. May forage throughout Project Area
<i>Miniopterus schreibersii oceanensis</i> (Eastern Bentwing-bat)	Vulnerable	-	Recorded during field surveys. May forage throughout Project Area.
<i>Mormopterus norfolkensis</i> (Eastern Freetail-bat)	Vulnerable	-	May roost in tree hollows or forage throughout Project Area
<i>Myotis macropus</i>	Vulnerable	-	Known to occur in the locality. May roost in tree hollows or forage throughout Project Area

Issue	Significance under TSC Act	Significance under EPBC Act	Comment
(Southern Myotis)			
<i>Pteropus poliocephalus</i> (Grey-headed Flying-fox)	Vulnerable	Vulnerable	Known to occur in the locality. May forage throughout Project Area
<i>Saccolaimus flaviventris</i> (Yellow-bellied Sheath-tail bat)	Vulnerable	-	Known to occur in the locality. May roost in tree hollows or forage throughout Project Area
<i>Scoteanax rueppellii</i> (Greater Broad-nosed Bat)	Vulnerable	-	Known to occur in the locality. May roost in tree hollows or forage throughout Project Area
<i>Petrus norfolcensis</i> (Squirrel Glider)	Vulnerable	-	Known to occur in the locality. Potential foraging and den habitat occurs in Project Area

### 3.2.2 Native Vegetation

Ten vegetation communities have been mapped within the Project Area (Table 5). None of these vegetation communities are commensurate with Endangered Ecological Communities listed under either the TSC Act or EPBC Act.

Table 5 **Vegetation communities in the development footprint to be cleared**

Vegetation Community	Area to be cleared (hectares)
Coastal Headland Complex	6.56
Coastal Holocene Banksia Scrub	1.74
Coastal Plains Smooth-barked Apple Woodland	3.18
Coastal Sand Mahogany-Paperbark Swamp Forest	0.24
Coastal Sand Wallum Heath-Scrub	5.01
Dam	0.46

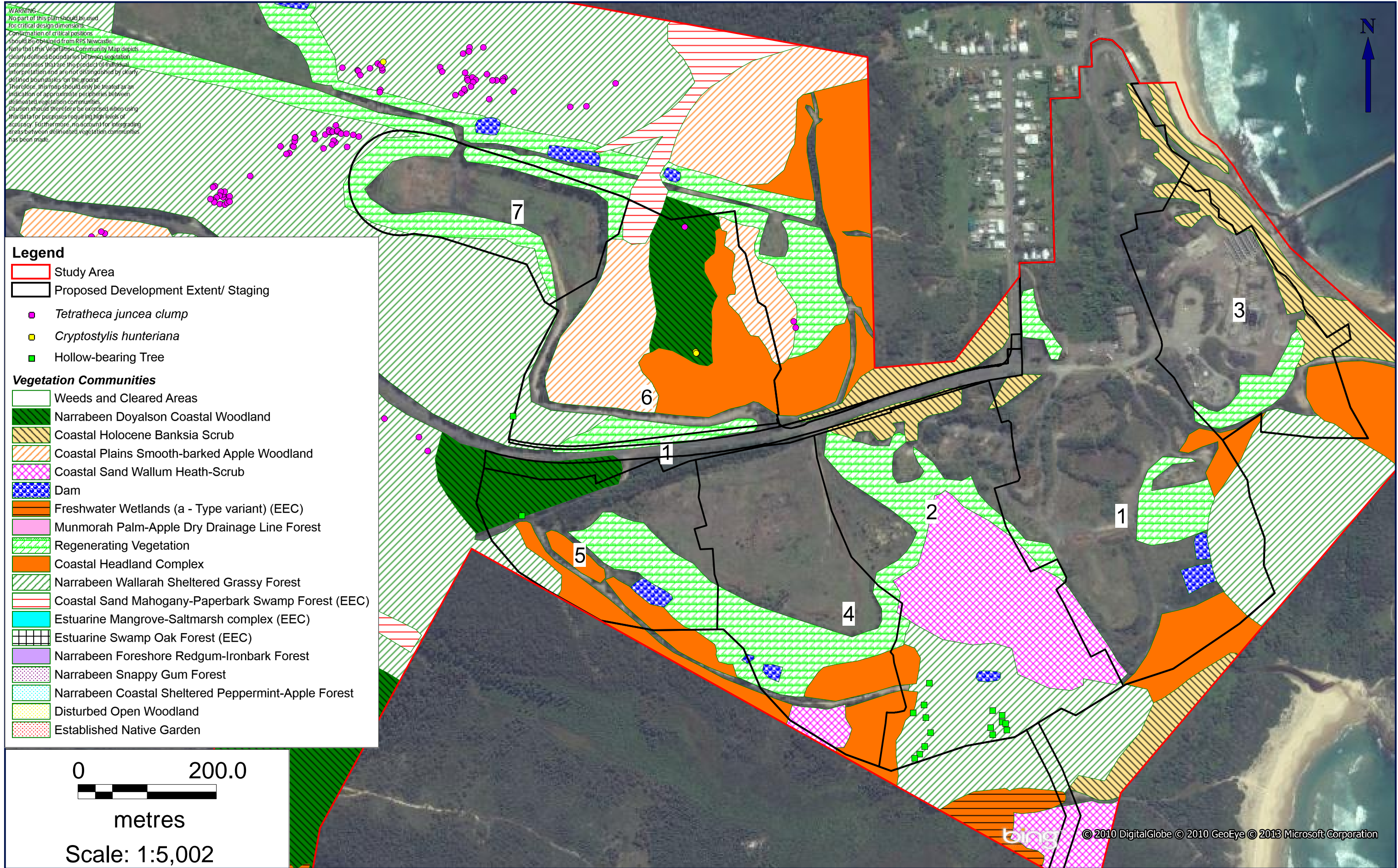
Vegetation Community	Area to be cleared (hectares)
Narrabeen Doyalson Coastal Woodland	3.08
Narrabeen Wallarah Sheltered Grassy Forest	5.70
Regenerating Vegetation	9.79
Weeds and Cleared Areas	36.24
<b>TOTAL</b>	<b>72</b>

### 3.2.3 Fauna Habitat

The Project involves clearing of 35.76 hectares of vegetation across all seven stages at Catherine Hill Bay. Clearing of native vegetation will result in the loss of woodland, forest, heath, estuarine and wetland habitats that offer habitat to a diversity of reptiles, amphibians, birds and mammals (Table 6). However, the development footprint is dominated by existing cleared areas, as large areas of native vegetation were likely removed for past mining operations. These cleared areas support disturbed and degraded native vegetation and as such, fauna habitat complexity in these areas is low. There is an absence of many habitat components important for breeding, foraging and sheltering of fauna. Just 17 hollow-bearing trees, support 19 hollows, have been identified in the Project Area. A total of 19 nest boxes are required to compensate for the loss of tree hollows (refer to Wildlife Management Plan).

Table 6 Fauna habitat values occurring in the Project Area

Issue	Comment
SEPP 14 Wetland	The SEPP 14 wetland extends into the southern portion of the Project Area; however, it lies approximately 50 metres from the construction footprint (closest to Stages 2, 4 and 5).
Tree Hollows	17 hollow-bearing trees containing 19 hollows will be removed.
Flowering trees and shrubs	The Project Area supports a diversity of shrub and trees species that offer nectar, blossom and fruit to birds, arboreal mammals and Grey-headed flying-fox.
Dense infestations of weeds	Dense infestations of woody weeds such as <i>Lantana camara</i> (Lantana) offer habitat to small birds and terrestrial mammals.
Dams, ponds and swales	These hydrological features offer potential habitat to frog species and small fish. Many of these features are substantially disturbed and degraded, with many supporting the introduced Mosquito fish.



TITLE: ECOLOGICAL FEATURES MAP WITH STAGING

LOCATION: CATHERINE HILL BAY

DATUM: (GDA 94)  
 PROJECTION: MGA ZONE 56

DATE: 18-9-2013  
 PURPOSE: FFMP

LAYOUT REF: J:\JOBS\244\24619 - Catherine Hill Bay\Drafting\MapInfo\Workspaces\Management Plans  
 VERSION (PLAN BY): A A3 (MD)

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## 4.0 Flora and Fauna Management Measures

### 4.1 Objectives

The main objectives of this FFMP are as follows:

#### **Fauna**

- Develop pre-clearing survey methods to minimise adverse effects on fauna.
- Protect habitat features and resources adjoining the development footprint during the construction.
- Establish an effective monitoring and reporting framework to determine the effectiveness of any mitigation measures used during and post construction.

#### **Flora**

- To protect all vegetation outside of the development footprint from disturbance during construction.
- To provide procedures for the protection of vegetation to be retained.
- To provide for the management and protection of *Tetratheca juncea* (Black-eyed Susan).
- To manage weeds within the site and to minimise their establishment in uninfested areas.
- To recover and reuse existing natural resources such as cleared vegetation, bush rock, topsoil, leaf litter, and to minimise any materials required to be disposed off site.

### 4.2 Pre-Construction Management Actions

Pre-construction activities include clearly delineating clearing extents, implementing flora and fauna habitat protection measures and undertaking pre-clearing surveys (Table 7).

Table 7 **Pre-construction activities**

Action	Timing	Responsibility
<p>Clearing limits and the Project Area boundary must be identified on all design, construction and operational drawings as well as sensitive area drawings.</p> <p>Clearing limits are to be delineated by installing highly visible barrier or tape with "No-Go signage" as shown on the drawings.</p> <p>The boundary of the adjoining Lake Macquarie Conservation Area must be clearly delineated by installing highly visible barrier or tape with "No-Go signage" as shown on the drawings.</p>	<p>Check and verify limits 5 days prior to the commencement of clearing.</p> <p>Highly visible flagging tape or fencing that delineates vegetation to be retained will be maintained until the date of construction completion.</p>	Site Foreman
<p>Mark all trees within the development footprint that could potentially be used by resident and migratory fauna as habitat (i.e. potential shelter sites, nest sites, hollows, termitaria, epiphytes, crevices, standing dead trees and large hollow logs). These habitat trees are to be clearly demarcated so that they are retained for the second stage of clearing.</p>	<p>Prior to the commencement of clearing</p>	Project Ecologist
<p>Identify natural habitat features such as hollow logs, felled branches and bush rocks within the development footprint.</p>	<p>Prior to the commencement of clearing</p>	Project Ecologist

Action	Timing	Responsibility
Locations of habitat features will be recorded with a GPS and marked with flagging tape or fluorescent paint. Fauna microhabitat features will be removed from areas to be cleared and relocated to suitable nearby areas to be retained		
Identify nearby habitat suitable for the release of fauna that may be encountered during the pre-clearing process.	Within seven days of the commencement of clearing	Project Ecologist
Install nest boxes to compensate for the loss of tree hollows from the Project Area, a one for one basis for any natural hollows removed, in accordance with the <i>Wildlife Management Strategy</i> .	One month prior to the commencement of	Project Ecologist
Appropriate drainage infrastructure (e.g. sediment basins, diversion drains), sediment and erosion controls will be during the initial stages of construction. Temporary mitigation measures for soil and water management control during construction will include, but will not be limited to the following: sediment fencing, diversion drains, geotextile fabric, sediment control basins and gravel shaker ramps for construction traffic.	During initial stages of construction	Environmental Manager
Contact local proprietors for the reuse of timber for milling as necessary, and the mulching contractor for timber that is unsuitable or not required for re-use as considered relevant. <ul style="list-style-type: none"> <li>Wyong North Sawmill: 380 Pacific Highway, Wyong North. 02 4352 1621</li> </ul>	Prior to the commencement of clearing	Environmental Manager
Undertake pre-clearing fauna surveys as outlined in the <i>Wildlife Management Strategy</i> .	Prior to the commencement of clearing	Project Ecologist

### 4.3 Construction Management Actions

In addition to the management actions outlined in Table 8, the clearing protocol provided in Appendix 2 will be adopted for the removal of native and exotic vegetation occurring in the Project Area.

Table 8 **Construction Management Actions**

Action	Timing	Responsibility
<b>Pre-start up</b>		
<p>All site personnel involved in construction activities must be inducted during Toolbox Talks on the requirements of this Environmental Work Method Statement prior to commencing work on the site. Site personnel are to be:</p> <ul style="list-style-type: none"> <li>▪ Made aware of the clearing limits and how they are marked</li> <li>▪ Informed that they are not to encroach on areas beyond the clearing limits</li> <li>▪ Are to be informed of the 2 stage clearing process for habitat trees</li> <li>▪ Made aware of the locations of noxious weeds within clearing limits</li> <li>▪ Made aware of the locations of threatened flora species, Endangered Ecological Communities and trees that will be retained, measures required to protect them, and the consequences of damage to these areas.</li> <li>▪ Made aware of the local fauna of the site and identification of protocols to be undertaken if fauna are encountered.</li> <li>▪ Made aware of the risk of Phytophthora.</li> </ul>	Immediately prior to the commencement of works	Foreman / Environment Manager
A pre-start up check for sheltering native fauna of all infrastructure, plant and equipment and/or during relocation of stored construction materials is to be undertaken.	Daily, prior to commencement of works	Contractors
<b>General Habitat Protection</b>		
Appropriate sediment and erosion controls will be installed prior to the commencement of earthworks and construction, particularly in sensitive areas, such as adjacent to watercourses.	Prior to commencement of construction	Environmental Manager
Where possible, earthworks (and certainly all works in the vicinity of drainage lines) will be undertaken during dry weather conditions. Clearing of vegetation will not to be undertaken during overland flow events.	During construction	Environmental Manager
Sensitive areas and areas for construction will be clearing marked on plans so that clearing activities are constrained to approved areas only.	Prior to commencement of construction	Project Ecologist Environmental Manager

Action	Timing	Responsibility
Soil or mulch stockpiles will be located away from watercourses and key stormwater flow paths to limit potential transport of these substances into the watercourses via runoff.	During construction	Environmental Manager
Dust suppression activities will be undertaken where appropriate.	During construction	Environmental Manager
Stabilisation of disturbed areas, including mulching will be undertaken as soon as practicable after disturbance.	During construction	Environmental Manager
Emergency response protocols and procedures for implementation in the event of a contaminant spill or leak will be clearly articulated in the Construction Environmental Management Plan.	During construction	Environmental Manager
Spill kits will be located to allow for timely response to uncontained spills. Site inductions will include a briefing on the use of spill kits.	During construction	Environmental Manager
No spoil or excavation material is to be stockpiled within the drip line of native trees retained outside the limits of clearing.	During construction	Environmental Manager
Any additional construction areas, such as site offices, construction stockpile locations and machinery/equipment lay down will be located, where possible, within existing cleared or disturbed areas. No additional construction areas will be located within habitat to be retained.	During construction	Environmental Manager
Directional lighting will be used where lighting is required in construction areas to minimise light pollution impacts on microbats and nocturnal birds.	During construction	Environmental Manager
Frequent maintenance of construction machinery and plant will be undertaken to minimise unnecessary noise.	During construction	Environmental Manager
Dust suppression activities to be undertaken where appropriate.	During construction	Environmental Manager
Vehicles, equipment, materials and footwear are to be clean on entry (free of soil, mud and/or seeds) to minimise the introduction or spread of <i>Phytophthora cinnamomi</i> .	During Construction	Environmental Manager
<b>Vegetation Management Issues</b>		
The clearing of native vegetation will be limited to the minimum necessary through detailed design.	During construction	Environmental Manager

Action	Timing	Responsibility
<p>A two-stage approach to clearing will be undertaken:</p> <ul style="list-style-type: none"> <li>▪ Stage 1: under-scrubbing of the entire site should be carried out by a 4x4 tractor with a slashing deck and a layer of mulch is to be left to aid in soil retention. Non-hollow-bearing tree and non-habitat trees will be cleared in a sequence that leaves trees that allow fauna to move to adjacent vegetation to be retained. This sequence is as follows: <ul style="list-style-type: none"> <li>» Stage One: north to south</li> <li>» Stage Two: north to south</li> <li>» Stage Three: north to south</li> <li>» Stage Four: north to south</li> <li>» Stage Five: north to south</li> <li>» Stage Six: south to north</li> <li>» Stage Seven: south to north</li> </ul> </li> <li>▪ Stage 2: After a period of two weeks, clearing of hollow-bearing and habitat trees will commence. Hollow bearing trees are to be knocked with an excavator bucket or other machinery to encourage fauna to evacuate the tree immediately prior to felling. Tree should be “soft-felled”; lowered sectionally or dismantled using an excavator (or similar techniques). Felled trees must be left for a short period of time on the ground to give any fauna trapped in the trees an opportunity to escape before further processing of the trees. Felled hollow bearing trees must be inspected by an ecologist as soon as possible. Trees must be left on the ground for two nights before being mulched and stockpiled.</li> </ul>	<p>During clearing activities</p>	<p>Project Ecologist Environmental Manager</p>
<p>The Environmental Manager is to be notified if areas require clearing that are additional to areas approved for clearing. The removal of additional areas may impact on threatened fauna species and/or fauna habitat. Such areas will be required to be assessed for additional impacts in consultation with OEH.</p>	<p>During construction</p>	<p>Environmental Manager</p>
<p>Any natural hollows removed by the development are to be placed wherever possible as ground hollows under the supervision of the consulting ecologist.</p>	<p>During construction</p>	<p>Project Ecologist</p>
<p><b>Fauna Management Issues</b></p>		
<p>A qualified wildlife ecologist shall be consulted to identify and manage issues potentially affecting fauna displaced during clearing activities.</p>	<p>During construction</p>	<p>Project Ecologist</p>
<p>The removal of hollow-bearing trees will be supervised by an ecologist to recover any native fauna that are potentially displaced</p>	<p>During construction</p>	<p>Project Ecologist</p>

Action	Timing	Responsibility
Any injured fauna will be treated in accordance with the <i>Wildlife Management Strategy</i> .	During clearing activities and construction	Project Ecologist Environmental Manager
<p>If the fauna species is identified by the Project Ecologist, as a threatened species that was not identified and assessed in the <i>Environmental Assessment</i> or other Project documentation, then the Project Ecologist must inform the Environmental Manager, who must:</p> <ul style="list-style-type: none"> <li>▪ Immediately cease all work that may affect the threatened species.</li> <li>▪ Contact the Environmental Manager and advise them of the situation.</li> <li>▪ Contact stakeholders, including OEH, Project Ecologist any other as instructed by RMS or OEH.</li> <li>▪ Determine in consultation with stakeholders, corrective actions and additional safeguards to be undertaken.</li> </ul> <p>Construction works may recommence only once the Environmental Manager in consultation with the Project Ecologist, has confirmed that all corrective actions and additional safeguards have been implemented</p>	During construction	Project Ecologist Environmental Manager
Any pits/trenches are to be thoroughly checked before they are filled in for the presence of fauna. Any fauna trapped in pits or trenched will be handled (removed) in accordance with the <i>Wildlife Management Strategy</i> .	During construction	Project Ecologist
Environmental exclusion fencing of retained vegetation, fauna rescue, weed infestations and plant weed hygiene inspections will be monitored and reported in the Weekly Checklist and maintained as required.	During construction	Environmental Manager
<b>Protection of riparian areas and SEPP 14 Wetland</b>		
Appropriate sediment and erosion controls will be installed prior to the commencement of earthworks and construction in proximity to the SEPP 14 wetland (i.e. Stages 2, 4 and 5).	Prior to commencement of construction	Environmental Manager
Where possible, earthworks in proximity to the SEPP 14 wetland (i.e. Stages 2, 4 and 5) will be undertaken during dry weather conditions. Clearing of vegetation will not to be undertaken during overland flow events.	During construction	Environmental Manager

Action	Timing	Responsibility
The SEPP 14 wetland boundary will be clearly marked on relevant plans so that clearing activities are constrained to approved areas only.	Prior to commencement of construction	Environmental Manager
Soil or mulch stockpiles will be located away from riparian areas and away from key stormwater flow paths, to limit potential transport of these substances into the wetland.	During construction	Environmental Manager
Emergency response protocols and procedures for implementation in the event of a contaminant spill or leak will be clearly articulated in the Construction Environmental Management Plan.	During construction	Environmental Manager
<b>Weed Management</b>		
Weeds will be identified and managed in accordance with the <i>Weed Management Plan</i> .	Prior to commencement and during construction	Environmental Manager
<b>Rehabilitation and Revegetation</b>		
Species selection for any future landscaping works and seed stock for any revegetation area should be limited to locally occurring species to maintain local genetic diversity. This should include <i>Eucalyptus robusta</i> and other regionally significant species.	Upon completion of construction	Environmental Manager
Permanent sediment retention ponds will be landscaped with fringing wetland vegetation (eg <i>Typha sp.</i> ) to provide habitat for species such as frogs.	Upon completion of construction	Environmental Manager
The mulch/tub grindings generated from the removal and thinning of native trees associated with the development is/are to be re-used in restoring the habitat protection areas as required	Upon completion of construction	Environmental Manager
Stabilisation of disturbed areas, including mulching and/or revegetation will be undertaken as soon as practicable after disturbance.	Upon completion of construction	Environmental Manager
<b>Disposal of Vegetative Material</b>		
Millable timber is to be recycled for use in construction, furniture or fencing or similar or through local sawmills or sawyers (contact Wyong North Sawmill 02 4352 1621). Other tree waste must be wood chipped or tub ground or used as firewood. Tree stumps that cannot be reasonably tub ground may be disposed of to a Council-approved site.	Upon completion of construction	Environmental Manager

## 5.0 Training, Monitoring and Review

### 5.1 Training

Appropriate training and induction should include, but not be limited to:

- Raising awareness of on-site environmental management issues;
- Providing information on the location and importance of threatened flora and fauna species (and habitat);
- Providing information on the boundaries for vegetation clearing;
- Training on procedures on encountering fauna; and
- Training on weed identification and the appropriate guidelines for removing weeds, driving vehicles in weed infested locations and the disposal of weed infested topsoil etc.

### 5.2 Monitoring

Monitoring actions to be undertaken for the Project are outlined in Table 9.

Table 9 **Monitoring actions to be undertaken**

Inspection/ Monitoring Activities	Frequency	Delegated Responsibility
Inspections of work areas to ensure all mitigation measures in this plan are being adhered to, and are operating successfully.	Daily	Environmental Officer
Inspections of work areas to ensure flora and fauna mitigation measures in this plan are being adhered to, and are operating successfully. A monthly report detailing the results of inspections undertaken in that month will be submitted to the Environmental Manager, Development Certifier and LMCC Development Planner Flora and Fauna.	Weekly	Project Ecologist
Inspections, where deemed necessary, of clearing areas to ensure environmental controls are being followed .	As required	Environmental Officer
Inspections of vegetation protection areas and riparian zones to check the integrity of protective fencing.	Weekly	Environmental Officer
Inspection of sediment control measures (sediment fencing / silt curtains).	Weekly, and as soon as practical following rainfall	Environmental Officer
Inspection and monitoring of nest boxes every six months throughout construction period.	Six months after installation of nest boxes and then every six months for a three year period	Project Ecologist



### 5.3 Review

Any non-compliance identified during monitoring, of management and mitigation measures, will be highlighted and an environmental incident report will be completed. In accordance with CoA 9, non-compliance with any conditions of approval (i.e. implementation of this management plan) must be reported to the Department of Environment at the same time the compliance report is published. A compliance report must be submitted to the Department of Environment within three months of every 12 month anniversary of the commencement of the Project.

Any non-compliance identified during monitoring will be resolved via a range of contingency measures. Types of contingency measures that would be implemented, in the event that a mitigation measure is deemed non-compliant, are dependent upon the nature, location and magnitude of the impact. Generally, the Environmental Manager will be notified by the Project Ecologist of non-compliance and the relevant mitigation measure will be reviewed, modified (e.g. increase the frequency of monitoring, amend existing procedures, repair damaged fencing or signage) and implemented.

The non-conformance will be considered unresolved until:

- The non-compliance issue has been resolved;
- A new or revised procedure has been established and implemented;
- Training has been provided to relevant personnel/ sub-contractors; or
- Additional specific environmental management inspections are detailed in this flora and fauna management plan.

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# Appendix 1

## Fauna Species Inventory

Table 10 Fauna species previously recorded in the study area

Birds	<i>Anas gracilis</i>	Chestnut Teal
Birds	<i>Anas superciliosa</i>	Pacific Black Duck
Birds	<i>Chenonetta jubata</i>	Australian Wood Duck
Birds	<i>Phalacrocorax fuscescens</i>	Pied Cormorant
Birds	<i>Pelecanus conspicillatus</i>	Australian Pelican
Birds	<i>Ardea intermedia</i>	Intermediate Egret
Birds	<i>Egretta novaehollandiae</i>	White-faced Heron
Birds	<i>Haliaeetus leucogaster</i>	White-breasted Sea-Eagle
Birds	<i>Haliastur sphenurus</i>	Whistling Kite
Birds	<i>Vanellus miles</i>	Masked Lapwing
Birds	<i>Vanellus tricolor</i>	Banded Lapwing
Birds	<i>Ocyphaps lophotes</i>	Crested Pigeon
Birds	<i>Streptopelia chinensis</i>	Spotted Turtle-Dove*
Birds	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo
Birds	<i>Cacatua roseicapilla</i>	Galah
Birds	<i>Platycercus eximius</i>	Eastern Rosella
Birds	<i>Trichoglossus chlorolepidotus</i>	Scaly-breasted Lorikeet
Birds	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet
Birds	<i>Tyto novaehollandiae</i>	Masked Owl
Birds	<i>Ninox boobook</i>	Southern Boobook
Birds	<i>Ninox strenua</i>	Powerful Owl
Birds	<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo
Birds	<i>Dacelo novaeguineae</i>	Laughing Kookaburra
Birds	<i>Malurus cyaneus</i>	Superb Fairy-Wren
Birds	<i>Acanthiza nana</i>	Yellow Thornbill
Birds	<i>Pardalotus punctatus</i>	Spotted Pardalote
Birds	<i>Sericornis frontalis</i>	White-browed Scrubwren
Birds	<i>Smicrornis brevirostris</i>	Weebill
Birds	<i>Manorina melanocephala</i>	Noisy Miner
Birds	<i>Meliphaga lewinii</i>	Lewin's Honeyeater
Birds	<i>Melithreptus lunatus</i>	White-naped Honeyeater
Birds	<i>Microeca leucophaea</i>	Jacky Winter
Birds	<i>Colluricincla harmonica</i>	Grey Shrike-thrush

Birds	<i>Dicrurus megarhynchus</i>	Spangled Drongo
Birds	<i>Rhipidura fuliginosa</i>	Grey Fantail
Birds	<i>Rhipidura leucophrys</i>	Willie Wagtail
Birds	<i>Grallina cyanoleuca</i>	Magpie-lark
Birds	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
Birds	<i>Cracticus nigrogularis</i>	Pied Butcherbird
Birds	<i>Gymnorhina tibicen</i>	Australian Magpie
Birds	<i>Strepera graculina</i>	Pied Currawong
Birds	<i>Corvus coronoides</i>	Australian Raven
Birds	<i>Neochmia temporalis</i>	Red-browed Finch
Birds	<i>Carduelis carduelis</i>	European Goldfinch*
Birds	<i>Hirundo neoxena</i>	Welcome Swallow
Birds	<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul*
Birds	<i>Acridotheres tristis</i>	Common Myna*
Amphibians	<i>Crinia signifera</i>	Common Eastern Froglet
Amphibians	<i>Litoria verreauxii</i>	Verreaux's Tree Frog
Reptiles	<i>Lampropholis delicata</i>	Grass Skink
Mammals	<i>Antechinus stuartii</i>	Brown Antechinus
Mammals	<i>Isodon macrourus</i>	Northern Brown Bandicoot
Mammals	<i>Petaurus breviceps</i>	Sugar Glider
Mammals	<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum
Mammals	<i>Trichosurus vulpecula</i>	Common Brushtail Possum
Mammals	<i>Chalinolobus gouldi</i>	Gould's Wattled bat
Mammals	<i>Miniopterus australis</i>	Little Bentwing-bat
Mammals	<i>Miniopterus schreibersii</i>	Large Bentwing-bat
Mammals	<i>Vulpes vulpes</i>	Red Fox*
Mammals	<i>Canis familiaris</i>	Dog*
Mammals	<i>Bos taurus</i>	Cow*

## Appendix 2

### Vegetation Clearing Protocol



## Purpose

This protocol explains the actions and measures to be implemented prior to the commencement of vegetation clearing in the Project Area.

## Scope

This protocol is applicable to all native and exotic vegetation that occurs in the Project Area.

## Training

All personnel undertaking clearing activities, or directly involved with works, will be training in this protocol through Toolbox Talks or a site induction.

## Prior to Commencement of Clearing

At least 5 days prior to proposed vegetation clearing the Environmental Officer will ensure:

- The Project Ecologist has undertaken an assessment of vegetation with-in and adjacent to the clearing zone clearly marking and recording all habitat trees within the clearing zone. The Project Ecologist is to be present during the felling of habitat trees;
- Nest boxes have been installed to off-set the habitat removed during the clearing, in accordance with the Wildlife Management Strategy;
- The Project Ecologist has identified weed infestation within the Project Area and weeds are managed in accordance with the Weed Management Plan;
- Sediment control measures have been installed in accordance with the Sediment and Erosion Management Plan;

## Site Preparation

Prior to vegetation clearing the Environmental Officer will ensure:

- The boundary of the clearing footprint is clearly fenced or delineated, and shown on all relevant plans;
- All construction personnel (subcontractors and employees) involved in the clearing are trained via toolbox talks or pre starts or on the environmental risks and aspects of during clearing including:
  - » Clearing limits including environmentally sensitive exclusion zones;
  - » 2 stage clearing for habitat trees;
  - » Threatened flora and fauna species;
  - » Guideline for working around trees;
  - » Categories for milling / re-snagging, CWD or mulching;
  - » The Wildlife Management Strategy; and
- Sediment controls are in place; and
- Complete the pre-clearing checklist.

## Clearing

- A qualified ecologist shall be consulted to identify and manage issues potentially affecting fauna displaced during the vegetation clearing works.

- A two-stage approach to the clearing of these habitat trees and protection of wildlife in general is to be used:

### Stage 1

- » Under-scrubbing of the entire site should be carried out by a 4x4 tractor with a slashing deck and a layer of mulch is to be left to aid in soil retention.
- » Non-hollow-bearing tree and non-habitat trees will be cleared in a sequence that leaves trees that allow fauna to move to adjacent vegetation to be retained.

### Stage 2

- » After a period of two weeks, clearing of hollow-bearing and habitat trees will commence.
- » Hollow bearing trees are to be knocked with an excavator bucket or other machinery to encourage fauna to evacuate the tree immediately prior to felling.
- » If an animal is detected in a tree prior to pushing over, the clearing activities are to cease to allow fauna time to leave, or the animal is carefully removed from the tree.
- » Tree should be "soft-felled".
- » Felled trees must be left for a short period of time on the ground to give any fauna trapped in the trees an opportunity to escape before further processing of the trees.
- » Felled hollow bearing trees must be inspected by an ecologist as soon as possible.
- » Any animals found in fallen trees will be treated in accordance with the Wildlife Management Strategy.
- » Trees must be left on the ground for two nights before being mulched and stockpiled.
- » Some of the timber e.g. large horizontal branches that provide perching habitat collected during the clearing and grubbing process will be redistributed in suitable nearby areas to be retained.