



**Transport**  
Roads & Maritime  
Services

# **APPENDIX B2**

## **Construction Flora and Fauna Management Plan**

### **Woolgoolga to Halfway Creek Pacific Highway Upgrade**

**MAY 2015**



## Document control

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# Contents

1	Introduction.....	1
1.1	Context.....	1
1.2	Background .....	1
1.3	Environmental management systems overview .....	1
2	Purpose and objectives.....	3
2.1	Purpose .....	3
2.2	Objectives.....	3
2.3	Targets .....	3
3	Environmental requirements .....	4
3.1	Relevant legislation and guidelines.....	4
3.2	Minister’s Conditions of Approval.....	6
4	Existing environment.....	18
4.1	Environmental aspects.....	18
5	Environmental aspects and impacts .....	25
5.1	Construction activities.....	25
5.2	Ecological impacts .....	25
6	Environmental mitigation and management measures.....	29
6.1	Flora and fauna mitigation and management measures.....	29
6.2	Biodiversity offsets.....	29
7	Compliance management .....	40
7.1	Roles and responsibilities.....	40
7.2	Training .....	40
7.3	Monitoring and inspections .....	40
7.4	Auditing.....	40
7.5	Reporting.....	41
8	Review and improvement.....	42
8.1	Continuous improvement.....	42
8.2	FFMP update and amendment .....	42

## Tables

Table 3-1 Conditions of Approval relevant to the CFFMP .....	6
Table 4-1 Threatened or otherwise significant plant species .....	18
Table 4-2 Fauna habitat types.....	19
Table 4-3 Threatened fauna.....	20
Table 4-4 Aquatic fauna .....	22
Table 4-5 Fisheries habitat classifications .....	23
Table 6-1 Flora and fauna management and mitigation measures.....	30

## Appendices

<b>Appendix A</b>	Nest Box Plan
<b>Appendix B</b>	Threatened Flora Management Plan
<b>Appendix C</b>	Connectivity Strategy
<b>Appendix D</b>	Threatened Frog Management Plan
<b>Appendix E</b>	Rainforest Invertebrates Management Plan (Not used on this Project)
<b>Appendix F</b>	Threatened Mammal Management Plan
<b>Appendix G</b>	Koala Management Plan
<b>Appendix H</b>	Glider Management Plan
<b>Appendix I</b>	Microbat Management Plan
<b>Appendix J</b>	Lowland Rainforest Management Plan (Not used on this Project)
<b>Appendix K</b>	Pre-clearing checklist
<b>Appendix L</b>	Working Around Trees Guideline
<b>Appendix M</b>	Fauna Handling and Rescue Procedure
<b>Appendix N</b>	Unexpected Threatened Species / EECs Procedure
<b>Appendix O</b>	Noxious Weed & Pathogen Management Plan
<b>Appendix P</b>	Urban Design and Landscape Management Plan
<b>Appendix Q</b>	Biodiversity Offset Strategy and Package
<b>Appendix R</b>	Mitigation Framework
<b>Appendix S</b>	Flora Translocation Strategy

## Glossary / Abbreviations

BONN	Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
CAMBA	China-Australia Migratory Bird Agreement
CEMP	Construction Environmental Management Plan
CoA	Condition of Approval
DECC	Former Department of Environment and Climate Change (NSW) now NSW Office of Environment and Heritage.
DP&E	NSW Department of Planning and Environment
DoE	Commonwealth Department of the Environment
DPI	NSW Department of Primary Industries (Fishing and Aquaculture)
EEC	Endangered Ecological Community
EIS	Woolgoolga to Ballina Pacific Highway Upgrade Environmental Impact Statement (December, 2012)
EPA	NSW Environment Protection Authority
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
EWMS	Environmental Work Method Statements
JAMBA	Japan-Australia Migratory Bird Agreement
JV	Joint Venture
FFMP	Flora and Fauna Management Plan
FM Act	NSW Fisheries Management Act 1994
Minister, the	NSW Minister for Planning
NPW Act	NSW National Parks and Wildlife Act 1974
NW Act	NSW Noxious Weeds Act 1993
The project	Woolgoolga to Halfway Creek
OHL Y	OHL York Joint Venture
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
SPIR	Submissions / Preferred Infrastructure Report
SSI	State significant infrastructure
SWMS	Safe Work Method Statements

# 1 Introduction

## 1.1 Context

This Construction Flora and Fauna Management Plan (FFMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the upgrade of the Pacific Highway between Woolgoolga and Halfway Creek (the Project).

This FFMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), updated mitigation and management measures listed in the Pacific Highway Upgrade Woolgoolga to Ballina Submissions / Preferred Infrastructure Report (SPIR) (Nov 2013) and all applicable legislation.

There is one tie in project within the Woolgoolga to Halfway Creek project limits, namely the Sapphire to Woolgoolga project. This tie in project has been approved separately by the Department of Planning and Environment. Relevant conditions of approval for this projects have been referenced in the CEMP and plans as appropriate, specifically the Arrawarra Rest Area, which will be constructed as part of the Woolgoolga to Halfway Creek Project.

## 1.2 Background

The Pacific Highway Upgrade Woolgoolga to Ballina Environmental Impact Statement (EIS) (December 2012) assessed the impacts of construction and operation of the Project on flora and fauna.

As part of EIS development, a detailed flora and fauna assessment was prepared to address the Environmental Assessment Requirements issued by the Department of Planning and Environment. The flora and fauna assessment was included in the EIS as Working Paper: Biodiversity Assessment.

The EIS proposed the implementation of the mitigation and management measures, including further survey and monitoring.

The EIS management measures were subsequently updated within the Woolgoolga to Ballina Submissions / Preferred Infrastructure Report (SPIR) (November 2013), with applicable (to Woolgoolga to Halfway Creek project) management measures incorporated into this FFMP. To manage potential impacts on biodiversity, the project incorporates a biodiversity management framework that includes a monitoring strategy, a connectivity strategy, and a strategy to offset residual impacts on biodiversity as required under CoA D5. The offset strategy would be further developed by Roads and Maritime in consultation with the Environmental Protection Authority, Department of Primary Industries (Fisheries) and the Commonwealth Department of the Environment.

## 1.3 Environmental management systems overview

The overall Environmental Management System for the Project is described in the Construction Environmental Management Plan (CEMP).

The FFMP is part of the OHL York Joint Venture (OHLY) environmental management framework for the Project, as described in Section 4.1 of the CEMP. In accordance with CoA D26(e) this Plan has been developed in consultation with the NSW office of Environment and Heritage, Department of Primary Industries (Fisheries) and the Commonwealth Department of Environment. Ongoing consultation would be in accordance with Chapter 6 of the CEMP.

Mitigation and management measures identified in this Plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS).

EWMS will be developed and signed off by environment and management representatives prior to associated works and construction personnel will be required to undertake works in accordance with the identified mitigation and management measures.

Used together, the CEMP, strategies, procedures and EWMS form management guides that clearly identify required environmental management actions for reference by OHLY personnel and contractors.

The review and document control processes for this Plan are described in Chapter 10 of the CEMP.

## 2 Purpose and objectives

### 2.1 Purpose

The purpose of this Plan is to describe how construction impacts on ecology will be minimised and managed.

### 2.2 Objectives

The key objective of the FFMP is to ensure that impacts to flora and fauna are minimised and managed. To achieve this objective, the following will be undertaken:

- Ensure controls and procedures are implemented during construction activities to avoid, minimise or manage potential adverse impacts to flora and fauna within and adjacent to the Project corridor.
- Ensure measures are implemented to address the relevant CoA outlined in Table 3.1 and the management measures detailed in the EIS.
- Ensure measures are implemented to comply with all relevant legislation and other requirements as described in Section 3.1 of this Plan.

### 2.3 Targets

The following targets have been established for the management of flora and fauna impacts during the project:

- Ensure full compliance with the relevant legislative requirements and CoA.
- No unapproved disturbance to flora and fauna outside the proposed construction footprint and associated access tracks and site compounds.
- No increase in distribution of weeds currently existing within the project areas.
- No new weeds introduced to the project areas.
- No transfer of plant diseases or pathogens to or from the project work areas.
- Minimise net loss of significant habitat resources including hollow logs and tree nesting hollows, with materials cleared from the construction area re-used in adjacent areas where possible.
- Effective rehabilitation / revegetation that ensures different successional stages of rehabilitation are achieved.
- Minimise fauna mortality during construction.
- Not facilitate spread of feral animals as a result of construction.
- No pollution or siltation of aquatic ecosystems, wetlands, endangered ecological communities or threatened species habitat.
- Minimise barriers to fauna movement and fish passage.



## 3 Environmental requirements

### 3.1 Relevant legislation and guidelines

#### 3.1.1 Legislation

Legislation relevant to flora and fauna management includes:

- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *National Parks and Wildlife Act 1974* (NPW Act).
- *Threatened Species and Conservation Act 1995* (TSC Act).
- *Fisheries Management Act 1994* (FM Act).
- *Native Vegetation Act 2003*.
- *Noxious Weeds Act 1993* (NW Act).
- *Pesticides Act 1999*.
- *Animal Research Act 1985*.
- *Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act).

Relevant provisions of the above legislation are explained in the register of legal and other requirements included in Appendix A2 of the CEMP.

#### 3.1.2 Additional approvals, licences, permits and requirements

Refer to Appendix A1 of the CEMP.

#### 3.1.3 Guidelines

The main guidelines, specifications and policy documents relevant to this Plan include:

- RMS QA Specification G36 – Environmental Protection (Management System).
- RMS QA Specification G40– Clearing and Grubbing.
- RMS QA Specification R176 – Native Seed Collection.
- RMS QA Specification R178 – Vegetation.
- RMS QA Specification R179 – Landscape Planting.
- RMS Environmental Direction No.25 - Management of Tannins from Vegetation Mulch (January 2012).
- RMS *Practice Note: Clearing and Fauna Management – Pacific Highway Projects* (May 2012).
- RMS *Biodiversity Guidelines* (September 2011).
- NSW Fisheries, January 2003, *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*, Fairfull and Witheridge, 2003.
- NSW Fisheries, November 2003, *Fishnote – Policy and Guidelines for Fish Friendly Waterway Crossings* – November 2003.
- NSW National Parks & Wildlife Service. 2001. *Policy for the Translocation of Threatened Fauna in NSW: Policy and Procedure Statement No. 9* Threatened Species Unit, Hurstville NSW.

- Australian Network for Plant Conservation. 2004. *Guidelines for the Translocation of Threatened Plants in Australia*, 2nd Edition.
- DECCW. 2008. *Hygiene protocol for the control of disease in frogs*.
- NSW Fisheries, 1999, DPI Policy and Guidelines: Aquatic Habitat Management and Fish Conservation.
- Relevant recovery plans, priority action statements and best practice guidelines.

### 3.2 Minister's Conditions of Approval

The CoA relevant to this Plan are listed Table 3-1.

**Table 3-1 Conditions of Approval relevant to the FFMP**

CoA No.	Condition Requirements	Document Reference
<b>BIODIVERSITY</b>		
B1	<p>The clearing of native vegetation shall be minimised with the objective of reducing impacts to any threatened species or EECs where feasible and reasonable, consistent with the following:</p> <ul style="list-style-type: none"> <li>(a) clearing of native vegetation shall be limited to a total area of 931.7 hectares, within the SSI boundary defined in the document referred to in condition A2(c), subject to condition B1(b);</li> <li>(b) clearing of native vegetation for ancillary facilities specified in the document referred to in condition A2(d) and outside the SSI boundary defined in the document referred to in condition A2(c) shall be limited to 4.75 hectares;</li> <li>(c) clearing of threatened ecological communities shall be limited to the areas specified in Table 6-1 (under the column titled: Revised—direct impact (hectares)) of Appendix J of the document referred to in condition A2(c), subject to condition B1(d);</li> <li>(d) clearing of the Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions shall be limited to a total area of 0.5 hectares; and</li> <li>(e) clearing of Koala (<i>Phascolarctos cinereus</i>) primary and secondary habitat shall be limited to a total area of 375 hectares.</li> </ul>	<p>This plan Table 6-1</p> <p>Table 6-1</p> <p>Table 6-1</p> <p>Table 6-1</p> <p>Table 6-1</p>
B2	Where feasible and reasonable, remnant vegetation shall be retained between the SSI boundary and the SSI footprint.	This plan Table 6-1
B3	Native vegetation shall be established in or adjacent to disturbed areas within the SSI boundary to provide habitat for wildlife following the completion of construction in the vicinity of the disturbed area, consistent with the Urban Design and Landscape Plan required under condition D20.	This plan

CoA No.	Condition Requirements	Document Reference
B4	Light spill from the SSI shall be avoided on Pink Underwing Moth and Atlas Rainforest Ground Beetle habitat, where feasible and reasonable.	This plan Appendix E
B5.	<p><b>Pre clearing</b></p> <p>Prior to construction, pre clearing surveys and inspections for endangered and threatened species shall be undertaken. The surveys and inspections, and any subsequent relocation of species, shall be undertaken under the guidance of a qualified ecologist and the methodology incorporated into the approved Construction Flora and Fauna Management Plan.</p> <p>All clearance of Koala habitat trees is to be undertaken in the presence of a Koala spotter.</p>	Section 5.2 of this plan
B6.	Incidental or unanticipated threatened flora and fauna finds shall be immediately reported and clearing work stopped in the vicinity of the find to allow for an evaluation of an appropriate response in accordance with the Construction Flora and Fauna Management Plan.	Appendix M and N of this plan
B13.	The Applicant shall minimise riparian vegetation clearing during construction and undertake a targeted rehabilitation program post construction to restore in-stream and riparian habitat to at least the pre-construction condition or better, unless otherwise agreed by DPI (Fisheries).	Table 6-1
<b>ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING</b>		
D1.	<p>The Applicant shall develop a framework for finalising mitigation measures for threatened species. This <b>Mitigation Framework</b> shall be developed by a suitably qualified and experienced ecologist in consultation with DPI (Fisheries), EPA and DoE, and submitted to the satisfaction of the Secretary prior to commencement of detailed design of the relevant stage, unless otherwise agreed by the Secretary. The Mitigation Framework shall detail the process for finalising the biodiversity strategies, plans and programs required under this approval. The Mitigation Framework shall include:</p> <p>(a) a description of the methodology of all proposed pre-construction species and habitat surveys, including surveys undertaken in the 2013-2014 spring and summer seasons and as otherwise required under this project approval, and with reference where</p>	Appendix R

CoA No.	Condition Requirements	Document Reference
	<p>relevant to compliance with relevant NSW and Commonwealth field survey methods and guidelines;</p> <ul style="list-style-type: none"> <li>(b) a summary of potential changes to the avoidance, mitigation and/or offset measures specified in the documents listed in condition A2, as justified by the results of surveys described in condition D1(a);</li> <li>(c) a summary of the potential avoidance, mitigation and/or offset measures for all species for which the proposed level of impact or mitigation required differs from that assessed in the documents listed in condition A2, including evidence that those measures would achieve the same or an improved biodiversity outcome;</li> <li>(d) provision for updating the relevant Threatened Species Management Plans required under condition D8; and</li> <li>(e) a schedule for submission of all biodiversity strategies, plans and programs required under this approval in accordance with the requirements for submission in the conditions below.</li> </ul>	
D2	<p>The Applicant shall prepare and implement a <b>Connectivity Strategy</b>, to be submitted and approved by the Secretary prior to the commencement of construction. The strategy shall describe the rationale for, and final design and location of, fauna connectivity structures for the SSI and shall demonstrate the effectiveness of connectivity measures for the species targeted for the crossing. The Strategy shall be developed from the draft Connectivity Strategy in the documents listed in condition A2 in consultation with the EPA, DPI (Fisheries) and DoE, to the satisfaction of the Secretary. The Strategy shall include:</p> <ul style="list-style-type: none"> <li>(a) details of all crossings for terrestrial and aquatic fauna, including but not limited to land bridges, bridge, arch and culvert crossings, and crossings for arboreal fauna;</li> <li>(b) justification for the location and design, and spacing of the connectivity structures, with reference to relevant State and Commonwealth threatened species guidelines and the results of on-ground surveys as required by D2(d);</li> <li>(c) demonstration of the effectiveness of the connectivity structures (including exclusionary fencing) in terms of location, design and number of connectivity structures to mitigate impacts to the relevant threatened species, and that the crossings: <ul style="list-style-type: none"> <li>(i) maintain or improve connectivity and movement pathways;</li> </ul> </li> </ul>	Appendix C Connectivity Strategy

CoA No.	Condition Requirements	Document Reference
	<ul style="list-style-type: none"> <li>(ii) reduce the risk of mortality for threatened species;</li> <li>(iii) are located at locations, at sufficient frequency along the alignment, based on the ecological requirements of the targeted species, including but not limited to home range size, movement patterns, and habitat use;</li> <li>(d) the results of surveys undertaken to determine the habitat, species movement patterns, distribution of species to confirm the design and location;</li> <li>(e) consideration of connectivity under the existing highway, service roads and local roads (servicing over 100 vehicles per day);</li> <li>(f) commitment that pathways to connectivity structures are not to be impeded by ancillary facilities, rest areas or service roads, or local roads (servicing over 100 vehicles per day) that are realigned as part of the SSI or experience an increase in traffic volumes during operation of the SSI;</li> <li>(g) commitment to implement the landscaping of vegetation leading to connectivity structures;</li> <li>(h) a <b>fencing strategy</b>, describing the location, design and length of fencing, which must extend beyond the edges of habitat for threatened species;</li> <li>(i) the maintenance of connectivity measures and fencing for the life of the impact of the action, including the timing and frequency;</li> <li>(j) an assessment of the flooding risk for proposed structures, and measures to confirm and provide for flood immunity of those structures in light of this assessment. The agreement of the EPA on flood immunity levels shall be obtained prior to the commencement of construction of the relevant stage;</li> <li>(k) commitment that all bridges in identified wildlife corridors, or adjacent to threatened species habitat, or are likely to provide connectivity for threatened species based on surveys undertaken in accordance with the Mitigation Framework required in condition D1, shall provide a minimum three metre wide dry passage from toe of the scour protection to the top of the bank, with natural substrate and refuge features. Where this criteria cannot be achieved and with the agreement of the EPA, consideration shall be given to the use of suitable materials in, and the final form of, the scour protection to provide for the safe and effective passage of fauna;</li> <li>(l) detailed consideration of the effects of connectivity structures on the maintenance or improvement of population viability and gene flow; and</li> <li>(m) incorporate the outcomes of the Mitigation Framework required under condition D1.</li> </ul>	

CoA No.	Condition Requirements	Document Reference
	<p>Unless connectivity measures can be demonstrated to be effective at successfully mitigating the barrier and fragmentation impact to relevant species, in accordance with the requirements of the Construction Flora and Fauna Management Plan required under condition D26(e) and threatened species management plans required under conditions D8 and D9, the residual impact to connectivity shall be offset.</p> <p>Where the location and/or design of connectivity structures has changed from that identified in the documents listed under conditions A2(c) and A2(e), the Strategy shall demonstrate how the new location and/or design would result in an improved biodiversity outcome. The Strategy shall clearly identify how the connectivity structures will work in conjunction with other biodiversity measures, such as complementary fauna exclusion fencing measures and the regeneration/replanting of native vegetation, to be implemented for the SSI.</p> <p>The Applicant shall demonstrate to the satisfaction of the Secretary how public authority comments on the Strategy have been addressed.</p> <p>The Strategy may be submitted in stages to suit the staging of the SSI.</p>	
D6	<p>Prior to the commencement of construction of the relevant stage that would result in the disturbance of native vegetation (or as otherwise agreed by the Secretary), the Applicant shall prepare and implement a <b>Nest Box Plan</b> to provide replacement hollows for displaced fauna. The Plan shall be prepared in consultation with the EPA and to the satisfaction of the Secretary. The Plan shall be prepared by a suitably qualified and experienced ecologist and detail the number and type of nest boxes to be installed, which shall be justified based on the number and type of hollows removed (based on pre clearing surveys), the density of hollows in the area to be cleared and in adjacent areas, and the availability of adjacent food resources. The Plan shall also provide details of maintenance protocols for the nest boxes installed including responsibilities, timing and duration.</p>	Appendix A
D7	<p><b>Translocation Strategy</b></p> <p>The Applicant shall prepare and implement a <b>Flora Translocation Strategy</b> to determine the feasibility and potential efficacy of translocation measures (as identified in the threatened species</p>	Appendix S

CoA No.	Condition Requirements	Document Reference
	<p>management plans required under condition D8), prior to the commencement of construction work that would result in the disturbance of threatened flora species for which translocation is proposed. The Strategy shall be prepared by a suitably qualified and experienced ecologist, in consultation with the EPA and DoE, and to the satisfaction of the Secretary. The Strategy shall include:</p> <ul style="list-style-type: none"> <li>(a) a feasibility assessment of timeframe and staging requirements, availability of expertise, risk effectiveness analysis and availability/suitability of translocation sites;</li> <li>(b) detail of species specific information on the proposed methods of, and discussion of results of past recorded responses to, translocations;</li> <li>(c) a framework for the translocation process applicable to each affected species; and</li> <li>(d) consideration of appropriate compensatory habitat in the Biodiversity Offsets Package required under condition D5 where translocation is not reasonable or feasible.</li> </ul>	
D8	<p><b>Threatened Species Management Plans</b></p> <p>The Applicant shall prepare and implement <b>Threatened Species Management Plans</b> to detail how impacts of the SSI will be minimised and managed specifically for each species identified as significantly impacted in the documents listed in condition A2 or in accordance with condition D1. The Plans shall be developed from the draft Threatened Species Management Plans included in the documents listed in condition A2(c) (subject to condition D9), in consultation with EPA, DPI (Fisheries) and DoE, and to the satisfaction of the Secretary, and shall include but not necessarily be limited to:</p> <ul style="list-style-type: none"> <li>(a) demonstration that adequate surveys have been undertaken to assess the impacts of the SSI with reference to the Mitigation Framework developed under condition D1, including baseline data collected from surveys, undertaken by a suitably qualified and experienced ecologist on threatened species and ecological communities within all habitat areas to be cleared of vegetation for the SSI, that are likely to contain these species and that are likely to be adversely impacted by the SSI (as determined by a suitably qualified expert). The data shall address the densities, distribution, habitat use and movement patterns of these species;</li> <li>(b) identification of potential impacts on each species;</li> <li>(c) details of and demonstrated effectiveness of the proposed avoidance and mitigation and management measures to be implemented for each threatened species including measures to at least maintain habitat values of habitat areas compared to baseline</li> </ul>	Appendix B, D, E, F, G, H, I and J



CoA No.	Condition Requirements	Document Reference
	<p>data and maintain connectivity for the relevant species;</p> <p>(d) an adaptive monitoring program to assess the use of the mitigation measures identified in conditions B10 and D2. The monitoring program shall nominate appropriate and justified monitoring periods, performance parameters and criteria against which effectiveness of the mitigation measures will be measured and include operational road kill and fauna crossing surveys to assess the use of fauna crossings and exclusion fencing implemented as part of the SSI;</p> <p>(e) monitoring methodology for threatened flora and fauna adjacent to the SSI footprint,</p> <p>(f) goals and performance indicators to measure the success of mitigation measures, which shall be specific, measurable, achievable, realistic and timely (SMART), and be compared against baseline data;</p> <p>(g) methodology for the ongoing monitoring of road kill, the species densities, distribution, habitat use and movement patterns, and the use of fauna crossings during construction and operation of the SSI, including the proposed timing, and duration of that monitoring;</p> <p>(h) provision for the assessment of monitoring data to identify changes to habitat usage and whether this can be attributed to the SSI;</p> <p>(i) details of contingency measures that would be implemented in the event of changes to habitat usage patterns, entities, distribution, and movement patterns attributable to the construction or operation of the SSI, based on adequate baseline data;</p> <p>(j) mechanisms for the monitoring, review and amendment of these plans;</p> <p>(k) provision for ongoing monitoring during operation of the SSI (for operation/ongoing impacts) until such time as the use and effectiveness of mitigation measures can be demonstrated to have been achieved over a minimum of three successive monitoring periods, unless otherwise agreed by the Secretary in consultation with the EPA, DPI (Fisheries) and DoE; and</p> <p>(l) provision for annual reporting of monitoring results to the Secretary and the EPA, DPI (Fisheries) and DoE, or as otherwise agreed by those agencies.</p> <p>In developing the Plans, the Applicant shall demonstrate to the satisfaction of the Secretary and DoE, how the public authorities and expert reviewer recommendations provided for each draft plan in the documents listed in condition A2(c) have been addressed, including detailed justification of any variance from the recommendations of the expert reviewer of the</p>	

CoA No.	Condition Requirements	Document Reference
	management plans, including analysis of potential risk to the threatened species.	
	The Plans must be submitted and approved by the Secretary prior to commencement of construction of the relevant stages of the action, and implemented prior to commencement of construction of the relevant stages, unless otherwise agreed by the Secretary.	
D9	<p data-bbox="439 464 775 491"><b>Koala Management Plan</b></p> <p data-bbox="439 499 1704 627">As part of the Threatened Species Management Plans required under condition D8, the Applicant shall prepare and implement a <b>Koala Management Plan</b>. The Plan shall be prepared by a suitably qualified and experienced species expert and shall include, but not necessarily be limited to:</p> <ul style="list-style-type: none"> <li data-bbox="510 635 1704 831">(a) results of detailed surveys to determine: <ul style="list-style-type: none"> <li data-bbox="589 671 1704 762">(i) habitat use and movement patterns of Koala populations within five kilometres of the proposed upgrade, or such area as determined by the independent ecologist; and</li> <li data-bbox="589 770 1704 831">(ii) habitat areas likely to be fragmented by the SSI; including the results of SPOT assessment and radio tracking.</li> </ul> </li> <li data-bbox="510 839 1704 999">(b) The results and adequacy of surveys shall be verified by an independent suitably qualified and experienced ecologist with appropriate qualifications and experience in Koala and road ecology. Where appropriate, the Applicant may vary the required area of survey specified under condition D9(a)(i) to the satisfaction of the independent ecologist;</li> <li data-bbox="510 1007 1704 1102">(c) a detailed assessment of the impacts to the Koala populations based on the survey results required by condition D9(a), including population impacts and the identification of habitat likely to be fragmented and/or isolated as a result of the SSI;</li> <li data-bbox="510 1110 1704 1171">(d) a detailed description, including the location and design, of all proposed avoidance and mitigation measures;</li> <li data-bbox="510 1179 1704 1375">(e) justification that the location and design of mitigation measures: <ul style="list-style-type: none"> <li data-bbox="589 1214 1704 1375">(i) have been designed with the objective of no Koala road kill from the commencement of construction of the SSI. In the event that a Koala is injured or killed during construction or operation, this shall be reported on the Applicant's website within 24 hours of this occurring, and the record shall remain available for a period of at least five years, unless otherwise agreed by the Secretary;</li> </ul> </li> </ul>	Appendix G

CoA No.	Condition Requirements	Document Reference
	<ul style="list-style-type: none"> <li>(ii) result in the complete, safe crossing of fauna crossings by the Koala. Fauna crossings shall be provided at a sufficient frequency to ensure that habitat connectivity is maintained or improved from pre-construction conditions, as determined by the independent ecologist and agreed by EPA;</li> <li>(iii) provide sufficient opportunities for species dispersal and re-colonisation as determined by the independent ecologist and EPA;</li> <li>(iv) are in areas that, and are at a sufficient frequency to, achieve (i) - (iii), based on site specific information contained in the survey results required by condition D9(a) and the ecological requirements of the Koala, including but not limited to home range size, local movement patterns and habitat use, in accordance with the advice of the independent ecologist and EPA;</li> <li>(v) all koala underpass structures shall have a minimum height and width of 2.4 metres and a maximum length of 40 metres, or a minimum height and width of 3 metres and a maximum length of 50 metres. The underpass/culvert entrance shall be located at ground level, and no higher in the fill. Structures that provide passage over the road shall have a minimum width of 30 metres and shall be treated with contiguous habitat features;</li> <li>(vi) provide passage for Koalas under or over the existing highway (where the existing highway forms part of the SSI) and service roads or local roads (servicing over 100 vehicles per day);</li> <li>(vii) effectively minimise the risk of predation from dogs in both dedicated and combined crossings;</li> <li>(viii) provide dry passage for dedicated fauna crossings and for combined fauna crossings to the satisfaction of EPA and DoE, at a flood immunity level determined in accordance with condition D2(c)(j);</li> <li>(ix) provide habitat linkages to crossing structures from adjacent Koala habitat; and</li> <li>(x) ensures that pathways to connectivity structures are not impeded by ancillary facilities, rest areas, service roads or local roads;</li> </ul> <p>(e) if the mitigation measures discussed in condition D9(d) cannot be demonstrated to be effective to the satisfaction of the Secretary, in consultation with EPA and DoE, provision for the Plan to be revised to include the design and construction of a minimum of one dedicated underpass or land bridge every 500 metres. Underpass structures shall have a minimum height and width of three metres and a maximum</p>	

CoA No.	Condition Requirements	Document Reference
	<p>length of 50 metres;</p> <p>(f) provision for the installation and vegetation planting of fauna overpasses prior to the commencement of construction;</p> <p>(g) a <b>revegetation strategy</b> to be implemented to increase connectivity adjacent to the SSI and leading to crossing locations, and the provision of vegetation planting on land bridges, to ensure the establishment of the vegetation prior to the commencement of construction;</p> <p>(j) if the measures in condition D9(i) cannot be demonstrated to be successful within one year of their implementation, procedure for the submission of further offsets in accordance with conditions D5 and D6(j), be provided within one year of these findings. Further offsets may include:</p> <p>(i) the legal protection and conservation management of additional areas of existing habitat that actively regenerated and secured into conservation management; and/or</p> <p>(ii) strategic revegetation of cleared areas to improve connectivity; and/or</p> <p>(iii) development of a supplementary feeding program and/or breeding program; and/or</p> <p>(iv) development of a long term predator control program; and</p> <p>(h) evidence of consultation with species experts, EPA and DoE in addressing the requirements of this condition, and demonstration of how comments provided by the species experts, EPA and DoE, as a result of this consultation, have been addressed.</p>	
	<p>The Koala Management Plan shall be submitted and approved by the Secretary prior to the commencement of construction of the relevant stages of the SSI. The approved Koala Management Plan shall be implemented prior to the commencement of construction of the relevant stages.</p>	
<p><b>CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN</b></p>		
<p>As part of the Construction Environmental Management Plan for the SSI, the Applicant shall prepare and implement:</p>		
D26(e)	<p>A <b>Construction Flora and Fauna Management Plan</b> to detail how construction impacts on ecology will be minimised and managed. The Plan shall be prepared by a suitably qualified and</p>	This plan

CoA No.	Condition Requirements	Document Reference
	experienced ecologist and developed in consultation with the EPA, DPI (Fisheries) and DoE, and shall include, but not necessarily be limited to:	
	(i) details of pre-construction surveys undertaken by a suitably qualified and experienced ecologist to verify the SSI footprint based on detailed design;	Section 5.2.1
	(ii) plans for impacted and adjoining areas showing vegetation communities; important flora and fauna habitat areas; locations where threatened species, populations or ecological communities have been recorded; including pre-clearing surveys to confirm the location of threatened flora and fauna species and associated habitat features;	Sensitive Area Plans
	(iii) the identification of areas to be cleared and details of management measures (such as fencing, clearing procedures, removal and relocation of fauna during clearing, habitat tree management and construction worker education) to avoid any residual habitat damage or loss and to minimise or eliminate time lags between the removal and subsequent replacement of habitat;	Appendix M This Plan
	(iv) a <b>protocol for the removal and relocation of fauna during clearing</b> , including provision for engagement of a suitably qualified and experienced ecologist to identify locations where they would be present; to oversee clearing activities and facilitate fauna rescue and re-location; and consideration of timing of vegetation clearing with consideration to the avoidance of clearing native vegetation during the breeding/nesting periods of threatened species, where feasible and reasonable;	Appendix M
	(v) details of general work practices and mitigation measures to be implemented during construction and operation to minimise impacts on native fauna and native vegetation (particularly threatened species and their habitats and EEC) not proposed to be cleared as part of the SSI, including, but not necessarily limited to: fencing of sensitive areas; measures for maintaining existing habitat features (such as bush rock and tree branches etc); seed harvesting and appropriate topsoil management; construction worker education; weed management (including controls to prevent the introduction or spread of <i>Phytophthora cinnamomi</i> and myrtle rust ( <i>Puccinia psidii</i> s.l.); erosion and sediment control, including measures to at least maintain habitat values downstream; and progressive re-vegetation;	Table 6-1
	(vi) rehabilitation details, including identification of flora species and sources, and	Table 6-1

CoA No.	Condition Requirements	Document Reference
	measures for the management and maintenance of rehabilitated areas;	
	(vii) weed management measures focusing on early identification, suppression and control of invasive weeds and effective management controls;	Appendix O
	(viii) a protocol for managing aquatic and terrestrial pest animal/invasive species and plant species, and pathogens;	Appendix O
	(ix) consideration of the Threatened Species Management Plans;	Appendix B, D, E, F, G, H, I and J
	(x) a description of how the effectiveness of these management measures would be monitored and linked to the monitoring undertaken as part of the Threatened Species Management Plans;	Appendix B, D, E, F, G, H, I and J
	(xi) a procedure for dealing with unexpected EEC/threatened species identified during construction, including cessation of work and notification of the EPA, DPI (Fisheries) and DoE, determination of appropriate mitigation measures in consultation with these agencies (including relevant re-location measures) and updating of ecological monitoring and/or biodiversity offset requirements; and	Appendix N
	(xii) mechanisms for the monitoring, review and amendment of this plan.	Chapter 8
2.4 (Sapphire to Woolgoolga project MOD 06 2012)	The Biodiversity Offset and Mitigation Package as required by condition 2.13 shall be updated to include vegetation cleared as a result of the construction of the Arrawarra Rest Area.	Appendix Q

## 4 Existing environment

The following sections summarise existing flora and fauna within and adjacent to the project area including species, communities and habitats. The key reference documents are Chapter 10 of the EIS and Working Paper: Biodiversity Assessment. The project boundary and relevant ecological data is shown on the sensitive area maps (SAPs) included in Appendix A5 of the CEMP.

### 4.1 Environmental aspects

#### 4.1.1 Endangered ecological communities

EECs listed in NSW under the TSC Act have been located in the study area and include:

- Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion
- Lowland Rainforest of the NSW North Coast and Sydney Basin Bioregion
- Coast Cypress Pine shrubby open forest of the North Coast Bioregion
- Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregion
- Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregion
- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregion.

EECs listed under the Commonwealth EPBC Act have been located in the study area and include:

- Lowland Rainforest of Subtropical Australia
- Littoral Rainforest and Coastal Vine Thickets of Eastern Australia.

The location of these EEC in relation to the project is shown on the Sensitive Area Plans included at Appendix A5 of the CEMP.

#### 4.1.2 Threatened or otherwise significant plant species

Threatened flora species identified, or with the potential to occur within the project corridor, and their conservation status, are listed in Table 4-1. These species listed are the result of the EIS findings and subsequent vegetation surveys

**Table 4-1 Threatened or otherwise significant plant species**

Common name	Scientific name	EPBC Act	TSC Act	Occurrence
Hairy-joint grass	<i>Arthraxon hispidus</i>	Vulnerable	Vulnerable	Potential
Square-fruited ironbark	<i>Eucalyptus tetrapleura</i>	Vulnerable	Vulnerable	Potential
Slender screw fern	<i>Lindsaea incisa</i>	Endangered	Endangered	Potential
Rough-shelled bush nut	<i>Macadamia tetraphylla</i>	-	Vulnerable	Potential
Weeping paperbark	<i>Melaleuca irbyana</i>	-	Endangered	Potential
Singleton mint bush	<i>Prostanthera cineolifera</i>	Vulnerable	Vulnerable	Potential
Moonee quassia	<i>Quassia</i> sp. 'Moonee Creek'	Endangered	Endangered	Potential
Maundia	<i>Maundia triglochoides</i>	-	Vulnerable	Confirmed

Common name	Scientific name	EPBC Act	TSC Act	Occurrence
Swamp foxglove	<i>Centranthera cochinchinensis</i>	-	Endangered	Potential
Spider orchid	<i>Dendrobium melaleucaphilum</i>	-	Endangered	Potential
Noahs false Chickweed	<i>Lindernia alsinoides</i>		Endangered	Confirmed
Water Nutgrass	<i>Cyperus aquatilis</i>		Endangered	Confirmed
Square-stemmed spike rush	<i>Eleocharis tetraquetra</i>		Endangered	Confirmed
Slender marsdenia	<i>Marsdenia longiloba</i>	Vulnerable	Endangered	Potential

The location of flora species identified in the project corridor is shown on the Sensitive Area Plans included at Appendix A5 of the CEMP.

#### 4.1.3 Fauna habitats

Four fauna habitat types were identified in the EIS. These are listed below and shown on the SAPs included at Appendix A5 of the CEMP.

**Table 4-2 Fauna habitat types**

Name	Habitat features
Dry forest habitats	<p>Dry forest habitats are the most abundant habitat along the project and include a large range of vegetation types. Dry forest habitats contain the highest proportion of hollow bearing trees. They provide important habitat for a range of fauna groups, particularly hollow-dependent species such as forest owls, arboreal mammals, microchirpterean bats, glossy black-cockatoo and brown treecreeper.</p> <p>Dry open forest habitats also provide a range of year-round food resources for fauna. Foraging features include peeling bark, fallen logs, leaf litter, shrubby understorey and grassy groundcover and 'spaces' for fauna.</p>
Wet and riparian forests and floodplain eucalypt habitat	<p>Wet sclerophyll and semi-mesic forests occur throughout the project, on mid- to lower-slopes of low undulating rises. The community is dominated by flowering trees (Myrtaceae), providing a suite of fauna habitat resources, including hollow bearing trees, fallen wood, leaf litter, shrubby understorey, grassy groundcover, and a year-round supply of nectar and pollen.</p> <p>The most commonly encountered floodplain forests within the study area are Eastern Red Gum Floodplain Forest, and Forest Red Gum Floodplain Forest, dominated by Forest Red Gum. They are moderately tall to tall woodland and open forests, supporting hollow bearing trees, flowering trees and shrubs, and abundant fallen wood. This habitat type is frequented by woodland and forest birds, arboreal and terrestrial mammals, bats, numerous reptiles and often frogs.</p> <p>Riparian habitat zones include areas of moist forest, rainforest and mangrove elements along larger tributaries and, in agricultural areas on cleared floodplain. Riparian habitats include tall moist forest up to heights of 35 metres, dominated by Blackbutt, Flooded Gum, Brushbox and Tallowwood with rainforest and/or swamp elements in the understorey. Threatened species known to roost, nest or forage in riparian habitats in the study area include Black-necked Stork, Black Bittern, Square-tailed Kite, Osprey, Golden-tipped Bat, Southern Myotis and tree roosting microbats. The Giant-barred Frog and Stuttering Frog could also be expected to occur within riparian habitat.</p>
Swamp forest habitat	<p>Swamp Sclerophyll Forest occurs on seasonally waterlogged floodplain or swampy creek lines throughout all sections, mostly on the Clarence and Richmond river floodplains. It provides habitat for a broad range of animals, including many that are dependent on trees for food, nesting or roosting (Law et al., 2000). The blossoms of Swamp Mahogany (<i>Eucalyptus robusta</i>) and Broad-leaved Paperbark are an important food source for the Grey-headed Flying Fox and Common Blossom Bat (Law, 1994), Yellow-bellied Glider, Squirrel Glider, Regent Honeyeater, Swift Parrot and Little Lorikeet.</p>



	Other species which may use Swamp Sclerophyll Forest includes Osprey, Australasian Bittern, Southern Myotis, Olongburra Frog and Wallum Froglet. Swamp Sclerophyll Forest also provides potential Koala habitat, with Swamp Mahogany one of the preferred feed trees for Koala.
Cleared and modified habitats	<p>Modified communities are former forests which have been modified through land clearing and draining for the development of farm land. Modified communities include cleared pasture with scattered trees, plantation, cropland, market garden, pine forest and cleared open pasture.</p> <p>Small isolated fragments of the former forest communities often occur with an understorey dominated by introduced pasture or weeds. Cleared cropping land is mostly sugar cane or introduced pasture grasses, with limited remnant vegetation and a generally low native floral diversity. Commonly, scattered remnant trees and small fragmented native vegetation patches are present, as are planted areas for windbreaks and landscaped gardens. The areas are dominated by introduced pasture grasses including <i>Paspalum</i> (<i>Paspalum dilatatum</i>) and Kikuyu (<i>Pennisetum clandestinum</i>).</p> <p>Although heavily modified, these environments do provide habitat for some fauna including some microchiropteran bats are known to forage and may roost in scattered paddock trees and forest and woodland remnants (Lumsden and Bennett, 2004), while owls and other predatory birds may frequent cane fields for foraging.</p>

#### 4.1.4 Threatened fauna

Twenty-one threatened fauna species have been recorded in the project area during surveys for the EIS and subsequent targeted threatened species surveys (Table 4-3). According to the EIS a further 33 threatened species potentially occur in section 1 (Table 4-4).

**Table 4-3 Threatened fauna recorded in the project area**

Common name	Scientific name	EPBC Act	TSC Act
Black-necked stork	<i>Ephippiorhynchus asiaticus</i>	-	Endangered
Brolga	<i>Grus rubicundus</i>	-	Vulnerable
Bush stone-curlew	<i>Burhinus grallarius</i>	-	Endangered
Eastern osprey	<i>Pandion haliaetus</i>	Migratory	Vulnerable
Glossy black-cockatoo	<i>Calyptorhynchus lathami</i>	-	Vulnerable
Hoary wattled bat	<i>Chalinolobus nigrogriseus</i>	-	Vulnerable
Eastern false pipistrelle	<i>Falsistrellus tasmaniensis</i>	-	Vulnerable
Little bent-wing bat	<i>Miniopterus australis</i>	-	Vulnerable
Eastern bent-wing bat	<i>Miniopterus schreibersii oceanensis</i>	-	Vulnerable
Southern myotis	<i>Myotis macropus</i>	-	Vulnerable
Yellow-bellied glider	<i>Petaurus australis</i>	-	Vulnerable
Squirrel glider	<i>Petaurus norfolcensis</i>	-	Vulnerable
Rufous bettong	<i>Aepyprymnus rufescens</i>	-	Vulnerable
Common planigale	<i>Planigale maculata</i>	-	Vulnerable
Spotted-tailed quoll	<i>Dasyurus maculatus maculatus</i>	Endangered	Vulnerable
Long-nosed potoroo	<i>Potorous tridactylus tridactylus</i>	Vulnerable	Vulnerable
Grey-headed flying-fox	<i>Pteropus poliocephalus</i>	Vulnerable	Vulnerable

Common name	Scientific name	EPBC Act	TSC Act
Wallum froglet	<i>Crinia tinnula</i>	-	Vulnerable
Olongburra frog	<i>Litoria olongburensis</i>	Vulnerable	Vulnerable
Green-thighed frog	<i>Litoria brevipalmata</i>	-	Vulnerable
Giant barred frog	<i>Mixophyes iterates</i>	Endangered	Endangered

**Table 4-4 Threatened fauna potentially occurring in the project area.**

Common name	Scientific name	EPBC Act	TSC Act
Australian painted snipe	<i>Rostratula australis</i>	Vulnerable, Migratory	Endangered
Black bittern	<i>Ixobrychus flavivollis</i>	-	Vulnerable
Powerful owl	<i>Ninox strenua</i>	-	Vulnerable
Eastern grass owl	<i>Tyto longimembris</i>	-	Vulnerable
Masked owl	<i>Tyto novaehollandiae</i>	-	Vulnerable
Sooty owl	<i>Tyto tenebricosa</i>	-	Vulnerable
Barking owl	<i>Ninox connivens</i>	-	Vulnerable
Black-chinned honeyeater	<i>Melithreptus gularis gularis</i>	-	Vulnerable
Swift parrot	<i>Lathamus discolor</i>	Endangered, Migratory	Endangered
Regent honeyeater	<i>Zanthyomyza phrygia</i>	Endangered, Migratory	Endangered
Wompoo fruit-dove	<i>Ptilinopus magnificus</i>	-	Vulnerable
Superb fruit-dove	<i>Ptilinopus superbus</i>	-	Vulnerable
Rose-crowned fruit dove	<i>Ptilinopus regina</i>	-	Vulnerable
Grey-crowned babbler	<i>Pomatostomus temporalis temporalis</i>	-	Vulnerable
Little eagle	<i>Erythrorchis radiatus</i>	-	Vulnerable
Square-tailed kite	<i>Lophoictinia isura</i>	-	Vulnerable
Red goshawk	<i>Erythrorchis radiatus</i>	Vulnerable	Critically endangered
Little lorikeet	<i>Glossopsitta pusilla</i>	-	Vulnerable
Barred cuckoo-shrike	<i>Coracina lineata</i>	-	Vulnerable
Golden-tipped Bat	<i>Kerivoula papuensis</i>	-	Vulnerable
Eastern freetail-bat	<i>Mormopterus norfolkensis</i>	-	Vulnerable
Eastern long-eared bat	<i>Nyctophilus bifax</i>	-	Vulnerable
Yellow-bellied sheath-tail-bat	<i>Saccolaimus flaviventris</i>	-	Vulnerable
Greater broad-nosed bat	<i>Scoteanax rueppellii</i>	-	Vulnerable
Eastern cave bat	<i>Vespadelus troughtoni</i>	-	Vulnerable
Large-eared pied-bat	<i>Chalinolobus dwyeri</i>	Vulnerable	Vulnerable

Common name	Scientific name	EPBC Act	TSC Act
Beccari's freetail-bat	<i>Mormopterus beccari</i>		Vulnerable
Brush-tailed phascogale	<i>Phascogale tapoatafa</i>	-	Vulnerable
Koala	<i>Phascolarctos cinereus</i>	Vulnerable	Vulnerable
Eastern pygmy-possum	<i>Cercartetus nanus</i>	-	Vulnerable
Stephens' banded snake	<i>Hoplocephalus stephensii</i>	-	Vulnerable
Pale-headed snake	<i>Hoplocephalus bitorquatus</i>	-	Vulnerable
Purple-spotted gudgeon	<i>Mogurnda adspersa</i>	-	Endangered

#### 4.1.5 Aquatic fauna

Aquatic fauna species recorded in the project are listed in Table 4-5. No threatened or otherwise significant fish species were recorded in the project, despite recent targeted surveys.

**Table 4-5 Aquatic fauna**

Habitat	Species
<b>Freshwater</b> Arrawarra Gully, Corindi River, Cassons Creek, Redbank Creek, Dirty Creek, Dundoo Creek, Halfway Creek, Glenugie Creek, Wells Crossing,	16 freshwater fish species were recorded: olive perchlet, short-finned eel, long-finned eel, blue catfish, freshwater herring, striped gudgeon, empire gudgeon, fire tail gudgeon, carp gudgeon, dwarf flathead gudgeon, unidentified gobies, crimson-spotted rainbow fish, ornate rainbow fish, and freshwater catfish.  Four aquatic invertebrates were recorded: freshwater shrimp, freshwater yabbie, school prawn and greentailed prawn.  One introduced species, plague minnow, was recorded.

The fisheries habitat classification for each of the waterways referred to above is provided in Table 4-. The description of the fisheries habitat classes is as follows:

- Class 1 – major fish habitat: Major permanently or intermittently flowing waterway (e.g. river or major creek), habitat of a threatened fish species.
- Class 2 – moderate fish habitat: Named permanent or intermittent stream, creek or waterway with clearly defined bed and banks with semi-permanent to permanent waters in pools or in connected wetland areas. Marine or freshwater aquatic vegetation is present. Known fish habitat and/or fish observed inhabiting the area.
- Class 3 – minimal fish habitat: Named or unnamed waterway with intermittent flow and potential refuge, breeding or feeding areas for some aquatic fauna. Semi-permanent pools form within the waterway or adjacent wetlands after a rain event. Otherwise, any minor waterway that interconnects with wetlands or recognised aquatic habitats.
- Class 4 – unlikely fish habitat: Named or unnamed waterway with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or free standing water or pools after rain events.

**Table 4-6 Fisheries habitat classifications**

Waterway	Classification
Arrawarra Gully	Class 3
Corindi River	Class 1
Corindi River Floodplain	Class 3
Cassons Creek	Class 1
Redbank Creek and associated tributaries	Class 1
Dirty Creek	Class 3
Dundoo Creek	Class 3
Halfway Creek	Class 2

# Classification in accordance with NSW DPI Fisheries Guidelines

#### 4.1.6 Migratory species

A total of four EPBC Act listed migratory species were confirmed in the project area from field surveys (as described in Table 10-12 in the EIS and reproduced as Table 4-7). An additional 10 migratory species are predicted to occur in the study area..

**Table 4-7 Migratory fauna species confirmed or predicted within the project boundary**

Migratory species	EPBC Act	Preferred habitat	Presence
Eastern Osprey ( <i>Pandion haliaetus</i> )	Marine; Migratory (BONN)	Occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers.	Confirmed
Great Egret ( <i>Egretta alba</i> )	Marine; Migratory (CAMBA, JAMBA)	Prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands.	Predicted
Cattle Egret ( <i>Ardea ibis</i> )	Marine; Migratory (CAMBA, JAMBA)	Is found in grasslands, woodlands and wetlands particularly in coastal areas. It also uses pastures and croplands, especially where drainage is poor. Is often seen with cattle and other stock.	Confirmed
White-bellied Sea-Eagle ( <i>Haliaeetus leucogaster</i> )	Marine; Migratory (CAMBA)	Forages over large open fresh or saline waterbodies, coastal seas and open terrestrial areas (Higgins, 1999; Simpson & Day, 1999). Breeding habitat consists of tall trees, mangroves, cliffs, rocky outcrops, silts, caves and crevices and is located along the coast or major rivers. Breeding habitat is usually in or close to water, but may occur up to a kilometre away (Marchant & Higgins, 1993).	Confirmed
Satin Flycatcher ( <i>Myiagra cyanoleuca</i> )	Marine; Migratory (BONN)	Associated with drier eucalypt forests, absent from rainforests (Blakers et al., 1984), open forests, often at height (Simpson & Day, 1999).	Confirmed
White Throated Needletail ( <i>Hirundapus caudacutus</i> )	Marine; Migratory(CA MBA, JAMBA, ROKAMBA)	Forages aerially over a variety of habitats usually over coastal and mountain areas, most likely with a preference for wooded areas (Higgins, 1999; Simpson & Day,	Predicted

Migratory species	EPBC status	Act	Preferred habitat	Presence
			1999). Has been observed roosting in dense foliage of canopy trees, and may seek refuge in tree hollows in inclement weather (Higgins, 1999).	
Rainbow Bee-eater ( <i>Merops ornatus</i> )	Marine; Migratory (JAMBA)		Occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation (Higgins, 1999). Usually occurs in open, cleared or lightly-timbered areas, especially in arid or semi-arid areas, in riparian, floodplain or wetland vegetation assemblages (Woinarski et al., 1988).	Predicted
Swift Parrot ( <i>Lathamus discolor</i> )	Marine; Migratory; Endangered		Forages in swamp and open eucalypt forests, feeding on nectar and pollen of flowering tree species.	Predicted
Regent Honeyeater ( <i>Xanthomyza phrygia</i> )	Migratory (JAMBA); Endangered (as <i>Anthochaera phrygia</i> )		Forages in swamp and open eucalypt forests, feeding on nectar and pollen of flowering tree species.	Predicted
Black-faced Monarch ( <i>Monarcha melanopsis</i> )	Marine; Migratory (BONN)		Occurs in rainforest and eucalypt forests, feeding in tangled understorey (Blakers et al., 1984).	Predicted
Rufous Fantail ( <i>Rhipidura rufifrons</i> )	Marine; Migratory (BONN)		Frequents wet forests, less often open forests and woodlands (Simpson & Day, 1999). May occur in open woodland and forest habitats throughout the north coast region.	Predicted
Latham's Snipe ( <i>Gallinago harwickii</i> )	Marine; Migratory (CAMBA, JAMBA, ROKAMBA)		Occurs in permanent and ephemeral wetlands, usually inhabiting open, freshwater wetlands with low, dense vegetation (eg swamps, flooded grasslands or heathlands, around bogs and other water bodies) (Frith et al, 1977). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity (Frith et al, 1977)	Predicted
Australian Painted Snipe ( <i>Rostratula australis</i> )	Marine; Migratory (CAMBA)		Generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage treatment plants and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of <i>lignum Muehlenbeckia</i> or canegrass or sometimes tea-tree ( <i>Melaleuca</i> ).	Predicted
Spectacled Monarch ( <i>Monarcha trivirgatus</i> )	Marine; Migratory (BONN)		Occurs in rainforest and eucalypt forests, feeding in tangled understorey (Blakers et al., 1984).	Predicted

## 5 Environmental aspects and impacts

### 5.1 Construction activities

Key aspects of the project that could result in impacts to terrestrial and aquatic flora and fauna include:

- Clearing of native vegetation (including habitat).
- Works around and within watercourses.
- Noise & dust impacts.
- Disturbance of soils, consequential erosion and the mobilisation of sediment.
- Use of chemicals / fuels (potential for spills).

Refer also to the Aspects and Impacts Register included in Appendix A2 of the CEMP.

### 5.2 Ecological impacts

Likely and/or potential impacts associated with the project are discussed in Chapter 10 of the EIS and include:

- Loss of native vegetation including threatened flora and threatened ecological communities and their habitats.
- Loss of terrestrial, riparian and aquatic habitat for protected and threatened fauna.
- Direct mortality of protected and threatened fauna as a result construction works within the project boundary.
- Loss of connectivity for protected and threatened flora and fauna species and populations with the degradation of wildlife and habitat corridors.
- Fragmentation of terrestrial, arboreal and aquatic habitat and edge effects from road noise, light and wind turbulence.
- Potential impacts to groundwater dependent ecosystems and wetlands.
- Changes to water quality and alterations to natural hydrological flows.
- Invasion and spread of terrestrial and aquatic weeds and pest fauna species.
- Potential spread of disease pathogens.
- Introduction or increased exposure to key threatening processes that may affect terrestrial and aquatic species, populations, ecological communities and their habitat.
- Cumulative impacts in association with the Pacific Highway Upgrade Program.

Notwithstanding, mitigation and management measures provided in Table 6-1 aim to minimise the above likely and potential impacts on those threatened plant species identified in Table 4-1.

In the absence of appropriate mitigation measures, there is the potential for significant impacts on those threatened flora and fauna species identified in as occurring, or with the potential to occur, within the project corridor.

### 5.2.1 Pre-construction surveys

As per D26 (e) (i) pre construction surveys have been undertaken within all areas that are to be cleared as part of the project by RMS. The surveys have been undertaken by suitably qualified and experienced ecologists.

Pre-construction surveys consisted of targeted surveys for threatened species known or predicted to occur and which are likely to be affected by clearing of native vegetation.

In addition to detailed specifications in the various threatened species management plans (refer Appendices A-J) the pre-construction works will also consist of:

- A targeted survey for threatened fauna and demarcation of habitat containing threatened fauna shelter or nesting resources will be undertaken. The outcome of this assessment will be identification of exclusion zones where vegetation may be retained to protect threatened species habitat, identification of priority areas for targeted survey during clearing, and identification of vegetation that can be retained near the entry/exit to fauna crossings.
- A survey for threatened flora and demarcation on the ground and on a map of the extent of threatened flora populations. The location and extent of threatened flora populations has already been determined and pre-construction surveys would seek to verify population boundaries.
- Demarcation of all habitat trees, including known and potential hollow bearing trees (HBT), trees with nests, dreys and termitaria likely to be occupied by fauna and key habitat resources such as hollow logs or large rocks at least 7 days prior to the commencement of clearing.
- In consultation with EPA, identification of approved location for release of any fauna captured during the survey.
- Recommendations on additional survey requirements.
- A check to ensure exclusion zones have been delineated and any biodiversity assets to be retained are marked.
- A check to ensure temporary fencing is in place on the construction boundary prior to clearing commencing.
- Implement bat roost exclusion at drainage structures being replaced or extended (i.e. structures 46, 49, 25, & Halfway Creek bridge). Timing of exclusion restricted to between late Aug – early Oct or mid Apr – end May to avoid breeding and over-wintering periods for microbats. Roost exclusion not to occur during forecast periods of heavy rain. The integrity of exclusion device and nearby bat boxes should be inspected the day after exclusion occurs.
- Undertake checks for microbats prior to works on each drainage structure as described in Table 3-5 of Microbat Management Plan (Appendix I).
- Identify areas that may be used as a movement corridor by threatened fauna and determine if temporary exclusion fence is necessary.
- Install temporary exclusion fencing at all threatened frog habitats five days before commencement of clearing. Targeted frog surveys required prior to installation and supervision by ecologist during installation.
- Install 70% of nest boxes prior to or during the clearing phase. Install the remaining 30% after clearing.
- Baseline noxious weed surveys would be carried out at least four weeks prior to commencement of clearing operations and the Noxious Weed and Pathogen Plan (Appendix O) updated.

Targeted surveys for threatened plants have been completed and pre-construction surveys would be limited to defining the boundaries of populations for exclusion fence installation. Translocation of five threatened flora species, *Arthraxon hispidus*, *Quassia* sp. Moonee Creek, *Lindernia alsinoides*, *Lindsaea incisa* and *Eleocharis tetraquetra* will be undertaken. Preparation of receiving sites to commence in January 2015. Collection of seed and plant material for *Lindernia alsinoides* to commence in February 2015 and March 2015 for the remaining threatened flora species. Refer to the Translocation Strategy for timing and duration of other translocation actions including nursery growing-on schedules, transplanting of seedlings and habitat maintenance schedules.

The outcome of these surveys will be documented by the Project Ecologist. Similarly, the SAPs will be updated following pre-construction surveys and distributed to the project team.

## 5.2.2 Pre-Clearing Surveys

Clearing will be undertaken using the 'two stage process', specifically -

### Stage 1 - Non Habitat Tree Removal

When vegetation, that may provide habitat for native fauna, is proposed to be removed the area shall be surveyed immediately (proceeding night & day of clearing) prior to clearing, to:

- obtain updated information on fauna and fauna habitat resources present; and
- capture and relocate non-mobile fauna, such as reptiles and frogs and key habitat features such as active bird nests

### Stage 2 – Habitat Tree Removal

Habitat trees (HBT) shall be retained for 48 hours, or two nights, after stage 1 clearing is completed. HBT would be felled carefully using a harvester with a rotating head or a bulldozer. Importantly, the equipment used to fell trees must be appropriately sized to handle the majority of trees on-site and the operator skilled in removing habitat trees and the two-stage clearing procedure. The ecologist will discuss the method of felling (i.e. orientation, equipment etc) with the operator to ensure there is a balance between operator safety and animal welfare. Once felled, HBT would be inspected carefully by a team of two ecologists (or ecologist & wildlife carer) and fauna would be captured, processed and, if healthy, relocated. Injured fauna would be taken to a local vet for treatment. Further details on this procedure are provided in Appendix M.

In some circumstances (i.e. threatened frog habitats, glider and koala habitat) targeted surveys will be undertaken in the night/s preceding clearing. Surveys will involve a combination of nocturnal active searches (spotlighting), call playback and trapping. The Threatened Frog Management Plan (Appendix D) includes specific details on pre-clearing and clearing survey requirements for relevant threatened frog species, including:

- nocturnal surveys during suitable weather conditions;
- dip-netting for tadpoles; and
- diurnal active searches.

Relocation of threatened frogs would be undertaken only after temporary frog exclusion fence has been installed.

In addition to the capture and relocation of fauna important habitat features such as hollow logs and limbs and large rocks will be placed outside the LoC to provide supplementary habitat. The placement of material would consider the location of threatened flora.



All fauna that can be physically captured during targeted works (i.e. active searches) will be relocated into areas of suitable habitat adjacent to the project site (i.e. adjacent to the LoC). The Koala Management Plan (Appendix G) specifies that: an ecologist/wildlife carer must be present during vegetation clearing and habitat removal activities to redirect koalas that may be encountered and CoA B5 states “All clearance of Koala habitat trees is to be undertaken in the presence of a Koala spotter”. The Threatened Glider Management Plan (Appendix H) states that an ecologist should be present during all vegetation clearing and habitat removal activities. The Threatened Mammal Management Plan (Appendix F) states that an ecologist should be on-site during all clearing activities to capture and relocate fauna and that trapping may be required.

Records will be kept of all pre-clearing surveys and for each habitat tree removed. Data collected on captured fauna will include; species, number of individuals, sex, age and general health or type of feature relocated. Further detail on this procedure is provided in the Fauna Handling and Rescue Procedure (Appendix M). Records will be kept on fauna mortality, injury, treatment and release sites as per standard protocols.

Fauna capture and handling would follow accepted procedures and be in accordance with licence conditions, Animal Care and Ethics Committee Approvals and relevant Codes of Practice (e.g. NSW Code of Practice for Injured, Sick and Orphaned Protected Fauna (EPA 2011)). Release sites would be identified prior to the commencement of clearing in a specific area and, if necessary, appropriate property access arranged. Fauna would be released into areas of suitable habitat as close as possible to their point of capture. Hollow dependent arboreal mammals will be released into a temporary nest box, whilst other species will be released in areas where there is refuge habitat appropriate for their ecological requirements. In the event that a koala is recorded the sequential vegetation clearing procedure detailed in section 5.3.5 of the Koala Management Plan will be followed.

#### **5.2.4 Nest Boxes**

Nest boxes would be installed in accordance with the Nest Box Management Plan (Appendix A). The distribution of nest boxes as agreed with EPA & RMS will be determined in the field by the project ecologist and provided to EPA & RMS once completed. This information will be then provided to Department of Planning by RMS.

## **6 Environmental mitigation and management measures**

### **6.1 Flora and fauna mitigation and management measures**

A range of environmental requirements and control measures are identified in the various environmental documents, including additional mitigation measures included in the Submission / Preferred Infrastructure Report (November 2013), the Conditions of Approval and relevant RMS documents. Specific measures and requirements to address impacts on flora and fauna are outlined in Table 6-1.

### **6.2 Biodiversity offsets**

Biodiversity offsets are proposed as required by CoA D3, D4 and D5. These are documented separately in the Biodiversity Offset Strategy, prepared and coordinated by RMS.

**Table 6-1 Flora and fauna management and mitigation measures**

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
<b>GENERAL</b>					
FF1	Training will be provided to all project personnel, including relevant sub-contractors on flora and fauna requirements from this plan through inductions, toolboxes and targeted training. Flora and fauna training requirements will be as per Section 7.1 of this plan.	Training resources such as threatened species fact sheets.	Pre-construction / Construction	Environment Manager	Good practice
FF2	Any works required outside the construction footprint will be referred to the Environment Manager for advice on further assessment and approval requirements in accordance with Section 3.7 of the CEMP.		Construction	Project / Site Engineers / Environment Manager	Good practice
FF3	In the event that threatened species or endangered ecological communities are unexpectedly identified during construction the Unexpected Threatened Species /EECs Finds Procedure (Appendix N) will be followed.		Construction	Environment Manager	Good practice
FF4	A project ecologist will be appointed prior to the commencement of construction		Pre-construction	Environment Manager	Good practice
FF5	The Biodiversity Offset Strategy (Appendix Q) will be implemented once approval has been obtained.		Pre-construction	Environment Manager	Submissions/PIR (B55)
FF6	The threatened species management plans will be finalised in consultation with the relevant State and Federal government agencies.		Pre-Construction / Construction	RMS	Submissions/PIR (B11)
<b>VEGETATION CLEARING, PROTECTION AND MANAGEMENT</b>					
FF7	The clearing of native vegetation shall be minimised with the objective of reducing impacts to any threatened species or EECs where feasible and reasonable. Where feasible and reasonable, remnant vegetation shall be retained between the SSI boundary and the SSI footprint.		Pre-construction / Construction	Project / Site Engineers / Environment Manager	Submissions/PIR (B13) CoA B1
FF8	The pre-clearing process will be consistent with RMS Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA projects (RTA, 2011) <a href="http://www.rms.nsw.gov.au/documents/about/environment/biodiversity">http://www.rms.nsw.gov.au/documents/about/environment/biodiversity</a>		Pre-construction / Construction	Project / Site Engineers / Foreman / Environment	Submissions/PIR (B23)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	<a href="#">guidelines.pdf</a> and follow the Pre-Clearing Checklist (Appendix K).			Manager	
FF9	To prevent injury and mortality of fauna during the clearing of vegetation and drainage of farm dams or temporary realignment of waterways an experienced and licensed wildlife carer and/or ecologist will be present to supervise vegetation clearing and capture and relocate fauna where required. Further details are provided in the Fauna Handling and Rescue Procedure (Appendix M).		Construction	Environment Manager	Submissions/PIR (B32)
FF10	Protective fencing to mark the limits of clearing (i.e. 'no-go' areas) surrounding the construction footprint will be installed and routinely inspected. The limits of clearing will be consistent with those verified in accordance with G40 2.4. The limits of clearing will be marked in accordance with the RMS Biodiversity Guidelines.	RMS Biodiversity Guidelines RMS Practice Note: Clearing and Fauna Management – Pacific Highway Projects (May 2012)	Pre-construction / Construction	Project / Site Engineers / Foreman / Environment Manager	G36 (Section 4) G40 (Section 2.4)
FF11	Fauna exclusion fencing locations and design will be further developed in accordance with the design principles outlined in the Connectivity Strategy in Appendix A of the Working paper – Biodiversity.		Pre-construction and construction		Submissions/PIR (B5)
FF12	Tree height surveys will be conducted at proposed arboreal crossing zones to determine the most appropriate location to place rope or pole structures. Where feasible, the design will place arboreal crossing zones where average tree heights exceed 20 metres, and/ or taller trees are able to be safely retained close to the road edge.		Pre-construction	Environment Manager / Ecologist	Submissions/PIR (B7)
FF13	The design and construction of fauna exclusion fencing, permanent & temporary fencing, drainage or fauna underpass structures in widened medians will minimise clearing where possible.		Pre-construction and construction		Submissions/PIR (B8)
FF14	Where feasible and reasonable, native vegetation forming part of the identified widened medians will not be disturbed for any ancillary construction purpose including access tracks, stockpiles, materials laydown and ancillary facilities.		Construction		Submissions/PIR (B9)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
FF15	Weeds will be managed in accordance with the Noxious Weed and Management Plan (Appendix O).		Construction	Project / Site Engineers / Foreman / Environment Manager	G36 (Section4) Submissions/PIR (B27)
FF16	A site assessment by an ecologist or person trained in weed identification will be undertaken to identify the presence and extent of Alligator weed. If present, management measures in the Weed Management Plan will be in accordance with the Department of Primary Industries Alligator Weed control manual (van Oosterhout, 2007).		Pre-construction		Submissions/PIR (B28)
FF17	The Urban Design and Landscape Management Plan (CoA D20) in Appendix P will be implemented.		Construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B12)
FF18	Prior to construction, pre clearing surveys and inspections for endangered and threatened species shall be undertaken. The surveys and inspections, and any subsequent relocation of species, shall be undertaken under the guidance of a qualified ecologist.  Incidental or unanticipated threatened flora and fauna finds shall be immediately reported and clearing work stopped to allow for an evaluation of an appropriate response (refer Appendix N)		Pre-construction / Construction	Project / Site Engineers / Foreman / Environment Manager	CoA B5, CoA B6
FF19	Native vegetation shall be established in or adjacent to disturbed areas within the SSI boundary to provide habitat for wildlife following the completion of construction in the vicinity of the disturbed area, consistent with the Urban Design and Landscape Plan.		Construction	Project / Site Engineers / Foreman / Environment Manager	CoA B3
<b>THREATENED FLORA</b>					
FF20	The measures identified in the Threatened Flora Management Plan (Appendix B) will be implemented.		As specified	Environment Manager	Submissions/PIR (B11)
FF21	The project boundary in Section 1 will be reviewed to identify any opportunities to avoid significant impacts to the existing population of the Slender Screw Fern. The project boundary and placement of sedimentation basins will be evaluated to minimise impacts to Slender		Pre-construction	Environment Manager	Submissions/PIR (B53 and B54)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	Screw Fern and native vegetation.				
FF22	Detailed design will investigate measures to reduce impacts to <i>Maundia triglochinos</i> : <ul style="list-style-type: none"> <li>Near Redbank Creek (population 14).</li> </ul>		Pre-construction	Environment Manager	Submissions/PIR (B61)
FF23	All clearance of Koala habitat trees is to be undertaken in the presence of a Koala spotter.		Pre-construction / Construction	Environment Manager	CoA B5
<b>THREATENED FAUNA</b>					
FF24	The Nest Box Plan (Appendix A) will be implemented.		Pre-construction As specified	Environment Manager	Submissions/PIR (B31)
FF25	The measures identified in the Threatened Frog Management Plan (Appendix D) will be implemented.		Pre-construction As specified	Environment Manager	Submissions/PIR (B11)
FF26	The measures identified in the Koala Management Plan (Appendix G) will be implemented.		Pre-construction As specified	Environment Manager	Submissions/PIR (B11)
FF27	The measures identified in the Threatened Mammal Management Plan (Appendix F) will be implemented.		Pre-construction As specified	Environment Manager	Submissions/PIR (B11)
FF28	The measures identified in the Microbat Management Plan (Appendix I) will be implemented.		Pre-construction As specified	Environment Manager	Submissions/PIR (B11)
FF29	The measures identified in the Threatened Glider Management Plan (Appendix H) will be implemented.		Pre-construction As specified	Environment Manager	Submissions/PIR (B11)
<b>FAUNA HABITATS AND CONNECTIVITY</b>					
FF30	The Connectivity Strategy (Appendix C) will be implemented.		Pre-construction	Environment Manager / Foreman	Submissions/PIR (B2, B3 and B4)
FF31	The location of exclusion zones will be identified, with temporary fencing or flagging tape to indicate the limits of clearing (in accordance		Pre Construction	Environment Manager /	Submissions/PIR

Pacific Highway Upgrade – Woolgoolga to Halfway Creek

**Construction Flora and Fauna Management Plan**

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	with the RMS Biodiversity Guidelines (RTA, 2011a)). Permanent fauna exclusion fencing for the project (as described in the Connectivity Strategy), where reasonable and feasible, will be installed prior to clearing.		& Construction	Foreman	(B24)
FF32	<p>A staged habitat removal process will be implemented consistent with the RMS Biodiversity Guidelines (RTA, 2011) and involve the following steps:</p> <ul style="list-style-type: none"> <li>• Contact vet and/or wildlife carers to ensure they are willing to assist in treating injured animals if necessary</li> <li>• An experienced and licensed wildlife carer and/or ecologist will be present during all habitat removal activities to capture and relocate any encountered fauna</li> <li>• Remove non-habitat vegetation first</li> <li>• Identified habitat (eg hollow-bearing trees) will be left for at least 48 hours after removing non-habitat vegetation to allow fauna to escape.</li> <li>• Remove habitat trees as carefully as possible to avoid injury to any fauna still remaining in trees.</li> <li>• An experienced and licensed wildlife carer and/or ecologist will inspect habitat once it is removed.</li> <li>• All hollows will be placed in adjacent habitat until the following day for further inspection by a licensed wildlife carer and/or ecologist to verify no fauna is present. If possible, the hollows will be permanently relocated in adjacent areas in accordance with the RMS Biodiversity Guidelines (RTA, 2011).</li> <li>• Outcomes of the clearing process will be recorded to relevant personnel (eg environment manager or RMS regional environment staff).</li> </ul>		Construction	Environment Manager / Foreman	Submissions/PIR (B25)
FF33	Woody debris and bushrock will be re-used on site for habitat improvement where possible as detailed in the Landscape Management Plan (Appendix Q) and the Roads and Maritime Biodiversity Guidelines (RTA 2011)		Construction	Environment Manager / Foreman	Submissions/PIR (B26)
<b>AQUATIC HABITATS</b>					
FF34	Prior to any disturbance of waterway banks, a thorough inspection by a		Construction	Environment	Submissions/PIR

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	qualified ecologist will be undertaken for aquatic fauna such as turtle nests.			Manager	(B33)
FF35	Streams to be crossed perpendicular to flow and where possible crossing sites selected to avoid unstable banks, bends in the channel, deep pools and confluences with other channels		Pre-construction	Design Manager	Submissions/PIR (B34)
FF36	The bed and banks are to be reinstated to a condition similar to or better than the original condition ensuring that there are no adverse impacts on the aquatic values (different measures may be required for each crossing) and where feasible and reasonable, avoid impacts on geomorphic processes.		Construction	Environment Manager	Submissions/PIR (B35)
FF37	All construction materials used for permanent watercourse crossings (rocks and gravel) are to be free of fine particles to minimise turbidity.		Construction	Environment Manager	Submissions/PIR (B36)
FF38	Instream and riparian disturbance will be minimised and sediment, woody snags or debris will be relocated and only removed from a stream or stream channel as a last resort. Trimming or 'lopping' of branches and logs will be considered as a first option before moving.		Construction	Environment Manager / Foreman	Submissions/PIR (B37)
FF39	The contractor shall minimise riparian vegetation clearing and undertake a targeted rehabilitation program post construction to restore in-stream and riparian habitat to at least the pre-construction condition or better, unless otherwise agreed by DPI (Fisheries NSW).		Construction	Environment Manager / Foreman	CoA B13
FF40	Any instream woody debris removed during construction will be replaced at the completion of the works within the same waterways from which it was removed.		Construction	Environment Manager	Submissions/PIR (B38)
FF41	Appropriate plant species will be incorporated into the rehabilitation of disturbed aquatic habitats and drains disturbed as a result of construction.		Construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B40)
FF42	All sediment and erosion control measures will be put in place during the construction process and may include sediment and erosion control curtains in the waterways to control turbidity generated during the construction and restoration process.		Construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B41)
FF43	No turbid water generated from the construction corridor or construction area is to be discharged to any waterway unless in accordance with relevant Environment Protection Licence conditions and developed in		Construction	Environment Manager	Submissions/PIR (B42)



ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	consultation with Environment Protection Agency and Department of Primary Industries (Fisheries).				
FF44	Fish that become stranded due to temporary access crossings or construction of temporary or permanent creek diversions must be captured and translocated following the DPI Fisheries Guidelines – A Guide to Acceptable Procedures and Practices for Aquaculture and Fisheries Research. All fish salvage and translocation would be undertaken by an aquatic ecologist.		Construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B22)
<b>PESTS AND DISEASES</b>					
FF45	Measures to prevent the introduction and/or spread of pests and disease causing agents such as bacteria and fungi will be implemented in accordance with the RMS Biodiversity Guidelines (RTA, 2011) and include: <ul style="list-style-type: none"> <li>• A background search of government-maintained websites for the most up-to-date hygiene protocols for each pathogen</li> <li>• Provide vehicle and boot wash down facilities and ensure vehicles and footwear is free of soil before entering or exiting the site</li> <li>• The risk of spreading pathogens and the mitigation measures required on site should be regularly communicated to staff and contractors during inductions and toolbox talks</li> <li>• Construction works will be programmed to move from uninfected areas to any known infected areas</li> <li>• Restrict vehicles to designated tracks, trails and parking areas</li> <li>• A Noxious Weed and Pathogen Management Plan (Appendix O) has been prepared to manage pests and diseases within the site.</li> </ul>		Pre-construction / Construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B29) G36 4.17
FF46	If pathogens are identified on site: <ul style="list-style-type: none"> <li>• Testing may be required to confirm the presence of pathogens</li> <li>• Advice from government departments will be sought on practical hygiene management measures</li> <li>• Fenced exclusion zones will be identified to restrict access into contaminated areas.</li> </ul>		Construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B30) G36 4.17
<b>BRIDGE AND CULVERT DESIGN</b>					

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
FF47	Instream structures such as bridges and culverts are to be designed and managed to minimise any potential impact to flow regimes and fish passage, in accordance with Fairfull and Witheridge (2003). Use of bridges or bebo arch is the preferred structure for Class 1 (major fish habitat) waterways.		Pre-construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B14)
FF48	During detailed design, the waterway class will be confirmed and the design will be reviewed to include appropriate crossing structures for the relevant waterway class		Pre-construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B15)
FF49	<p>Each permanent waterway crossing is to be designed to ensure no physical, hydraulic and behavioural barriers to aquatic fauna movements. Impacts would be minimised by ensuring that:</p> <ul style="list-style-type: none"> <li>• The natural stream flow and velocity are maintained as closely as possible</li> <li>• Surface level of any causeway is the same or lower than the natural stream bed to reduce interference with flow</li> <li>• Habitat within a culvert is as natural as possible (eg allow rock and bed materials to infill the culvert base)</li> <li>• There is the maximum light penetration</li> <li>• Fauna and fish passage standards are maintained, as detailed in the Connectivity Strategy, including minimum design widths, including for natural banks, while also providing for scour protection and cut and fill batters</li> <li>• Creek crossing structures would be designed to maximise habitat features within the passage. To achieve this, the design of bridge and culverts would encourage the deposition of sediment creating similar bed substrate to adjacent creek and the planning of specific plant species</li> <li>• Pools would be constructed or retained upstream and downstream of the waterway crossings to provide resting and refuge habitat near the crossing structures</li> </ul>		Pre-construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B17)
FF50	<p>Bridge structures would be designed in light of the following principles:</p> <ul style="list-style-type: none"> <li>• Bridges are to be single span bridges with piers located outside the</li> </ul>		Pre-construction	Project / Site Engineers / Foreman /	Submissions/PIR (B18)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	<p>main channel</p> <ul style="list-style-type: none"> <li>• Bridge structures to be designed to prevent an increase of backup of water during times of flood that would enable Plague Minnow to access waterbodies where they are currently not found.</li> </ul>			Environment Manager	
<b>TEMPORARY AND PERMANENT WATERWAY DIVERSIONS / CROSSINGS</b>					
FF51	Where temporary access tracks are required over drainage lines with no flow, fords may be installed.		Construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B19)
FF52	Where possible, existing crossings would be used. Where this is not feasible or reasonable, the temporary crossings would be designed to minimise impacts on the existing aquatic ecology and water quality.		Construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B20)
FF53	<p>General temporary waterway access track mitigation measures would be undertaken:</p> <ul style="list-style-type: none"> <li>• Temporary crossings would be constructed from clean fill using pipe or box culvert cells to carry flows.</li> <li>• All temporary works (eg crossings, flow diversion barriers) would be removed as soon as practicable and in a way that does not promote future channel erosion.</li> <li>• The preferred temporary structure for crossing waterways would be consistent with Witheridge (2002) where the use of bridges is the preferred structure for Class 1 (major fish habitat waterways).</li> <li>• Scour protection works would be established at temporary crossings as required</li> <li>• At the completion of construction, the temporary crossings would be removed and rehabilitated.</li> </ul>		Construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B21) CoA B8
<b>WATER QUALITY</b>					
FF54	Operational spill basins are to be installed at key locations ie near key drainage lines that lead directly into threatened fish habitat, or protected areas, ie Solitary Islands Marine Park.		Construction / Operation	Project / Site Engineers / Foreman / Environment	Submissions/PIR (B44)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
				Manager	
FF55	Chemicals and fuels would be appropriately stored and bunded, away from waterways and drainage lines.		Construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B45)
FF56	Water quality monitoring will be undertaken to assess the effectiveness of (and where necessary amend) water, sediment and erosion management strategies that aim to protect native fish species, their habitat and other aquatic flora and fauna species. Water quality monitoring program be undertaken in line with details in Appendix B of the Working paper – Biodiversity.		Construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B47)
<b>STOCKPILE AND ANCILLARY FACILITIES MANAGEMENT</b>					
FF57	Where feasible and reasonable, stockpiles will be located above the 1:100 year flood level with appropriate management control measures in place such as bunding.		Construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B48)
FF58	Ancillary facilities will be located in cleared or sparsely treed portions of the ancillary facility sites, and avoid unnecessary clearing of native vegetation.		Pre-construction / Construction	Project / Site Engineers / Foreman / Environment Manager	Submissions/PIR (B51)

# 7 Compliance management

## 7.1 Roles and responsibilities

The Project Team's organisational structure and overall roles and responsibilities are outlined in Section 4.2 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Chapter 6 of this Plan.

## 7.2 Training

All employees, contractors and utility staff working on site will undergo site induction training relating to flora and fauna management issues. The induction training will address elements related to flora and fauna management including:

- Existence and requirements of this sub-plan.
- Relevant legislation.
- Specific species likely to be affected by the construction works and how these species can be recognised.
- Mulch stockpile location and management measures.
- Fauna rescue requirements.
- Weed control measures.
- Pathogen management.
- General flora and fauna management measures.
- Specific responsibilities for the protection of flora and fauna.

Further details regarding staff induction and training are outlined in Chapter 5 of the CEMP.

## 7.3 Monitoring and inspections

Inspections of sensitive areas and activities with the potential to impact flora and fauna will occur for the duration of the project.

Monitoring of in-situ threatened plant populations is to be undertaken twice per year (during autumn and spring) during construction. Monitoring of translocated flora populations is to commence in June 2015. Monitoring is to be conducted:

- every three months during the first year of construction;
- every six months during the second year of construction; and
- every 12 months thereafter for a minimum of five years post-construction (ie. approximately eight years in total).

A monitoring report is to be prepared and submitted to EPA annually. A copy will also be provided to Department of the Environment, and Department of Planning and Environment. All monitoring and reporting is to be independently overseen by the project ecologist.

Requirements and responsibilities in relation to monitoring and inspections are documented in Section 8.2 of the CEMP.

## 7.4 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this plan, CoA and other relevant approvals, licenses and guidelines.

Audit requirements are detailed in Section 8.4 of the CEMP.

## 7.5 Reporting

Reporting requirements and responsibilities are documented in Section 8.4 of the CEMP. There are specific reporting requirements associated with additional survey work and monitoring including:

- *Results of pre-clearing surveys.*
- *Threatened Species Management Plans.*
- *Nest Box Plan.*

An Ecological Monitoring Program will assess and report on the effectiveness of mitigation measures implemented as part of the project. Details of the Ecological Monitoring Program are included in Appendix D of this Plan.

## **8 Review and improvement**

### **8.1 Continuous improvement**

Continuous improvement of this plan will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance.
- Determine the cause or causes of non-conformances and deficiencies.
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies.
- Verify the effectiveness of the corrective and preventative actions.
- Document any changes in procedures resulting from process improvement.
- Make comparisons with objectives and targets.

### **8.2 FFMP update and amendment**

The processes described in Chapter 8 and Chapter 9 of the CEMP may result in the need to update or revise this Plan. This will occur as needed.

Any revisions to the FFMP will be in accordance with the process outlined in Section 1.6 of the CEMP.

A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure – refer to Section 10.2 of the CEMP.

# **Appendix A**

## Nest Box Plan



**Appendix B**  
Threatened Flora Management Plan

## **Appendix C**

### Connectivity Strategy

**Appendix D**  
Threatened Frog Management Plan

**Appendix E**  
Rainforest Invertebrates Management Plan

**Appendix F**  
Threatened Mammal Management Plan

**Appendix G**  
Koala Management Plan

**Appendix H**  
Glider Management Plan

**Appendix I**  
Microbat Management Plan



**Appendix J**  
Lowland Rainforest Management Plan

# **Appendix K**

## **Pre Clearing Checklist**

Note – this is an example and is subject to change based on the work environment.

## Pre-Clearing & Ground Disturbance Checklist and Permit to Clear

<b>Project: Woolgoolga to Halfway Creek</b>			<b>Inspection Date:</b>	
Note: <i>Checklist</i> to be submitted to JV Environmental Manager 2 days prior to clearing commencement. Clearing must not commence in any part of the area until this vegetation clearing permit has been approved.				
<b>VEGETATION CLEARING LOCATIONS – ATTACH DRAWINGS / SKETCHES / MAPS</b>				
<b>Ch. From</b>		<b>Ch. To</b>		<b>Location</b>
<b>#</b>	<b>Control Measures</b>			<b>Yes / No / N/A</b>
1	Has the limit of clearing been established by the Survey Team?			
2	Has the limit of clearing been clearly marked with markers being no further apart than 15m and ensuring each marker can be seen from the next? Continuous flagging must be in place – no works to proceed unless in place.			
3	Is protective fencing installed around threatened ecological communities, heritage sites / items and vegetation to be retained?			
4	Has topsoil in areas containing threatened species been marked for special treatment?			
5	Has weed eradication been carried out where appropriate?			
6	Have areas of weed-infected topsoil been identified?			
7	Have all pre construction surveys been completed, including habitat trees been identified, marked and clearing exclusion zone established?			
8	Have the trees to be salvaged for milling or re-snagging been identified and marked onsite with the RMS representative (for the construction site) and the relevant environmental authority?			
9	Have timber storage sites been identified and prepared within the construction boundary for bridge timber storage for RMS and log storage for Forests NSW?			
10	Has the mulching and chipping plant been established for timber that is unsuitable or not required for milling / re-snagging or Coarse Woody Debris (CWD)?			
11	Have all residents with the potential to be disturbed been advised at least five (5) days prior to clearing vegetation? Has 'Permission to Enter' been obtained, where access to private property is required?			
12	Have the relevant construction personnel been briefed with regards to 2 stage clearing and any area specific issues?			
13	Have boundary limits been established and clearly marked at 15m from rivers, creeks, watercourses and drainage lines to indicate to the clearing contractors where to stop clearing			
14	Have the limit of Clearing and Grubbing at proposed fauna crossings being minimised. Native vegetation in these areas must be retained wherever possible to maintain corridors for fauna movement.			
15	If near a creek or waterway crossing, ensure that the riparian zone is managed in accordance with Table 6.1 Flora and Fauna Management and Mitigation Measures.			
16	Have sediment control measures been installed before clearing as required by the Construction Soil, Water Quality and Hydrology Management Plan?			
17	Has the Project ecologist been notified and scheduled to undertake pre-clearance and clearance activities? Have fauna release sites been identified (refer to Appendix H Fauna Handling and Rescue			

	Procedure)?		
18	Is a copy of Appendix N Fauna Handling and Rescue Procedure available?		
19	Have Nest boxes been installed outside the clearing zone to off-set the habitat removed during the clearing (in accordance with Appendix A Nest Box Plan)?		
20	Has translocation of species occurred?		
21	Has seed collection occurred?		
Comments:			

**Completed by:** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Zone Manager Name:** \_\_\_\_\_

**Zone Manager Signature:** \_\_\_\_\_

**I have reviewed the pre-clearing checklist and all measures have been implemented as required. The clearing between the above mentioned chainages may proceed in accordance with this procedure.**

**HOLD POINT**

**Environmental Manager Name:** \_\_\_\_\_

**Environmental Manager Signature:** \_\_\_\_\_

# **Appendix L**

## Working around trees guideline

# Working around Trees Guideline

## Background / Purpose

Many of the works undertaken by the Woolgoolga to Halfway Creek Project involve works near vegetation, in particular for the construction of drainage. Damage to trees and roots from excavation or material / equipment storage can cause declining tree health leading to structural instability. Damage can also result in an increased risk to worker and public safety from unstable trees and possible fines for the JV and subcontractors.

This guideline has been prepared to provide Contractors and JV personnel with an easy to use guide to the minimum requirements of working around trees.

## Guideline

### **General**

All project personnel are required to be inducted on the location of environmental exclusion zones, the associated fencing / signage delineating these areas and the relevant actions for them with regards to this guideline during the Project induction, SWMS and regular toolbox talks.

For trees identified on the constraints maps as being either part of a threatened community, habitat trees to be retained, trees with heritage value or are of local importance, the JV environmental and construction personnel are to ensure exclusion fencing is installed and maintained to ensure no impact to trees.

For any issues regarding works around trees that cannot be resolved by following this guideline contact the Environment Officer (EO) as early on as possible.

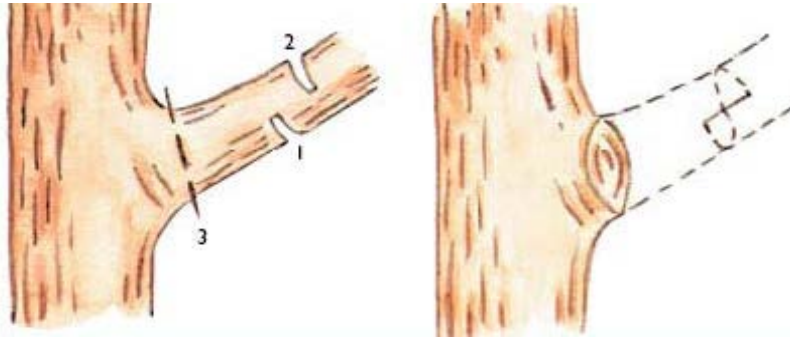
### **General Construction Near Trees**

For all works to be undertaken near vegetation to be retained, the following points should be observed:

1. Prior to using an excavator or other machinery around trees, ensure damage to trunks, roots and branches is avoided by observing their location. Damage to tree trunks may result in future decay.
2. The EO should confirm with the arborist that the tree (or other vegetation type) is not heritage listed, a habitat tree nominated for retention or protected under relevant legislation and is legally able to be removed and/or trimmed.
3. If trimming is required report to the JV Foreman or EO who will engage the Arborist and refer to Figure 1 below for management.
4. Report any tree damage to the JV Foreman or EO. Quick remedial action can usually prevent long term damage to the tree.

### **Lopping/Pruning Trees**

Heavy machinery should not be used for pruning or trimming. The Arborist will be contacted to ensure works are conducted in compliance with Australian Standard AS 4373 (1996), "Pruning of Amenity Trees" and the Work Cover "Code of Practice for the Amenity Tree Industry" (1998). Appropriate tools to use are loppers, chain saws and vehicle mounted saws. In the first instance, limbs bearing hollows should be retained. If this is not possible the hollow bearing limb should be inspected by the Project Ecologist and placed in adjacent un-disturbed vegetation to provide fauna habitat. The three cut method shown below in Figure 1.



1; The under cut. 2; The upper cut to remove the branch 3; The final trim cut.

**Figure 1 Three cut method**

### Excavations Near Trees

Some construction works, particularly drainage, may be designed within close proximity to vegetation planned to be retained. To ensure roots are not damaged in a way that could detrimentally affect tree health, the following points should be observed:

1. Where possible, redesign drainage to avoid impact within the drip lines of retained vegetation;
2. Excavation with machinery should occur outside the drip line of trees where possible. Refer to Diagram 1 for an explanation of tree drip line and root zones
3. For necessary works within the drip line of trees and the Critical Root Zone (CRZ), the following techniques should be utilised:
  - Hand Trenching / Excavation to avoid machinery damage to roots;
  - Under Boring if underground pipes are to be installed (NB the location of under bore pits to be outside the drip line of trees (Primary Root Zone) and avoid roots greater than 50mm). A minimum 600mm depth must be kept for all boring under trees; and
4. For all excavations near trees, proceed with caution and monitor for roots greater than 50mm in diameter. Roots greater than 50mm must not be damaged unless approved by the Environment Officer following consultation with the Arborist. Larger roots may need to be cut by the Arborist.

<p><b>Figure 2:</b> Excavation into the CRZ resulting in major roots being cut. This may result in the tree falling over.</p>	<p><b>Figure 3:</b> Damage to CRZ has been minimised by shaping the drainage around the CRZ.</p>

NOTE: Damage to woody roots >50mm may make trees unstable and they can fall over.

### Tree Removal or Trimming Process

Some construction works will require tree removal or trimming that has not been included in the design. Where additional impacts to trees are proposed, the following process should be followed:

1. The JV Foreman should notify the EO of the location and need for the tree impact;
2. The EO should confirm that the tree (or other vegetation type) is not heritage listed, a habitat tree nominated for retention or protected under relevant legislation and is legally able to be removed and/or trimmed.
3. The EO should notify the Arborist for advice on management options and where possible take and send photos or organise a site visit;
4. The EO should notify the RMS Environmental Officer of the works which may require a site visit;
5. If the tree is to be removed or trimmed, the EO will contact the Arborist to undertake the removal or trimming of the tree(s) as required;
6. JV Foreman should await confirmation from the EO prior to re-commencing works around the tree(s).

### Site Material Storage

The storage of soils/material under trees can compact soil, limit water and oxygen uptake, damage roots and cause tree death. Therefore prior to the commencement of works near trees, the JV Foreman or other construction personnel should determine areas where machinery, materials and equipment can be stored that are outside the drip line of trees.



**Figure 4:** Spoil stored within the drip line of trees.



**Figure 5:** Tree protected via fencing with no materials stored within the drip line.



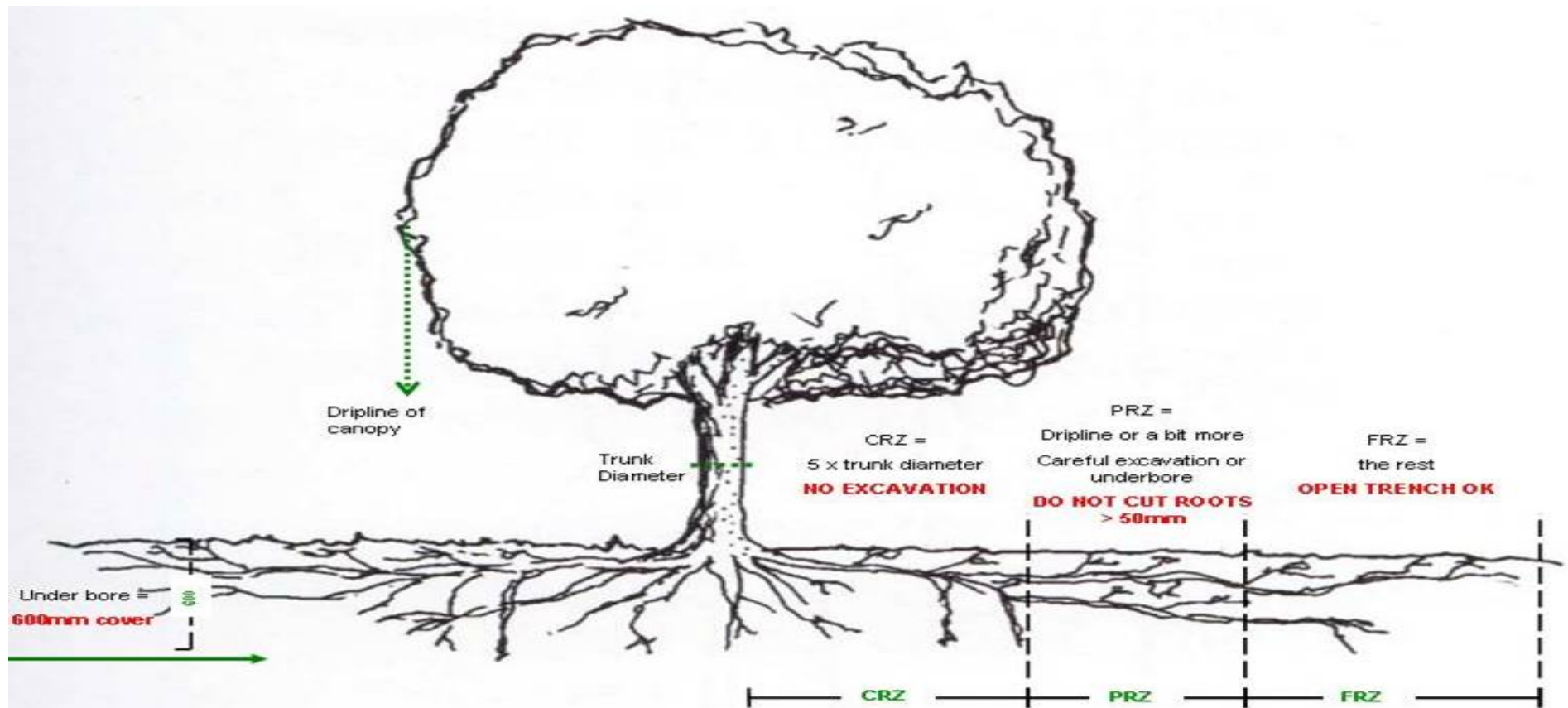


Diagram 1 - Tree drip line & root zone mitigation

**Appendix M**  
Fauna Handling & Rescue Procedure

# Fauna Handling and Rescue Procedure

## Purpose

This procedure explains the actions to be taken if an animal or eggs are discovered on the Project site that require handling or rescue during vegetation and soil clearance and ongoing construction activities. The procedure relates primarily to injured shocked and juvenile individuals but also applies to nocturnal fauna or slow moving species that may not be capable of moving away from mobile plant and equipment.

## Scope

This procedure is applicable to all native and introduced species that are found on the Project site.

## Induction / Training

All JV personnel will attend the Project induction, which will include a section on Fauna.

## Procedure

In the event wildlife (including shocked, juvenile animals or eggs) are discovered on the Project site during vegetation and soil clearance and ongoing construction activities the following steps shall be taken:

1. **STOP ALL WORK** in the vicinity of the fauna and immediately notify a JV Superintendent, who is then to notify Environment Officer (EO) or Environmental Manager (EM).
2. Contact project ecologist to obtain positive identification of the subject species.
3. Preferably allow fauna to leave the area without intervention.
4. If immediately available, use a licensed fauna ecologist or wildlife carer with specific animal handling experience to carry out any fauna handling.
5. To minimise stress to native fauna and remove the risk of further injury an appropriately licensed and experienced person shall:
  - a. If time permits call ecologist or fauna rescue for advice.
  - b. Attempt to herd animal into adjoining forest, outside the LoC.
  - c. If capture is necessary cover larger animals with a towel or blanket and place in a large cardboard box and/or cotton/calico bag;
  - d. Place smaller animals in a cotton/calico bag tied at the top;
  - e. Keep the animal in a quiet, warm, ventilated and dark place away from noisy construction activities.
  - f. Aquatic fauna are to be placed in plastic aquaria or a moistened plastic bag. Frogs will be transported in moistened plastic bags (1 frog/bag) with a small amount of leaf litter. Handling and translocation of frogs shall be in accordance with the Hygiene Protocol for the Control of Disease in Frogs (see below).

Note 1. Some animals require particular training before being handled (e.g. venomous reptiles, raptors) and should only be handled by appropriately qualified and experienced personnel i.e. Project Ecologist or wildlife carer.

Note 2. If handling bats, the handler must be vaccinated against the Australian Bat Lyssavirus (ABL - a form of rabies).

Note 3. Any frog handling will be undertaken in accordance with the *Hygiene Protocol for the Control of Disease in Frogs* (DECC 2008). This protocol recommends onsite hygiene precautions be undertaken to minimise the transfer of disease between and within wild frog populations. Measures recommended include:

- i. Thoroughly cleaning/disinfecting footwear and equipment before entering frog habitat and when moving from one site to another.
- ii. In high risk areas, spraying/flushing vehicle tyres with a disinfecting solution and avoid driving through frog habitat.
- iii. Cleaning/disinfecting hands between collecting samples/frogs (preference would be given to using bags, rather than bare hands to handle frogs).

iv. Limiting one frog or tadpole to a bag. Bags should not be reused.

6. If the animal cannot be handled (i.e. venomous reptiles);
  - a. Exclude all personnel from the vicinity with fencing and / or signage; and
  - b. Record the exact location of the individual and provide details to the appropriate rescue agency.
7. Call the Project Ecologist immediately and follow any advice provided. The ecologist may nominate to contact a rescue agency (e.g. WIRES) to assist. Any decisions regarding the care of the animal will be made by the ecologist, with advice from the rescue agency as required. Contact details of key personnel are as follows:

Agency / business	Phone number
Environment Manager	0400 675 298
Environment Officer	0427 143 904
Project Ecologist	0401 195 480
WIRES Mid North Coast	(02) 6652 7119
RSPCA Coffs Harbour	(02) 6651 3311
Coffs Harbour Veterinary Hospital	(02) 6652 1577
Pacific Vetcare Coffs Harbour	(02) 6652 3455

In the event the rescue service and/or local veterinary service cannot be contacted, the injured animal will be delivered to the relevant agency as soon as practically possible. The injured animal should be recorded on the Fauna rescue and relocation register.

8. If the fauna species is a threatened species that is not identified in the Construction Flora and Fauna Management Plan, the EO or EM must:
    - a. Apply the Unexpected Finds Procedure (Appendix N of CFFMP)
    - b. Immediately cease all work likely to affect the threatened species;
    - c. The EM shall contact the RMS Senior Environmental Officer (SEO) to inform them of the situation.
    - d. The EM shall then contact the following stakeholders, in this order, to determine the appropriate corrective actions and additional safeguards to be undertaken:
      - i. EPA (ph 131555);
      - ii. Environmental Representative ;and
      - iii. Others as instructed by RMS or EPA.
    - e. EM to record find in RMS Environmental Incident Report and JV Environmental Issue Report.
    - f. Following consultation with all relevant stakeholders, the EM shall implement any corrective actions and additional safeguards.
    - g. Following confirmation by the EM that all appropriate safeguards have been implemented, construction works shall recommence.
  9. Relocation of fauna adjacent to the footprint will be undertaken by, or under advice from, the project ecologist or wildlife carer and will be recorded on the Fauna rescue and relocation register. If the animal is not injured or stressed, it may be released nearby in an area that is not to be disturbed by construction, in accordance with the following procedures:
    - a. Sites identified as suitable release points by the Project Ecologist;
    - b. Release will be into similar habitat as close to the original area as possible;
    - c. If the species is nocturnal, release will be carried out at dusk; and
    - d. Release would generally not be undertaken during periods of heavy rainfall.
    - e. Hollow-dependent species, particularly those with dependent young, shall be released into a temporary nest box.
-

## **Dewatering procedure and aquatic fauna relocation**

Where necessary, aquatic fauna shall be relocated in accordance with the following steps:

- 1) Ensure all aquatic fauna relocation works are supervised by a suitably qualified aquatic ecologist.
- 2) Prior to the commencement of pumping, advice should be sought from the aquatic ecologist on pumping methods and the extent of drawdown.
- 3) The water level should be pumped down to a level that will allow the safe and effective implementation of capture methods, such as seine nets, dip nets and electrofishing.
- 4) A fine mesh screen may be installed on the inlet of the pump or a fish basket used to remove the risk of native aquatic fauna being transferred through pump. A maximum depth of 500mm is typically required before fish salvage can commence but site-specific advice will be required from the aquatic ecologist.
- 5) Aquatic ecologist is to establish the presence of native and introduced aquatic fauna and plan relocation. Access to adjoining properties may be required for relocation, particularly when dewatering dams. The aquatic ecologist will ensure that native aquatic fauna species are released into suitable habitat as close to the original location as possible.
- 6) In areas of threatened frog habitat dip-netting for tadpoles will be undertaken prior to substantial water draw-down, as per the Threatened Frog Management Plan.
- 7) Native fish will be placed in tubs full of water sourced from the salvage site where they will be housed for brief periods before being transferred to the release site. Pest fish will be euthanized using an ice slurry.
- 8) Tadpoles will be placed in individual clip-seal bags and acclimatized to the release site (i.e. bag placed in waterbody for 30 minutes) before being released.
- 9) Following completion of relocation, a final check shall be undertaken to find any remaining fish, or dying/dead fish.
- 10) All euthanized and dead fish will be transported to a licensed landfill facility for disposal.
- 11) Records will be kept on habitat type, method of water extraction, species, number of individuals and reproductive status of fish encountered.
- 12) Aquatic ecologist will prepare a report on the relocation, detail the source of the fish, the number and species of fish released and euthanized.

## **Project Ecologist responsibilities for fauna handling and rescue**

The Project Ecologist will follow the relevant steps detailed below:

1. All fauna habitat will be clearly marked ("H" painted on four sides and red & white tape tied around trunk at eye height) seven days prior to the commencement of clearing. Targeted nocturnal surveys will be undertaken 24-48hrs prior to clearing; pre-clearing surveys (i.e. active searches for fauna) will occur immediately prior to clearing.
  2. Surveys and rescue will be undertaken in accordance with the two stage clearing process:
    - a) Stage 1 (under-scrubbing and non habitat tree removal) - all fauna that can be physically captured during targeted surveys (i.e. active searches, spotlighting, trapping) will be relocated into areas of suitable habitat adjacent to the project site (i.e. normally adjacent to the clearing footprint) as soon as possible after capture.
-

- b) Stage 2 (habitat tree removal at least 48 hours after Stage 1) - all fauna captured will be relocated into areas of suitable habitat adjacent to the project site. Note - Habitat trees are to be felled using equipment that allows trees to be carefully felled with minimal impact (e.g. adequately sized harvester with rotating head).
3. Relocation of fauna captured during the clearing and associated works will take place in areas of suitable habitat as close as possible to the project site, taking into account:
- a) The release site contains similar habitat and occurs as close to the point of capture as possible;
  - b) If the species is nocturnal, release will normally be carried out at dusk;
  - c) Hollow dependent nocturnal fauna will generally be housed in a nest box, which will be installed temporarily at the release site and unplugged at dusk. The box will be checked and, if unoccupied, retrieved the following day.
  - d) Release would not be undertaken during periods of heavy rainfall except for aquatic fauna; and
  - e) Non-native fauna will be euthanased in accordance with licence conditions and Animal Care & Ethics Committee Approvals.

If the animal has been placed into care due to injury, age (i.e. young) or stress, upon its rehabilitation it will be released in an area, selected by the Project Ecologist, that will not be disturbed by the project construction works. The Project Ecologist will record and provide the capture and relocation data in the post clearing report.

4. To minimise stress to native fauna and/or remove the risk of further injury the Project Ecologist shall:
- a) Cover larger animals with a towel or blanket and place in a suitable nest box, carry cage or canvas bag.
  - b) Place smaller animals in a cotton bag, tied at the top, or suitable nest box.
  - c) Place frogs/tadpoles in a plastic bag with a small amount of water and leaf litter. One individual per bag.
  - d) Fish and other aquatic life (i.e. turtles) place in plastic aquaria or plastic container with sufficient water.
  - e) For terrestrial fauna keep the animal in a quiet, warm, well-ventilated and dark place away from noisy activities.
  - f) For aquatic fauna species ensure there is sufficient water and adequate aeration.

Notes on fauna handling -

Note 1. Some animals require particular handling (e.g. venomous reptiles, raptors) and should only be handled by appropriately qualified personnel i.e. Project Ecologist or wildlife carer.

Note 2. If handling bats, the handler must be vaccinated against the Australian Bat Lyssavirus (ABL) which is a form of rabies.

Note 3. Any frog handling would be undertaken in accordance with the *Hygiene Protocol for the Control of Disease in Frogs* (DECC 2008).

5. In the event an animal is injured the following fauna rescue services and local veterinary surgeries contact details are detailed in 5.1(6) above.
- In the event the rescue service and/or local veterinary service cannot be contacted, the most appropriate euthanasia method will be administered by the Project Ecologist (i.e. cervical dislocation for small vertebrates, ice slurry for introduced fish). This is to occur in accordance with applicable guidelines and legislative requirements. If the fauna species is identified as a threatened species that is not a species identified in the FFMP, notify the Environmental Manager immediately.
6. The project ecologist will keep a register of all pre-clearing survey methods (including times, weather conditions, effort and results), fauna species captured (number of individuals, sex, age class and general health of each individual), release sites and dates, individuals taken into care and release date or fate.
-

7.



# **Appendix N**

## **Unexpected Threatened Species / EEC Procedure**





# Unexpected Threatened Species / EEC Find Procedure

## Purpose

This procedure details the actions to be taken when a threatened species or Endangered Ecological Community (EEC) is unexpectedly encountered during construction activities.

## Induction/Training

All JV personnel are to be inducted on the identification of potential threatened species occurring on site and the relevant actions for them with regards to this procedure during the Project Induction, Site Inductions and regular Toolbox Talks.

## Scope

This procedure is applicable to all activities conducted by JV personnel that have the potential to come into contact with threatened species.

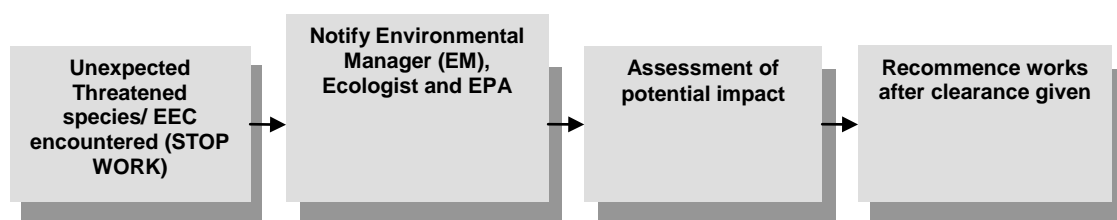


Figure 1 Unexpected Threatened Species & EEC Find Procedure flow chart.

## Procedure

### 1. Threatened Species unexpectedly encountered during excavation/construction activities

If a threatened species, either flora or fauna, is encountered during construction activities:

- **STOP ALL WORK** in the vicinity of the find.
- Immediately notify the JV Construction Environment Manager who will notify the Ecologist and the EPA.
- Ecologist or EM to confirm identification and that the species is an unexpected find.

Agencies will be informed of any unplanned event, death or injury to threatened species during construction.

### 2. Assessment of Impact

An assessment is to be undertaken by the EM and the Ecologist to determine the likely impact to the threatened species and appropriate management options developed.

If a species that was not considered in the EIS may be affected by the project an assessment of impacts may be required. The need for such an assessment will be based on advice from relevant state and federal agencies and the assessment

### 3. Approvals

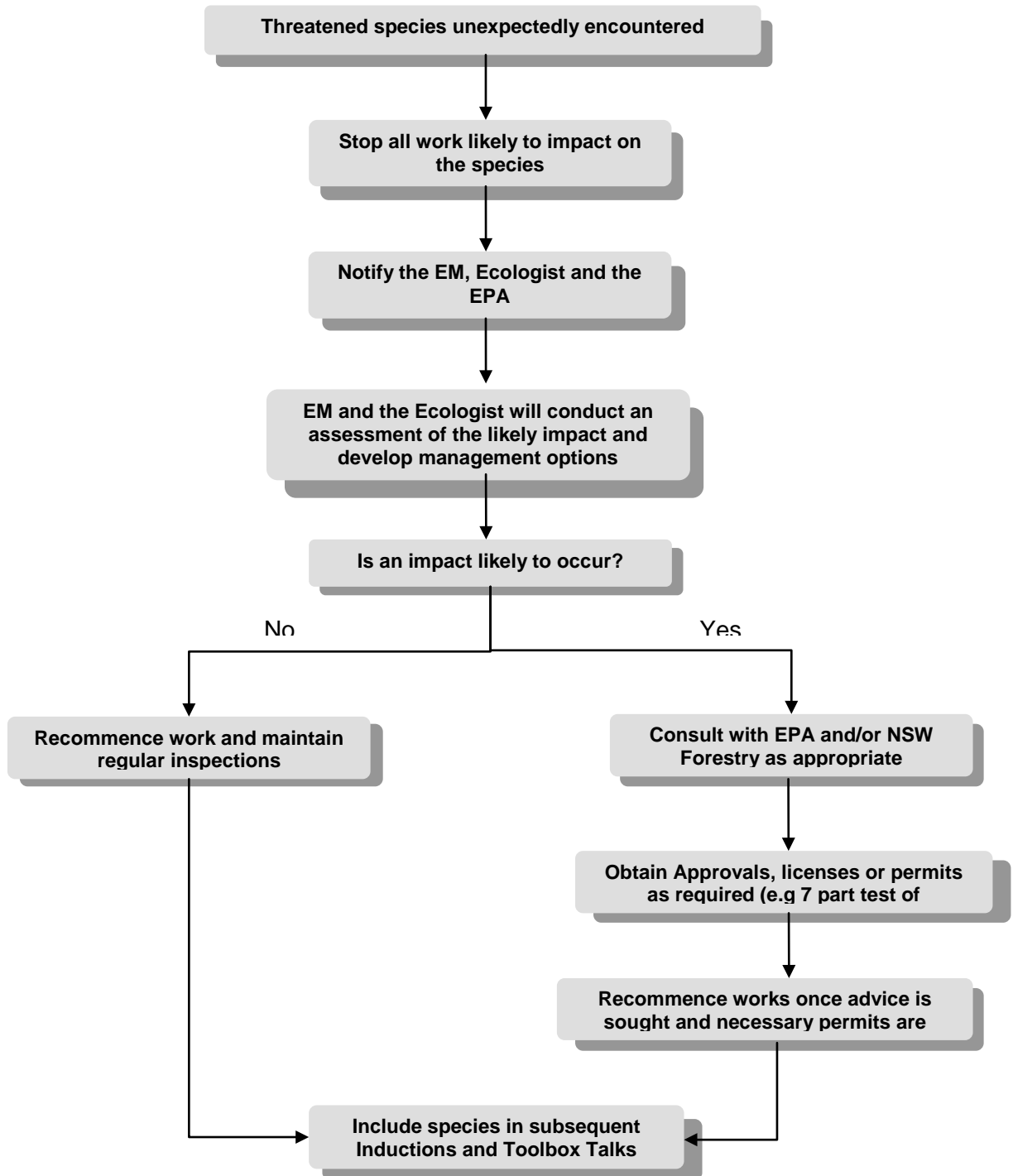
The JV will obtain any licences, permits or approvals required if the species is likely to be significantly impacted.

### 5. Resumption of Works

Works will recommence once necessary advice has been sought and permits obtained if required. If permits are not required, works can recommence once after advice from the Fauna and / or Flora Specialist.

Include threatened species in subsequent Project Inductions and Toolbox Talks.

**Figure 1 Unexpected Threatened Species & EEC Find Procedure Flow Chart**





# **Appendix O**

## Noxious Weed & Pathogen Management Plan



# APPENDIX O

## Noxious Weed and Pathogen Management Plan

### Woolgoolga to Halfway Creek Pacific Highway Upgrade

MAY 2015

*FOR*



**Transport**  
Roads & Maritime  
Services

# Contents

1	Introduction.....	1
1.1	Background .....	1
1.2	Weeds .....	1
1.3	Pathogens .....	1
2	Environmental Controls.....	3
2.1	Weed & Pathogen Management Process .....	3
2.2	Control of Weeds.....	4
2.3	Control of Pathogens.....	7
2.4	Topsoil.....	11
2.5	Aquatic Weeds.....	12
3	Inspection and Monitoring.....	14
3.1	Weed Monitoring .....	14
3.2	Pathogen Monitoring .....	14
3.3	Other Inspections and Monitoring .....	15

## Appendices

Appendix A – Weed and Pest Declaration Checklist

## Glossary / Abbreviations

CEMP	Construction Environmental Management Plan
CoA	Condition of approval
EPA	Environment Protection Authority
DP&E	Department of Planning and Environment
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
EWMS	Environmental Work Method Statements
FFMP	Construction Flora and Fauna Management Plan
NPW Act	<i>National Parks and Wildlife Act 1974</i>
OEH	Office of Environment and Heritage
Project, the	The Woolgoolga to Halfway Creek Project
Secretary	Secretary of the Department of Planning and Environment
SWMP	Construction Soil and Water Management Plan
RMS	Roads and Maritime Services
TSC Act	<i>Threatened Species Conservation Act 1995</i>

# 1 Introduction

## 1.1 Background

This Weed & Pathogen Management Plan (WPMP) outlines the management measures, monitoring and reporting requirements relating to noxious weeds and pathogens associated with the construction of the Woolgoolga to Halfway Creek Project.

The Woolgoolga to Ballina, Pacific Highway Upgrade Environmental Impact Statement, identifies a number of weed and pathogen species in the Woolgoolga to Halfway Creek section.

This Plan has been prepared and is to be implemented in accordance with the *Noxious Weeds Act 1993* and the National Trust Weed Management Plan.

The information contained in this plan has been included in the project induction, training posters which will be distributed across the projects compounds and offices and will be delivered to the project team via toolboxes.

## 1.2 Weeds

Roads and Maritime Services (RMS) has a statutory obligation under Part 3, Division 1, Section 13 of the *Noxious Weeds Act 1993* to control noxious weeds on the land to the extent necessary to prevent the weeds from spreading to adjoining land.

Furthermore it is a requirement of RMS QA Specification G36 Section 4.8(d) that the contractor have a procedure for controlling the introduction and spreading of weeds and pathogens caused by the Work Under the Contract, including hygiene protocols and the arrangements for monitoring.

The definition of a weed for the purposes of this plan is consistent with the definition of a noxious weed in the *Noxious Weeds Act 1993*, which is a plant declared by an order under section 7 of the *Noxious Weeds Act 1993* to be a noxious weed. A total of six noxious weed species have been recorded within the project corridor during the flora surveys. These species included Annual Ragweed (*Ambrosia artemisiifolia*), Groundsel Bush (*Baccharis halimifolia*), Bitou Bush (*Chrysanthemoides monilifera* subsp. *rotundata*), Camphor Laurel (*Cinnamomum camphora*), Lantana (*Lantana camara*) and Fireweed (*Senecio madagascariensis*).

## 1.3 Pathogens

Pathogens addressed in this plan and relevant to the project include Root-rot Fungus (*Phytophthora cinnamomi*), Myrtle Rust (*Uredo rangelii*), Panama Disease (*Fusarium oxysporum*) and Frog Chytrid Fungus (*Batrachochytrium dendrobatidis*).

### 1.3.1 Root-rot Fungus

Root-rot Fungus (*Phytophthora cinnamomi*) is a soil-borne water mould that produces an infection, which causes a condition in plants called "root rot" or "dieback". It directly threatens a range of individual plant species, and also threatens ecological communities and landscapes (Commonwealth of Australia 2014). Consequently, root-rot fungus has been listed as a Key Threatening Process on the TSC Act and EPBC Act.



### **1.3.2 Myrtle Rust**

Myrtle Rust is a plant disease caused by the exotic fungus *Uredo rangellii* (OEH 2011). Myrtle rust affects plants in the family Myrtaceae, including the genera Eucalyptus, Angophora, Callistemon, and Melaleuca (OEH 2011). The likely impacts of myrtle rust on biodiversity in Australia are unknown. However, the disease may cause significant mortality among younger plants and hence reduce recruitment into adult populations, which may contribute to the decline and extinction of species (OEH 2011). Reduced recruitment may also have severe impacts on the structure and function of the many natural ecosystems that depend on Myrtaceae (OEH 2011). Consequently, the introduction and establishment of myrtle rust has been included in a preliminary listing as a Key Threatening Process on the TSC Act.

### **1.3.3 Panama Disease**

Panama Disease is a fungal disease that kills banana plants and is considered to be the most destructive disease of bananas at the present time (Newley 2010). The disease is most commonly introduced in infected planting material (Newley 2010). However, it can also spread with soil and water movement or on contaminated machinery (Newley 2010). Once established, the fungus persists in the soil for many years (Newley 2010).

### **1.3.4 Frog Chytrid Fungus**

Frog Chytrid Fungus (*Batrachochytrium dendrobatidis*) is a water-bourne fungal pathogen that invades the skin of amphibians, including tadpoles, often causing sporadic deaths with up to 100 percent mortality in some populations (DECC 2008). Frog chytrid fungus is responsible for the disease Chytridiomycosis, which has been detected in over 40 species of native amphibian in Australia (DECC 2008). Furthermore, Chytridiomycosis has been implicated in the decline of several State and Commonwealth listed threatened amphibian species. Consequently, Chytridiomycosis due to the amphibian chytrid fungus has been listed as a Key Threatening Process on the TSC Act and EPBC Act.

## 2 Environmental Controls

### 2.1 Weed & Pathogen Management Process

Figure 2.1 illustrates the weed and pathogen management approach adopted on the Woolgoolga to Halfway Creek project.

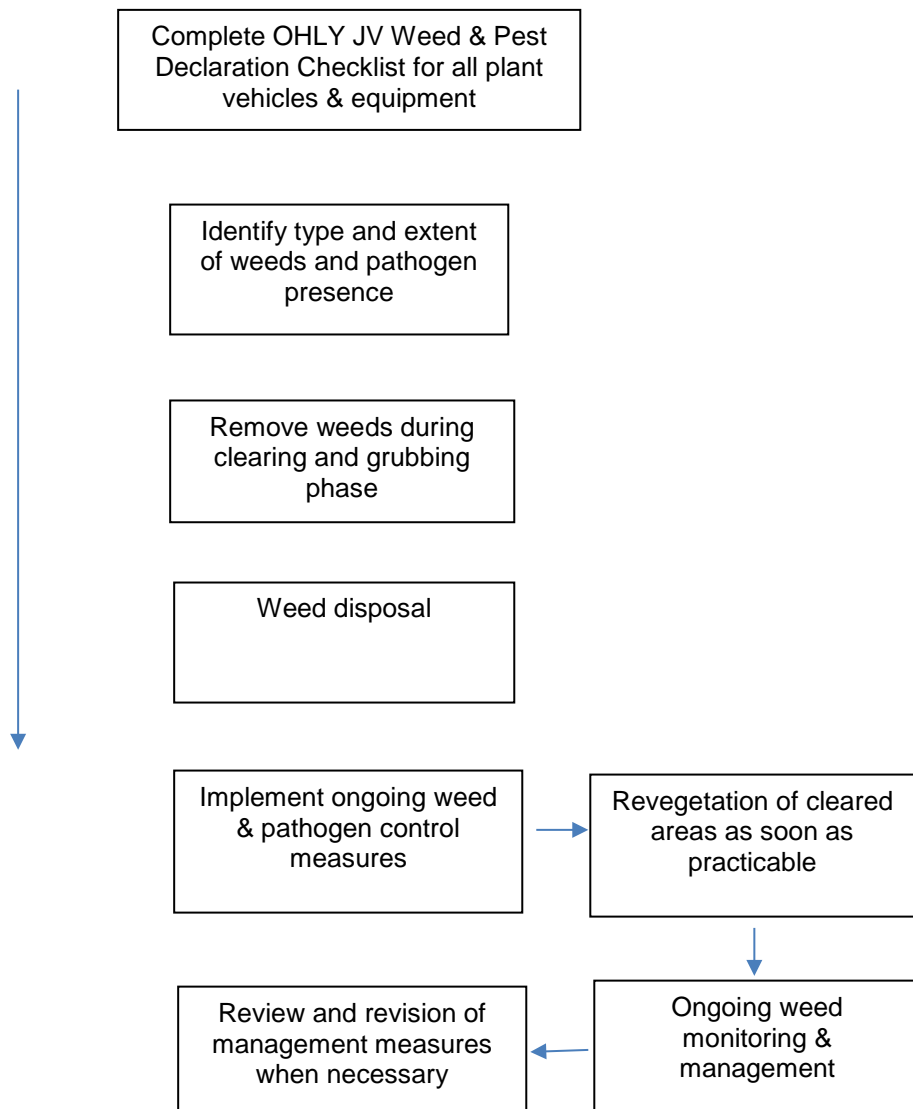


Figure 2-1 Weed and Pathogen Management Process

## **2.2 Control of Weeds**

### **2.2.1 Mechanical Control of Weeds**

Weeds will be controlled primarily through mechanical means.

Example of mechanical control methods will include:

- Use of an excavator/harvester to remove shrub and larger trees and their stumps in accordance with the *Noxious Weeds Act 1993*; and
- Strategic use of seasonal slashing for select weed species in association with chemical application (ie spring slashing of easements and verges followed by chemical application to reduce seeding opportunities).

#### **Timing**

Weeds will be controlled during the clearing and grubbing program.

#### **Performance Indicators**

If required, all noxious weeds removed mechanically will be done so in accordance with the *Noxious Weeds Act 1993 and relevant Department of Primary Industries (DPI) Weed Fact Sheets*.

### **2.2.2 Chemical Control of Weeds**

Chemical methods of weed control will be used primarily during the site rehabilitation phase of the project in response to weed monitoring outcomes and recommendations (refer to Section 3.1).

#### **Timing**

Timing of chemical application will vary depending on the lifecycle and periods of active growth for each weed species.

#### **Performance Indicators**

- Herbicide application administered by authorised personnel only, with ChemCert Accreditation AQF 3 (in accordance with Workcover requirements); and
- Noxious weeds treated in accordance with the herbicide specific to each species, as listed in the *Noxious and Environmental Weed Control Handbook (DPI 2011)*.

### **2.2.3 Stockpiling and Disposal**

Weed infested materials will not be stockpiled adjacent to native vegetation wherever possible during topsoiling stripping operations. All topsoil and mulch containing potential weed propagules will be used only in areas that contained the weed species prior to clearing.

#### **Timing**

Weed material and weed contaminated topsoil will be stockpiled during the clearing and grubbing program. The stockpiles will be regularly monitored by the construction personnel & the project ecologist (refer to Section 3.1) and treated for weeds prior to being used in site rehabilitation and/or landscaping works.

### Performance Indicators

- All classified weed material will be handled and/or disposed of lawfully; and
- No stockpiling of weed infested materials adjacent to native vegetation.

### 2.2.4 Specific Management Measures

Specific management measures identified for those noxious weeds identified during the pre-construction survey are identified in Table 2-1. Timing and performance indicators will be implemented as per Section 2.2.3 and 2.2.2 of this plan.

**Table 2-1 Noxious weeds present in Woolgoolga to Halfway Creek Section**

Scientific Name	Common Name	Control Class	Legal Requirement	Management Measures
<i>Ambrosia artemisiifolia</i>	Annual Ragweed	5	Prevent the spread of the plant within NSW.	Notify relevant weed control authorities of sites containing annual ragweed; 2. In response to weed monitoring requirements spot spray actively growing plants using Dicamba at 1.5L in 100L of water. A surfactant is also required.
<i>Baccharis halimifolia</i>	Groundsel Bush	3	The plant must be fully and continuously suppressed and destroyed.	1. <b>Slash or spray actively growing plants before April 2015;</b> 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re- use of topsoil and mulch to be limited to affected areas only; 4. Grow a combination of winter and summer grasses to maintain dense cover & inhibit growth; 5. Conduct spring inspection of open (disturbed) areas and apply suitable herbicide treatment on any new infestations or isolated plants.
<i>Chrysanthemoides monilifera subsp. rotundata</i>	Bitou Bush	4	The growth of the plant must be managed in a manner that	1. Thoroughly clean machinery of soil and plant material prior to exiting

			continuously inhibits its reproduction.	<p>affected areas;</p> <ol style="list-style-type: none"> <li>2. Re-use of topsoil and mulch to be limited to affected areas only;</li> <li>3. Any new infestations or isolated plants detected during monitoring inspections should be manually removed or sprayed with herbicide treatment during winter.</li> </ol>
<i>Cinnamomum camphora</i>	Camphor Laurel	4 (Clarence Valley Council LGA only)	The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	<ol style="list-style-type: none"> <li>1. Thoroughly clean machinery of soil and plant material prior to exiting affected areas;</li> <li>2. Re-use of topsoil and mulch to be limited to affected areas only;</li> <li>3. Any new infestations or isolated plants detected during monitoring inspections should be manually removed or sprayed with herbicide treatment during.</li> </ol>
<i>Lantana camara</i>	Lantana	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	<ol style="list-style-type: none"> <li>1. Thoroughly clean machinery of soil and plant material prior to exiting affected areas;</li> <li>2. Re-use of topsoil and mulch to be limited to affected areas only;</li> <li>3. Any new infestations or isolated plants detected during monitoring inspections should be manually removed or sprayed with herbicide treatment during late summer/autumn.</li> </ol>

<i>Senecio madagascariensis</i>	Fireweed	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	<ol style="list-style-type: none"> <li>1. Thoroughly clean machinery of soil and plant material prior to exiting affected areas;</li> <li>2. Re-use of topsoil and mulch to be limited to affected areas only;</li> <li>3. Grow a combination of winter and summer grasses to maintain dense cover and inhibit growth;</li> <li>4. Conduct autumn inspection of open areas and apply suitable herbicide treatment on any new infestations or isolated plants.</li> </ol>
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## 2.3 Control of Pathogens

### 2.3.1 Overall Management Measures

Pathogens will be managed as per the RMS Biodiversity Guidelines (September 2011) and through the establishment of washout procedures and facilities. The washdown procedure will include the manual removal of thick soil deposits, high pressure wash down of the undercarriage followed by the application of a sterilant of Chytrid Fungus. The washout water will be contained and not reused for dust suppression in areas along the alignment that are pathogen/disease free.

#### Timing

Washout facilities will be established for plant, equipment and personnel at least 24 hours prior to entering a known area of pathogens.

#### Performance Indicators

- Plants and soil that is imported to site will be certified disease-free;
- Topsoil and other surface soil materials from infected areas stockpiled and/or re-used within the sub-catchment of its source location; and
- All runoff in known infected areas captured and returned to the infected area.

### 2.3.2 Chytrid Fungus Disinfectant Protocol

The following measures will be implemented in areas where Chytrid fungus is known to exist:

- Footwear must be thoroughly cleaned and disinfected at the commencement of fieldwork and between each sampling site. This can be achieved by initially scraping boots clear of mud and standing the soles in a disinfecting solution. The remainder of the boot should be rinsed or sprayed with a disinfecting solution that contains benzalkonium chloride as the active ingredient. Disinfecting solutions should be prevented from entering any water bodies. Works must adhere to the Safety Data Sheet;
- Rubber boots (ie gum boots) are recommended because of the ease with which they can be cleaned and disinfected;

- Several changes of footwear bagged between sites might be a practical alternative to cleaning;
- Equipment such as nets, balances, callipers, bags, scalpels, headlamps, torches, wetsuits and waders etc that are used at one site must be cleaned and disinfected before reuse at another site;
- Disposable items should be used where possible. Non-disposable equipment should be used only once during a particular field exercise and disinfected later or disinfected at the site between uses using procedures as outlined below;
- Where necessary, vehicle tyres should be sprayed/flushed with a disinfecting solution in high-risk areas;
- Transmission of disease from vehicles is unlikely to be a problem. However, if a vehicle is used to traverse a known frog site, which could result in mud and water being transferred to other bodies of water or frog sites, then wheels and tyres should undergo cleaning and disinfection. Where possible disinfection will be carried out at a safe distance from water bodies and on an imperious surface in order to prevent infiltration of the soil and run-off into water bodies;
- Spraying with benzalkonium chloride is recommended to disinfect car wheels and tyres;
- Cleaning of footwear before getting back into the car will prevent the transfer of pathogens from/to vehicle floor and control pedals;
- Frogs should only be handled when necessary. Minimise the handling of frogs to only those personnel which must perform pre-clearing surveys, capture and relocation process (project ecologist). When handling frogs, use disposable gloves, sample bags and sterile equipment; and
- When handling frogs, the risk of pathogen transfer should be minimised as follows –
  - Hands should be either cleaned or disinfected between samples or a new pair of disposable gloves used for each sample. This may be achieved by commencing with a work area that has a dish containing a disinfecting solution and paper towels.
  - A 'one bag-one frog' approach to frog handling should be used especially where several people are working together with one person processing frogs and others doing the collecting. Bags should not be reused.
  - A 'one bag-one sample' approach to tadpole sampling should be used. Bags should not be reused.
- All used disinfecting solutions, glove and other disposable items should be stored in a sharps or other waste container and disposed or sterilised appropriately at the completion of fieldwork. Disinfecting solutions must not come into contact with frogs or be permitted to contaminate any water bodies.
- The disinfecting agents for hands and equipment will be effective against bacteria as well as both the vegetative and spore stages of fungi.

### **Timing**

Disinfectant protocols will be implemented prior to the exit of personnel, or removal of plant and equipment, from areas of known pathogens.

### **Performance Indicators**

- Implementation of the Chytrid Fungus Disinfectant Protocol
- No increase in the prevalence of Chytrid Fungus

### 2.3.3 Myrtle Rust Management Measures

All occurrences of Myrtle Rust will be reported to the Environment Manager immediately upon positive identification and infected areas will be considered contaminated and threatened accordingly.

#### Timing

Surveys for Myrtle Rust as part of pre-clearing checks will be completed daily in known areas of Myrtle as advised by ecologist. The Environment Manager is to report all occurrences to the NSW DPI within 7 days of positive identification and obtain advice on the most suitable control method.

#### Performance Indicators

- Pre-clearing surveys for myrtle rust completed daily in known areas of Myrtle as advised by project ecologist;
- All occurrences of Myrtle Rust reported to the Environment Manager immediately upon positive identification; and
- Environment Manager report all occurrences of Myrtle Rust to the NSW DPI within 7 days of positive identification.

### 2.3.4 *Phytophthora cinnamomi* Management Measures

Where necessary, the introduction and spread of *Phytophthora cinnamomi* will be managed using a combination of the following measures, where applicable and necessary:

- Testing of soil in known phytophthora and seeking advice from Royal Botanical Gardens & EPA Biodiversity unit.
- Training of staff on the risk of, and controls to be implemented for, working in or adjacent to *Phytophthora cinnamomi* infested areas.
- Establishment of No-Go Zones where works within infested areas can be avoided.
- Maintenance of natural barriers between construction activities and infected areas, where possible.
- Scheduling activities in non-infested areas before moving to infested areas.
- Scheduling activities for periods with the highest likelihood of dry soil conditions to minimise the spread of the pathogen, where possible.
- Ensuring vehicles, material and footwear are clean upon entry into, and exit from, infested areas.
- Minimisation of the amount of water discharged into infested areas.
- Restricted movement of soil from infested areas and implementation of local stockpiling and demarcation of infested soils within infested areas.
- Implementation of hygiene protocols where working across infested and non-infested areas cannot be avoided.

### 2.3.5 Panama Disease Management Measures

The following measures will be implemented in areas where Panama disease is known to exist:



### 1. Identification and Prevention of Panama Disease:

- The EM must contact the RMS and I&I NSW Agriculture prior to works in former banana sites to determine if any Panama disease (or other disease) may be present and where the diseased area is located.

### 2. Where potentially contaminated soils may be present:

- Signage to be installed advising special hygiene measures apply in the zone.
- Limit access to contaminated area with fencing.
- No earth works will occur after extended rainfall that could make the earth saturated.
- No earth work will occur during heavy rainfall where water could potentially cause overland flow.
- Vehicles should be kept clean of mud, dirt and plant matter, including tyres, wheels and the undersides of vehicles.
- Vehicles should not, where possible, be driven through mud or potentially infected areas.
- Vehicles should not, where possible, be parked off plantations and not be driven across plantation access routes, such as driveways.
- If a vehicle or machinery is taken onto a plantation, **all** mud and dirt is to be removed, (including from floor mats, the underside of vehicles, tyres and wheels) and the vehicle is to be washed with Truckwash<sup>®</sup> (or equivalent) & disinfected with Castrol Farmcleanse<sup>®</sup> (or equivalent):
  - Immediately prior to accessing a plantation,
  - Immediately prior to leaving the plantation, or
  - Immediately after leaving the plantation.A vehicle and machinery clean-down checklist is to be completed for all vehicles and machinery taken onto a current or former banana plantation site.
- Water used for vehicle wash-downs must **not** come from run-off in sedimentation basins fed by potentially contaminated catchments.
- The area where a vehicle is to be washed is to be bunded by a sandbag wall 400 mm high. All liquids used in the washing and disinfecting vehicles are to be pumped up and removed from site in a sealed tank. The tank shall be emptied at an appropriate waste disposal facility and disinfected with Castrol Farmcleanse<sup>®</sup> (or equivalent).

### 3. Limiting movement of potentially contaminated soils via personnel and equipment:

- Footwear should be cleaned and disinfected by removing mud and dirt and then stepping into a tray of Castrol Farmcleanse<sup>®</sup> (or equivalent):

- Immediately prior to accessing a plantation,
- Immediately prior to leaving the plantation, or
- Immediately after leaving the plantation.
- Equipment should be cleaned and disinfected by removing mud and dirt and sponging with a solution of Castrol Farmcleanse<sup>®</sup> (or equivalent):
- Immediately prior to accessing a plantation,
- Immediately prior to leaving the plantation, or
- Immediately after leaving the plantation.
- Vehicles and heavy machinery should be cleaned and disinfected by removing mud and dirt from the tyres and undersides. Tyres and undersides should be cleaned using Truckwash<sup>®</sup> and then sterilised with a solution of Castrol Farmcleanse<sup>®</sup> (or equivalent): This should be undertaken
- Immediately prior to accessing a plantation,
- Immediately prior to leaving the plantation, or
- Immediately after leaving the plantation.
- A vehicle and machinery clean-down checklist is to be completed for all vehicles and machinery taken onto a current or former banana plantation site.
- Wash-down water is to be disposed of safely in manner that it can not contaminate plantation soils.

#### 4. Limiting movement of potentially contaminated soils via sedimentation controls:

- Any sandbags, hay bales or other sediment controls in areas of potentially contaminated soil should be removed in a covered truck and disposed of at an appropriate waste disposal facility and shall not be used more than once.
- Run-off water with potentially contaminated sediment collected in basins must **not** be used for dust control or other road construction purposes where there is a risk of spreading the spores. This water may be used for concrete production with prior approval of RMS and I&I NSW Agriculture.
- Run-off sedimentation basin water must not be released on plantations or where it can run onto plantations and it must not be used for irrigation.
- Potentially contaminated basin sediment must **not** be disposed in area where it can contaminate banana plantations. It may be used as general fill in the area from where it originated.

#### 5. Limiting movement of potentially contaminated plantation topsoil

- Topsoil stripped from banana plantations potentially infected with Panama disease must be only stockpiled, contained and reused within the contaminated area of the plantation.

#### 6. Limiting importation of potentially contaminated soil and plant matter

- Any vehicles or equipment brought onto to the Project from construction sites north of Evans Head (NSW Northern Zone banana plantations) need to be checked and cleared of any potentially Panama disease contaminated soil and/or potentially Bunchy Top Virus contaminated plant matter.
- If signs of soil and/or plant matter are present, vehicles or equipment should be cleaned in accordance with the procedure in Step 2 above.

## 2.4 Topsoil

Refer to the Spoil and Fill Management Procedure (Appendix B SWMP) for the appropriate weed control measures relating to stockpiles. Topsoil management measures will be implemented in a manner that minimises the spread of weeds.

## 2.5 Aquatic Weeds

### 2.5.1 Overview

All noxious weeds are listed under the *NSW Noxious Weeds Act 1993*. Aquatic plants will only be controlled when they interfere with the use of particular aquatic environments or where there is a statutory obligation. All weeds will be disposed offsite to an appropriately licensed facility to accept that kind of waste.

The following management approach for aquatic weeds is taken from the NSW DPI (Primefact 30, NSW DPI, November 2008). To select the most appropriate management option, it is essential that the plant is correctly identified. The project ecologist should undertake an assessment of any aquatic weeds.

### 2.5.2 Overall Management Measures

Where possible preventative measures will be implemented. These measures include:

- All plant, vehicles, equipment must be checked as per the Projects Weed & Pest Declaration Checklist (Appendix A) prior to commencing works onsite.
- Monitoring and early detection of new infestations;
- The use of booms and fences to prevent the spread (a permit under the *Fisheries Management Act 1994* is needed if a boom is likely to impact fish movement);
- Hygienic practices when moving nets and traps from one waterbody to another; and
- Proper management of a waterbody and uses of its surrounding land to minimise nutrient loads and disturbances to banks and riparian vegetation.

#### Timing

Weeds will be controlled during the clearing and grubbing program.

#### Performance Indicators

All classified weed material disposed of lawfully and controlled in accordance with statutory requirements.

### 2.5.3 Mechanical Removal of Weeds

Mechanical removal involves the removal of the plant biomass from the water body using specifically designed harvesters or equipment. Physical control includes the removal of plant material by hand. Mechanical and physical removals are often a good first option, particularly where the water is used for animal or human consumption and herbicide control is undesirable.

#### Timing

Weeds will be removed during the clearing and grubbing program.

#### Performance Indicators

If required, all noxious weeds removed mechanically are done so in accordance with the *Noxious Weeds Act*.

### 2.5.4 Environmental Control

Control can be achieved by altering the water body in some way to limit the growth of aquatic plants.

- For submerged plants, lowering the water level to expose them to the sun can be effective.
- Dredge or excavate to a depth where the plants will not grow, or will only grow at reduced densities due to lack of light. This approach is most successful in very turbid water.
- Limit the inflow of nutrients by diverting effluent from stockyards or feeding areas.
- Do not allow stock direct access to waterways, provide a watering point below the catchment area.
- Provide a buffer zone around waterways and between water storages by way of long, dense grass or a strip of native shrubs and trees. This can impede or trap the movement of aquatic plants from one water source to another.

### **Timing**

Weeds will be removed during the clearing and grubbing program.

### **Performance Indicators**

If required, all noxious weeds controlled using environmental controls are done in accordance with the *Noxious Weeds Act*.

### **2.5.5 Chemical Control**

In the event of chemical control, the following approach will be adopted:

- Select a herbicide registered for use in water and for the specific plant. Take note of toxicity to other plants, fish or wildlife, residual activity and withholding periods for treated water.
- Make an accurate measure of the water volume or surface area to be treated in order to calculate the correct application rate and volume of herbicide to be used.
- Infestations should be treated in sections so that the risk of water contamination is minimised, and the decay of smaller amounts of vegetation will not reduce oxygen levels in the water sufficiently to kill fish.

### **Timing**

All noxious weed chemical application will be carried out within 7 days of clearing operations within known noxious weeds populations and will be undertaken by suitably qualified persons. Further chemical control will be carried out as required. An example of where chemical control may need to be carried out is to ensure the plants do not see ahead of the clearing and grubbing program.

### **Performance Indicators**

- Herbicide application administered by authorised personnel only, with ChemCert Accreditation AQF 3 (in accordance with Workcover requirements).
- Noxious weeds treated in accordance with the herbicide specific to each species, as listed in the Noxious and Environmental Weed Control Handbook (DPI 2011).

### **2.5.6 Stockpiling and Disposal**

Weed infested materials will not be stockpiled adjacent to native vegetation wherever possible during topsoiling operations. Under no circumstances will weeds or exotic species be used to make up any shortfall of mulch.

All classified weed material will be disposed of, in accordance with the requirements of the local council, by burial or disposal at an appropriate waste management facility following positive identification.

### **Timing**

Weeds will be stockpiled and removed during the clearing and grubbing program.

### **Performance Indicators**

- All classified weed material disposed of lawfully;
- No stockpiling of weed infested materials adjacent to native vegetation;
- No use of weed infested mulch for landscaping purposes.

## **3 Inspection and Monitoring**

### **3.1 Weed Monitoring**

Weed monitoring will be conducted in all disturbed areas, landscaped areas, rehabilitation sites and mulch and topsoil stockpiles. The frequency and duration of weed monitoring will be specific to the site and adjoining areas and have the flexibility to respond to changes in the environment. As a minimum, weed inspections will be undertaken on a six monthly basis (ie. autumn and spring) during the project construction phase (or in response to seasonal and climatic conditions).

The following items will be included in environmental reporting on weed management:

- Locations and appropriate areas (m<sup>2</sup>) where weed management was carried out;
- Number of hours spent in weed control works in total and at each area;
- Number of staff carrying out weed control works;
- Treatment methods applied in each area.

The program will be guided by the results and recommendations of the baseline Noxious Weed survey. Initial or baseline data points will be used to document the following:

- Location, type, appropriate area and extent/cover
- Proposed management action

The works shall be regularly reviewed and inspected by the Project Engineer, Superintendent, Foreman and Environment Manager to ensure compliance with this Plan. This will identify inappropriate weed and pathogen management actions and identify more suitable control measures. Observations on the success of control measures and results of each monitoring inspection will be made against the weed management objectives and activities outlined in this Plan. The inspections will be undertaken by project ecologist and the project environmental team.

### **3.2 Pathogen Monitoring**

Monitoring for Frog Chytrid Fungus will be conducted as part of the threatened frog population monitoring programs and undertaken by the project ecologist and the project

environment team. Monitoring of all other pathogens will be devised once the presence and extent of the pathogens has been determined during the construction phase of the project.

### 3.3 Other Inspections and Monitoring

All plant, vehicles, equipment must be checked as required by the Projects Weed & Pest Declaration Checklist (Appendix A) prior to commencing works onsite. The Weed and Pest inspection is a two stage inspection process, specifically:

- a) Plant, vehicles & equipment are to be inspected by the subcontractor prior to coming to site
- b) Plant, vehicles & equipment are to be inspected by OHLY plant supervisor when machinery is onsite.

A copy of the signed declaration will be retained by the Environment Manager.

Section 8 of the CEMP outlines the requirements for all environmental inspections, monitoring, and auditing on the project.

## References

Commonwealth of Australia 2014, Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi*, Commonwealth of Australia, 2014'.

Department of Environment and Climate Change (NSW) 2008, *Hygiene Protocol for the Control of Disease in Frogs – Information Circular No. 6*, DECC NSW, Sydney South.

Newley, P. 2010, *Panama Disease in Bananas – Primefact 1029*, Industry and Investment (NSW), Coffs Harbour.

Office of Environment and Heritage NSW 2011, *Management Plan for Myrtle Rust on the National Parks Estate*, Office of Environment and Heritage NSW, Sydney.

# Appendices



# Weed & Pest Declaration Checklist

## Woolgoolga to Halfway Creek Project

Subcontractor/Supplier:

Date :

Plant/Vehicle/Equipment Type:

Received From (location):

- 
1. **Has the plant/equipment/vehicle been moved through an area infested with noxious pests or weeds, or been used to clear forest containing noxious weeds? for example:**  Yes  No
- Pest animals (cane toads)
  - Pest insects (fire ants, yellow crazy ants, electric ants)
  - Pest aquatic weeds (Alligator weed, salvina, water hyacinth)
  - Pest grasses (Giant rats tail, American Rats tail, Giant Parramatta)
  - Pest weeds (camphor laurel, lantana, groundsel bush, coral tree)
2. **If the answer to Question 1 is "yes", has the plant/vehicle/equipment been quarantined/washed/cleaned/certified clean/other to prevent prohibited use onsite?**  Yes  No
3. **Has the vehicle/plant/equipment been cleaned prior to coming onto site?**  Yes  No  
*"Clean means that no soil and/or organic matter that may contain weed reproductive material in or on in areas that are accessible during cleaning and maintenance work.*
4. **Have the following areas been checked for signs of seeds, mud, organic matter, grass or animals?**  Yes  No
- a) between dual wheels/rims, muffler surrounds, wheel guards and mud guards;  Yes  No
  - b) spare tyres, toolbox, tracks and track frames;  Yes  No
  - c) turret pivot areas and axle beams;  Yes  No
  - d) engine bays where grease and oil stains may accumulate soil and plant material in the residue;  Yes  No
- Yes  No



e) radiators;

Yes  No

f) the underside of the machinery (guards and belly plates should be removed for inspection);

Yes  No

Yes  No

g) hollows, crevices and exposed welded plates;

h) the interior of the cabin.

i) bullbars and light recesses

**Refer to Government Websites for supporting information:**

[https://www.daff.qld.gov.au/\\_data/assets/pdf\\_file/0011/58178/IPA-Cleanup-Procedures.pdf](https://www.daff.qld.gov.au/_data/assets/pdf_file/0011/58178/IPA-Cleanup-Procedures.pdf)

[https://www.daff.qld.gov.au/\\_data/assets/pdf\\_file/0016/64006/IPA-Inspection-Procedures.pdf](https://www.daff.qld.gov.au/_data/assets/pdf_file/0016/64006/IPA-Inspection-Procedures.pdf)

**Comments/Observations:**

*To be signed when onsite by Supplier & Joint Venture Representative*

**INSPECTION SIGN OFF**

**Inspection undertaken by:** ..... **JV Authorised Date:**  
**Rep)**

Name & Signature Required

**Inspection undertaken by:**..... **(Subcontractor Date:**  
**Rep)**

Name & Signature Required

**PROVIDE SIGNED COPY OF COMPLETED FORM & SUPPORTING DOCUMENTS TO ENVIRONMENT TEAM**

# **Appendix P**

## Urban Design & Landscape Management Plan



# **Appendix Q**

## Biodiversity Offset Strategy and Package



# **Appendix R**

## Mitigation Framework

# **Appendix S**

## Flora Translocation Strategy