



APPENDIX B2

Construction Flora and Fauna Management Plan

Halfway Creek to Glenugie

Pacific Highway Upgrade

MAY 2015



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Glossary / Abbreviations

CEMP	Construction Environmental Management Plan
CMC	Civil Mining and Construction Pty Ltd
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
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	<i>NSW Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>
EWMS	Environmental Work Method Statements
CFFMP	Construction Flora and Fauna Management Plan
FM Act	<i>NSW Fisheries Management Act 1994</i>
HBT	Habitat Tree
LoC	Limit of Clearing
Minister, the	NSW Minister for Planning
NPW Act	<i>NSW National Parks and Wildlife Act 1974</i>
NW Act	<i>NSW Noxious Weeds Act 1993</i>
SSI	State significant infrastructure
OEH	NSW Office of Environment and Heritage
Project, the	Halfway Creek to Glenugie Section 2 Woolgoolga to Ballina Pacific Highway Upgrade Project
Roads and Maritime,	NSW Roads and Maritime Services
Secretary	Secretary of the Department of Planning and Environment
SPIR	Woolgoolga to Ballina Pacific Highway Upgrade Submissions Preferred Infrastructure Report (November, 2013)
TSC Act	<i>NSW Threatened Species Conservation Act 1995</i>

1 Introduction

1.1 Context

This Construction Flora and Fauna Management Plan (CFFMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the upgrade of the Pacific Highway from Halfway Creek to Glenugie (the Project). The Project is Section 2 of the Woolgoolga to Ballina (W2B) Pacific Highway upgrade project, approved by the Minister for Planning in June 2014.

This CFFMP 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 (Nov 2013) and all applicable legislation.

The existing Glenugie Upgrade project ties into the northern extent of this project. The Glenugie project was approved separately by the Minister for Planning. Relevant conditions of approval for this project have been referenced in the CEMP and plans as appropriate.

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 (November 2013), with applicable management measures incorporated into this CFFMP. 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. The offset strategy would be further developed by Roads and Maritime in consultation with the Environment Protection Agency, Department of Primary Industries (Fishing and Aquaculture) and the Commonwealth Department of the Environment and would be subject to the approval of the Secretary, Department of Planning and Environment as per condition D3.

1.3 Environmental management systems overview

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

The CFFMP is part of the CMC 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 Environment Protection Authority, Department of Primary Industries (Fishing and Aquaculture) and the Commonwealth Department of the 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 CMC 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 CFFMP 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.
- No 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.
- No 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 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*.
- *Environment 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. A cross reference is also included to indicate where the condition is addressed in this Plan or other Project management documents.

Table 3-1 Conditions of Approval relevant to the CFFMP

CoA No.	Condition Requirements	Document Reference
BIODIVERSITY		
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"> (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); (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; (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); (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 (e) clearing of Koala (<i>Phascolarctos cinereus</i>) primary and secondary habitat shall be limited to a total area of 375 hectares. 	This plan Table 6.1
B2	Where feasible and reasonable, remnant vegetation shall be retained between the SSI boundary and the SSI footprint.	This plan Table 6,1 FF8
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
B5.	<p>Pre clearing</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>	This plan
B6.	<p>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.</p>	This plan
B10.	<p>Connectivity</p> <p>Subject to conditions B11 and B12, the Applicant shall revise the Connectivity Strategy identified in the documents listed in condition A2(e), based on the outcomes of the Mitigation Framework required by condition D1.</p> <p><i>Note:</i></p> <ul style="list-style-type: none"> <i>The requirements for the Connectivity Strategy are contained in condition D2.</i> 	
B12.	<p>Investigations into the location and design of connectivity structures, including but not limited to those identified in the documents listed under conditions A2(c) and A2(e), shall be undertaken during detailed design with the input of a suitably qualified and experienced ecologist. The investigations shall be undertaken in consultation with the OEH, DPI (Fisheries) and DoE and include workshops and on-site ground verification. The results of these investigations shall be detailed in the Connectivity Strategy required under condition D2.</p>	
B13.	<p>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</p>	The plan

CoA No.	Condition Requirements	Document Reference
	least the pre-construction condition or better, unless otherwise agreed by DPI (Fisheries).	Appendix C
B38	Watercourse crossings shall be designed and constructed in consultation with the DPI (Fisheries), EPA, NOW and DoE, and where feasible and reasonable, be consistent with the Guidelines for Controlled Activities Watercourse Crossings (Department of Water and Energy, February 2008), Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (Fairfull and Witheridge, 2003), Policy and Guidelines for Fish Friendly Waterway Crossings (NSW Fisheries, February 2004), and Policy and Guidelines for Fish Habitat Conservation and Management (DPI Fisheries, 2013). Where multiple cell culverts are proposed for crossings of fish habitat streams, at least one cell shall be provided for fish passage, with an invert or bed level that mimics watercourse flows.	This Plan Appendix C and E
B39	<p>All crossings of known Giant Barred Frog habitat or waterways with the confirmed presence of the species shall be designed and constructed with bridges. Should the Applicant construct a crossing structure other than a bridge, the Applicant shall demonstrate maintained connectivity for the Giant Barred Frog upstream and downstream of that crossing for a monitoring period of three consecutive years, or such other period agreed by the Secretary in consultation with the OEH.</p> <p>Demonstration of maintained habitat connectivity shall:</p> <ul style="list-style-type: none"> (a) be based on baseline data that confirms the presence, nature and distribution of Giant Barred Frog population using a survey methodology that has been endorsed by the OEH, and detailed in the Mitigation Framework required in condition D1, and an assessment of the connectivity of the crossing site prior to commencement; or, if adequate baseline data is not provided to the satisfaction of the Secretary, be based on the assumption of occurrence of a population on either side of the crossing site; and (b) be based on evidence that the Giant Barred Frog has remained present upstream and downstream of the crossing site for the monitoring period, with periodic monitoring to occur at least biannually. Should the results of any instance of periodic monitoring record an absence of the Giant Barred Frog, the Applicant shall be required to demonstrate that this change is not as a result of 	This Plan Appendix E

CoA No.	Condition Requirements	Document Reference
	<p>the SSI within one month of the completion of that instance of periodic monitoring, to the satisfaction of the Secretary. Should the Secretary not be satisfied that the change is not a result of the SSI, the SSI will be deemed as the cause of the impact and the Applicant shall offset the loss of the habitat in accordance with this approval.</p>	
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING		
D1.	<p>The Applicant shall develop a framework for finalising mitigation measures for threatened species. This Mitigation Framework shall be developed by a suitably qualified and experienced ecologist in consultation with DPI (Fisheries), OEH 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> <ul style="list-style-type: none"> (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 relevant to compliance with relevant NSW and Commonwealth field survey methods and guidelines; (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); (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; (d) provision for updating the relevant Threatened Species Management Plans required under condition D8; and (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. 	Appendix S

CoA No.	Condition Requirements	Document Reference
D2	<p>The Applicant shall prepare and implement a Connectivity Strategy, 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 OEH, DPI (Fisheries) and DoE, to the satisfaction of the Secretary. The Strategy shall include:</p> <ul style="list-style-type: none"> (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; (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); (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"> (i) maintain or improve connectivity and movement pathways; (ii) reduce the risk of mortality for threatened species; (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; (d) the results of surveys undertaken to determine the habitat, species movement patterns, distribution of species to confirm the design and location; (e) consideration of connectivity under the existing highway, service roads and local roads (servicing over 100 vehicles per day); (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; (g) commitment to implement the landscaping of vegetation leading to connectivity structures; (h) a fencing strategy, describing the location, design and length of fencing, which must extend beyond the edges of habitat for threatened species; 	Appendix C Connectivity Strategy

CoA No.	Condition Requirements	Document Reference
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- (i) the maintenance of connectivity measures and fencing for the life of the impact of the action, including the timing and frequency;
- (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 OEH on flood immunity levels shall be obtained prior to the commencement of construction of the relevant stage;
- (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 OEH, 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;
- (l) detailed consideration of the effects of connectivity structures on the maintenance or improvement of population viability and gene flow; and
- (m) incorporate the outcomes of the Mitigation Framework required under condition D1.

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.

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.

The Applicant shall demonstrate to the satisfaction of the Secretary how public authority comments on the Strategy have been addressed.

CoA No.	Condition Requirements	Document Reference
	The Strategy may be submitted in stages to suit the staging of the SSI.	
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 Nest Box Plan 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>Translocation Strategy</p> <p>The Applicant shall prepare and implement a Flora Translocation Strategy to determine the feasibility and potential efficacy of translocation measures (as identified in the threatened species 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 OEH and DoE, and to the satisfaction of the Secretary. The Strategy shall include:</p> <ul style="list-style-type: none"> (a) a feasibility assessment of timeframe and staging requirements, availability of expertise, risk effectiveness analysis and availability/suitability of translocation sites; (b) detail of species specific information on the proposed methods of, and discussion of results of past recorded responses to, translocations; (c) a framework for the translocation process applicable to each affected species; and (d) consideration of appropriate compensatory habitat in the Biodiversity Offsets Package required under condition D5 where translocation is not reasonable or feasible. 	Appendix T

CoA No.	Condition Requirements	Document Reference
D8	<p>Threatened Species Management Plans</p> <p>The Applicant shall prepare and implement Threatened Species Management Plans 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 OEH, 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"> (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; (b) identification of potential impacts on each species; (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 data and maintain connectivity for the relevant species; (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; (e) monitoring methodology for threatened flora and fauna adjacent to the SSI footprint, (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; (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 	Appendix E, G, H, I, J

CoA No.	Condition Requirements	Document Reference
	<p>construction and operation of the SSI, including the proposed timing, and duration of that monitoring;</p> <ul style="list-style-type: none"> (h) provision for the assessment of monitoring data to identify changes to habitat usage and whether this can be attributed to the SSI; (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; (j) mechanisms for the monitoring, review and amendment of these plans; (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 OEH, DPI (Fisheries) and DoE; and (l) provision for annual reporting of monitoring results to the Secretary and the OEH, DPI (Fisheries) and DoE, or as otherwise agreed by those agencies. <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 management plans, including analysis of potential risk to the threatened species.</p> <p>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.</p>	
D9	<p>Koala Management Plan</p> <p>As part of the Threatened Species Management Plans required under condition D8, the Applicant shall prepare and implement a Koala Management Plan. 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"> (a) results of detailed surveys to determine: <ul style="list-style-type: none"> (i) habitat use and movement patterns of Koala populations within five kilometres 	Appendix H

CoA No.	Condition Requirements	Document Reference
	<p>of the proposed upgrade, or such area as determined by the independent ecologist; and</p> <p>(ii) habitat areas likely to be fragmented by the SSI; including the results of SPOT assessment and radio tracking. 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;</p> <p>(b) 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;</p> <p>(c) a detailed description, including the location and design, of all proposed avoidance and mitigation measures;</p> <p>(d) justification that the location and design of mitigation measures:</p> <p>(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;</p> <p>(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 OEH;</p> <p>(iii) provide sufficient opportunities for species dispersal and re-colonisation as determined by the independent ecologist and OEH;</p> <p>(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 OEH;</p> <p>(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</p>	

CoA No.	Condition Requirements	Document Reference
	<p>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;</p> <ul style="list-style-type: none"> (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); (vii) effectively minimise the risk of predation from dogs in both dedicated and combined crossings; (viii) provide dry passage for dedicated fauna crossings and for combined fauna crossings to the satisfaction of OEH and DoE, at a flood immunity level determined in accordance with condition D2(c)(j); (ix) provide habitat linkages to crossing structures from adjacent Koala habitat; and (x) ensures that pathways to connectivity structures are not impeded by ancillary facilities, rest areas, service roads or local roads; <ul style="list-style-type: none"> (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 OEH 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 length of 50 metres; (f) provision for the installation and vegetation planting of fauna overpasses prior to the commencement of construction; (g) a revegetation strategy 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; (h) details of the proposed monitoring methodology to ensure the effectiveness of the mitigation measures. Monitoring shall: <ul style="list-style-type: none"> (i) include goals that demonstrate the mitigation measures are effective, including clear objectives, milestones, performance measures, corrective actions, and thresholds for corrective actions, and timeframes for completion; (ii) occur until such time as the mitigation measures are demonstrated to be 	

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	<p>effective for three consecutive monitoring periods, or as agreed by the Secretary, to the satisfaction of the independent ecologist and OEH; and</p> <p>(iii) for the purposes of the Coolgardie/Bagotville population, consider the results of the surveys undertaken in the Koala habitat and population assessment: Ballina Shire Council LGA (Biolink Ecological Consultants Pty Ltd, November 2013) in determining the baseline population;</p> <p>(i) where the results of monitoring undertaken in accordance with condition D9(h) suggests that the mitigation measures are ineffective or changes to the population have occurred, the Applicant shall provide the Secretary, within one month of recording the changes, the corrective actions that have been implemented and/or proposed to be implemented, or a procedure for demonstrating that this change is not a result of the SSI. Should the Applicant be unable to demonstrate to the satisfaction of the Secretary that any change to the population is not attributable to the SSI, the SSI shall be deemed as the cause of the impact and the Applicant shall, within one month of these findings, provide, to the satisfaction of the Secretary, in consultation with the OEH and DoE, the proposed corrective actions to address the impacts of the SSI. Any required corrective actions shall include, but not necessarily be limited to:</p> <p>(i) installation of further crossings or modifications to existing crossings and the provision of evidence of the complete, safe crossing of these fauna crossings by the Koala. Any additional crossings shall be provided at a sufficient frequency to ensure that habitat connectivity is maintained or improved from pre-construction conditions, within two years of their installation; and</p> <p>(ii) reassessment of all revegetation areas and frequent reporting and maintenance including addressing failures;</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;</p>	

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	<p>and/or</p> <p>(iv) development of a long term predator control program; and</p> <p>(k) evidence of consultation with species experts, OEH and DoE in addressing the requirements of this condition, and demonstration of how comments provided by the species experts, OEH 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>CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN</p>		
<p>As part of the Construction Environmental Management Plan for the SSI, the Applicant shall prepare and implement:</p>		
D26(e)	<p>A Construction Flora and Fauna Management Plan to detail how construction impacts on ecology will be minimised and managed. The Plan shall be prepared by a suitably qualified and experienced ecologist and developed in consultation with the OEH, DPI (Fisheries) and DoE, and shall include, but not necessarily be limited to:</p> <ul style="list-style-type: none"> (i) details of pre-construction surveys undertaken by a suitably qualified and experienced ecologist to verify the SSI footprint based on detailed design; (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; (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; (iv) a protocol for the removal and relocation of fauna during clearing, including provision for engagement of a suitably qualified and experienced 	<p>This plan</p> <p>Section 5.2.1</p> <p>Section 5.2.1</p> <p>Table 6.1 FF11</p> <p>Table 6.1 FF10</p>

CoA No.	Condition Requirements	Document Reference
	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;	
	(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 measures for the management and maintenance of rehabilitated areas;	CEMP Appendix A7
	(vii) weed management measures focusing on early identification, suppression and control of invasive weeds and effective management controls;	Appendix P
	(viii) a protocol for managing aquatic and terrestrial pest animal/invasive species and plant species, and pathogens;	Appendix P
	(ix) consideration of the Threatened Species Management Plans;	Table 6.1 F24 – F27
	(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;	
	(xi) a procedure for dealing with unexpected EEC/threatened species identified during construction, including cessation of work and notification of the OEH, 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 O
	(xii) mechanisms for the monitoring, review and amendment of this plan.	Chapter 8

CoA No.	Condition Requirements	Document Reference
2.2 (Glenugie Upgrade 2009)	<p>Prior to the commencement of construction the Proponent shall develop and implement a strategy for the minimisation of impacts to the <i>Melaleuca irbyana</i> species. The strategy shall be developed in consultation with DECCW, to the satisfaction of the Director General, and include:</p> <ul style="list-style-type: none"> a) consideration of options for avoiding direct impacts to known individuals during detailed design of the project, including in relation to ancillary infrastructure and works; b) translocation of affected individuals in consultation with DECCW, where feasible, including identification and assessment of recipient sites, monitoring and maintenance requirements after translocation, and any reporting/ recording of the translocation process; and c) measures to avoid indirect impacts to known individuals in proximity to construction areas, including demarcation of construction zones and staff! contractor education. Implementation of the Package shall commence prior to the disturbance of any <i>Melaleuca Irbyana</i> individual, unless otherwise agreed by the Director General. 	Appendix B
2.3 (Glenugie Upgrade 2009)	<p>Prior to the commencement of construction the Proponent shall develop a Square-fruited Ironbark Offset Package in consultation with EPA and DEWHA, to the satisfaction of the Director General. The Package shall include one or more of the following compensatory measures:</p> <ul style="list-style-type: none"> a) land offsets intended for the conservation of existing <i>Eucalyptus tetrapleura</i> individuals or translocation of individuals affected by the project; and/ or b) funding contributions towards the development and implementation of recovery plans for <i>Eucalyptus tetrapleura</i>; and/ or c) funding contributions towards the development and implementation of research programs into <i>Eucalyptus tetrapleura</i>; and/ or d) any other form of offset measure agreed by DEWHA. <p>Implementation of the Package shall commence prior to the disturbance of any <i>Eucalyptus tetrapleura</i> individual, unless otherwise agreed by the Director General.</p>	Biodiversity Offset Strategy
2.3 (Glenugie Upgrade 2009)	<p>Prior to the commencement of vegetation clearing, the Proponent shall employ a suitably qualified ecologist to undertake surveys for tree hollows within vegetation to be cleared as part of the project. Should any such hollows be located during the survey(s), the timing and number of nest boxes to be installed in an appropriate adjacent area as an alternative roosting site shall be</p>	Appendix A

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	determined by the Proponent in consultation with the DECCW and I&INSW and to the satisfaction of the Director General.	

Note: DECCW was dissolved in 2009 and became the DP&E

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 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
- Swamp Sclerophyll Forest 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

The location of these EEC's 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.

Table 4-1 Threatened or otherwise significant plant species

Common name	Scientific name	EPBC Act	TSC Act	Occurrence
Square-fruited ironbark	<i>Eucalyptus tetrapleura</i>	Vulnerable	Vulnerable	Identified
Slender screw fern	<i>Lindsaea incisa</i>	Endangered	Endangered	Identified
Maundia	<i>Maundia triglochinosoides</i>	-	Vulnerable	Identified
Square-stemmed olax	<i>Olax angulate</i>	-	Vulnerable	Identified
Water nutgrass	<i>Cypres aquatilis</i>	Not listed	Endangered	Identified

The location of threatened 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

Seven fauna habitat types were identified by the EIS. These are listed below and shown on the Sensitive Area Maps included at Appendix A5 of the CEMP.

Table 4-2 Fauna habitat types

Name	Habitat features
Dry forest habitats	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

	<p>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> <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.</p>
Wetland habitats	<p>A range of freshwater wetland forests occur in floodplain areas throughout the project. These comprise both permanent and ephemeral wetlands. Species dominating the upper strata include Lepironia (<i>Lepironia articulata</i>) and Common Reed (<i>Phragmites australis</i>). Jointed Baumea (<i>Baumea articulata</i>), Common Baumea (<i>Baumea rubiginosa</i>) and Tall Knotweed (<i>Persicaria lapathifolium</i>) are also common occurrences. Bungwahl Fern (<i>Blechnum indicum</i>) and Bristly Knotweed (<i>Persicaria strigosa</i>) dominate the lower strata, with Swamp Rice Grass (<i>Leersia hexandra</i>), Rough Ground Fern (<i>Hypolepis muelleri</i>) and Triglochin (<i>Triglochin procerum</i>) commonly occurring.</p> <p>These freshwater wetland habitats offer foraging, shelter, roosting and breeding habitat for a range of fauna including frogs, fish, turtles, waterbirds and a diversity of micro- and macro-invertebrates. The frog families represented are Myobatrachidae (southern frogs) and Hylidae (tree frogs), including the threatened Green and Golden Bell Frog. Freshwater wetland habitat provides potential breeding sites for local populations of waterbirds as well as habitat for migratory birds. Threatened or migratory waterbirds which use wetland habitat within the study area include Black-necked Stork, Latham's Snipe and Comb-crested Jacana. These areas are also important for threatened frog species such as Wallum Froglet and Olongburra Frog, and the threatened fish species Oxleyan Pygmy Perch.</p>
Lowland rainforest	<p>Lowland rainforest is typically highly structurally diverse and productive, providing a range of habitat for fauna. These areas support hollow bearing trees, and year-round flowering and fruiting plants, providing a reliable food source for terrestrial and arboreal animals.</p> <p>The dominant tree cover consists of Bangalow Palms (<i>Archontophoenix</i></p>

cunninghamiana), Turpentine (*Syncarpia glomulifera*), Swamp Turpentine (*Lophostemon suaveolens*) and Paperbarks (*Melaleuca spp.*). The ground layer is sparse with ferns, *Lomandra spp.*, *Gahnia spp.* and *Cordyline* most prominent. Vines and epiphytes are common.

Species that prefer moist forest habitats, including rainforest, are fruit-dove species, Sooty Owl, Giant-barred and Stuttering Frogs, Golden-Tipped Bat, Common Blossom Bat and Stephen's Banded Snake. Other threatened species within adjoining vegetation communities also make use of the rainforest remnants on a seasonal basis.

Cleared and modified habitats

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.

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 *Paspalum (Paspalum dilatatum)* and Kikuyu (*Pennisetum clandestinum*).

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.

4.1.4 Threatened fauna

Threatened fauna species identified during survey (confirmed) and those which have been previously recorded in the area are listed in Table 4-3.

Table 4-3 Threatened fauna

Common name	Scientific name	EPBC Act	TSC Act	Occurrence
Wetland and migratory bird species				
Australasian bittern	<i>Botaurus poiciloptilus</i>	Endangered	Endangered	Identified
Black-necked stork	<i>Ephippiorhynchus asiaticus</i>	-	Endangered	Identified
Magpie goose	<i>Anseranas semipalmata</i>	-	Vulnerable	Identified
Brolga	<i>Grus rubicundus</i>	-	Vulnerable	Identified
Australian painted snipe	<i>Rostratula australis</i>	Vulnerable, Migratory	Endangered	Potential
Pale-vented bush hen	<i>Amauromis molucanna</i>	-	Vulnerable	Potential
Comb-crested jacana	<i>Irediparra gallinacea</i>	-	Vulnerable	Potential
Black bittern	<i>Ixobrychus flavivollis</i>	-	Vulnerable	Potential
Freckled duck	<i>Stictonetta naevosa</i>	-	Vulnerable	Potential
Large forest owls and other nocturnal birds				
Powerful owl	<i>Ninox strenua</i>	-	Vulnerable	Identified
Eastern grass owl	<i>Tyto longimembris</i>	-	Vulnerable	Identified
Masked owl	<i>Tyto novaehollandiae</i>	-	Vulnerable	Identified
Sooty owl	<i>Tyto tenebricosa</i>	-	Vulnerable	Identified
Barking owl	<i>Ninox connivens</i>	-	Vulnerable	Potential
Woodland birds				

Common name	Scientific name	EPBC Act	TSC Act	Occurrence
Brown treecreeper	<i>Climacteris picumnus</i>	-	Vulnerable	Identified
Black-chinned honeyeater	<i>Melithreptus gularis gularis</i>	-	Vulnerable	Identified
Bush stone-curlew	<i>Burhinus grallarius</i>	-	Endangered	Identified
Swift parrot	<i>Lathamus discolor</i>	Endangered, Migratory	Endangered	Potential
Regent honeyeater	<i>Zanthomyza phrygia</i>	Endangered, Migratory	Endangered	Potential
Rainforest birds				
Double-eyed fig-parrot	<i>Cyclopsitta diophthalma coxeni</i>	Endangered	Critically endangered	Potential
Wompoo fruit-dove	<i>Ptilinopus magnificus</i>	-	Vulnerable	Potential
Superb fruit-dove	<i>Ptilinopus superbus</i>	-	Vulnerable	Potential
Rose-crowned fruit dove	<i>Ptilinopus regina</i>	-	Vulnerable	Potential
Forest birds				
Eastern osprey	<i>Pandion haliaetus</i>	Migratory	Vulnerable	Identified
Glossy black-cockatoo	<i>Calyptorhynchus lathami</i>	-	Vulnerable	Identified
Grey-crowned babbler	<i>Pomatostomus temporalis temporalis</i>	-	Vulnerable	Identified
Coastal emu	<i>Dromaius novaehollandiae</i>	-	Endangered	Identified
Little eagle	<i>Erythrotriorchis radiates</i>	-	Vulnerable	Potential
Square-tailed kite	<i>Lophoictinia isura</i>	-	Vulnerable	Potential
Red goshawk	<i>Erythrotriorchis radiates</i>	Vulnerable	Critically endangered	Potential
Little lorikeet	<i>Glossopsitta pusilla</i>	-	Vulnerable	Potential
Ground parrot	<i>Pezoporus wallicus wallicus</i>	-	Vulnerable	Potential
Barred cuckoo-shrike	<i>Coracina lineata</i>	-	Vulnerable	Potential
Mangrove honeyeater	<i>Lichenostomus fasciulari</i>	-	Vulnerable	Potential
Large forest owls and other nocturnal birds				
Grass owl	<i>Tyto longimembris</i>	-	Vulnerable	Potential
Microchiropteran bats				
Hoary wattled bat	<i>Chalinolobus nigrogriseus</i>	-	Vulnerable	Identified
Eastern false pipistrelle	<i>Falsistrellus tasmaniensis</i>	-	Vulnerable	Identified
Golden-tipped bat	<i>Kerivoula papuensis</i>	-	Vulnerable	Identified
Little bent-wing bat	<i>Miniopterus australis</i>	-	Vulnerable	Identified
Eastern bent-wing bat	<i>Miniopterus schreibersii oceanensis</i>	-	Vulnerable	Identified
Eastern freetail-bat	<i>Mormopterus</i>	-	Vulnerable	Identified

Common name	Scientific name	EPBC Act	TSC Act	Occurrence Likelihood
<i>norfolkensis</i>				
Southern myotis	<i>Myotis macropus</i>	-	Vulnerable	Identified
Eastern long-eared bat	<i>Nyctophilus bifax</i>	-	Vulnerable	Identified
Yellow-bellied sheath-tail-bat	<i>Saccolaimus flaviventris</i>	-	Vulnerable	Identified
Greater broad-nosed bat	<i>Scoteanax rueppellii</i>	-	Vulnerable	Identified
Eastern cave bat	<i>Vespadelus troughtoni</i>	-	Vulnerable	Identified
Large-eared pied-bat	<i>Chalinolobus dwyeri</i>	Vulnerable	Vulnerable	Potential
Beccari's freetail-bat	<i>Mormopterus beccari</i>		Vulnerable	Potential
Arboreal mammals				
Yellow-bellied glider	<i>Petaurus australis</i>	-	Vulnerable	Identified
Squirrel glider	<i>Petaurus norfolkensis</i>	-	Vulnerable	Identified
Brush-tailed phascogale	<i>Phascogale tapoatafa</i>		Vulnerable	Identified
Koala	<i>Phascolarctos cinereus</i>	Vulnerable	Vulnerable	Identified
Eastern pygmy-possum	<i>Cercartetus nanus</i>	-	Vulnerable	Potential
Ground-dwelling mammals				
Rufous bettong	<i>Aepyprymnus rufescens</i>	-	Vulnerable	Identified
Common planigale	<i>Planigale maculata</i>	-	Vulnerable	Identified
Spotted-tailed quoll	<i>Dasyurus maculatus maculatus</i>	Endangered	Vulnerable	Identified
Long-nosed potoroo	<i>Potorous tridactylus tridactylus</i>	Vulnerable	Vulnerable	Identified
Megachiropteran bats				
Greh-headed flying-fox	<i>Pteropus poliocephalus</i>	Vulnerable	Vulnerable	Identified
Common blossom-bat	<i>Syconycteris australis</i>	-	Vulnerable	Identified
Wetland and swamp dwelling frogs				
Wallum froglet	<i>Crinia tinnula</i>	-	Vulnerable	Identified
Green-thighed frog	<i>Litoria brevipalmata</i>	-	Vulnerable	Identified
Olongburra frog	<i>Litoria olongburensis</i>	Vulnerable	Vulnerable	Identified
Stream dwelling frogs				
Giant barred frog	<i>Mixophyes iteratus</i>	Endangered	Endangered	Identified
Reptiles				
Stephens' banded snake	<i>Hoplocephalus stephensii</i>	-	Vulnerable	Identified
Pale-headed snake	<i>Hoplocephalus bitorquatus</i>	-	Vulnerable	Potential
Fish				

Common name	Scientific name	EPBC Act	TSC Act	Occurrence Likelihood
Purple-spotted gudgeon	<i>Mogurnda adspersa</i>	-	Endangered	Potential
Eastern freshwater cod	<i>Maccullochella ikei</i>	Endangered	Endangered	Potential
Invertebrates				
Pink underwing moth	<i>Phyllodes imperialis</i>	Vulnerable	Vulnerable	Identified
Atlas rainforest ground beetle	<i>Nurus atlas</i>	-	Endangered	Identified
Coastal petaltail	<i>Petalura litoera</i>	-	Endangered	Potential

4.1.5 Aquatic fauna

Species recorded in freshwater and estuarine habitats during investigations for the EIS are shown in Table 4-4.

Table 4-4 Aquatic fauna

Habitat	Species
Freshwater Halfway Creek, Glenugie Creek, Wells Crossing,.	16 freshwater fish species were recorded within the Woolgoolga to Ballina Pacific Highway project boundary: 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, oxleyan pygmy perch, and freshwater catfish. The oxleyan pygmy perch is listed as engaged under the Fisheries Management Act and nationally endangered under the EPBC Act. RMS have advised that no Oxleyan Pygmy Perch inhabit streams within the Section 2 project boundaries. Four aquatic invertebrates were recorded within the Woolgoolga to Ballina Pacific Highway project boundary: 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 4-5 Fisheries habitat classifications

Project section	Waterway	Classification
2	Halfway Creek	Class 1
	Wells Crossing	Class 1

. 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 4-5 Fisheries habitat classifications

Project section	Waterway	Classification
2	Halfway Creek	Class 1
	Wells Crossing	Class 1

Classification in accordance with NSW DPI Fisheries Guidelines

4.1.6 Migratory species

A total of ten EPBC Act listed migratory species were confirmed from field surveys (as described in Table 10-12 in the EIS and reproduced as Table 4-6). An additional two migratory species are considered to have a high likelihood of occurring in the study area, these being the Australian Painted Snipe and Spectacled Monarch.

Table 4-6 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.	
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.	Commonly recorded in all project sections 1-5 and 9-11 associated with grazing paddocks particularly in floodplains. Predicted across the entire study area and commonly reported in the Clarence valley wetlands (Smith, 2011) which is traversed by section 3-5.

Migratory species	EPBC status	Act	Preferred habitat	Presence
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).	Was confirmed in a number of sites in project sections 1 and 2 and 6- 8 in dense forest. Predicted throughout the study area in all forested habitats.
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, 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).	Confirmed near Tucabia in Section 3. Predicted throughout the study area in dry forest and woodland habitats, typically prefers more open landscapes.
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 throughout the study area in all forested habitats. Not observed from targeted surveys.
Regent Honeyeater (<i>Xanthomyza phrygia</i>)	Migratory (JAMBA); Endangered (as Anthochaera phrygia)		Forages in swamp and open eucalypt forests, feeding on nectar and pollen of flowering tree species.	Predicted throughout the study area in all forested habitats. Not observed from targeted surveys.
Black-faced Monarch (<i>Monarcha melanopsis</i>)	Marine; Migratory (BONN)		Occurs in rainforest and eucalypt forests, feeding in tangled understorey (Blakers et al., 1984).	Confirmed in dry forest habitat at one site near Tucabia in project section 4. Predicted throughout the study area in all forested habitats. Confirmed in dry forest near Tucabia in Section 4.
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.	One individual confirmed in project section 6 in Doubleduke State Forest. Predicted throughout the study area in all forested habitats.
Latham's Snipe (<i>Gallinago harwickii</i>)	Marine; Migratory(CA MBA, 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	One individual confirmed in project section 3 in the Coldstream wetlands. Predicted throughout the study area particularly in floodplain

Migratory species	EPBC status	Act	Preferred habitat	Presence
			modified or artificial habitats, and in habitats located close to humans or human activity (Frith et al, 1977)	areas of the Richmond River, Clarence River and Corindi River.
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 throughout the study area particularly in floodplain areas of the Richmond River, Clarence River and Corindi River. Not observed during targeted field surveys.
Spectacled Monarch (<i>Monarcha trivirgatus</i>)	Marine; Migratory (BONN)		Occurs in rainforest and eucalypt forests, feeding in tangled understorey (Blakers et al., 1984).	Predicted throughout the study area in all forested habitats. Not observed during targeted field surveys.

Footnote: BONN – BONN Convention for the Conservation of Migratory Species, CAMBA – China Australia Migratory Bird Agreement, JAMBA – Japan Australia Migratory Bird Agreement, ROKAMBA – Republic of Korea Migratory Bird Agreement

4.1.7 Endangered populations

No endangered populations were recorded in section 2.

5 Environmental aspects and impacts

The primary objective of this plan is to mitigate potential significant impacts on threatened flora and fauna species identified in as occurring, or within the potential to occur, within the project corridor.

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 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 from vehicle or equipment strike within the construction footprint, or wider fauna mortality as a result of the construction project.
- 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 will be undertaken within all areas that are to be cleared as part of the project. The surveys will be undertaken by a suitably qualified and experienced ecologist and will be undertaken at least 20 working days in advance of clearing activities. Surveys will be limited to the time required to satisfactorily complete the required activities.

Pre-construction surveys will include targeted surveys for threatened species known or predicted to occur (refer to tables 4.1 and 4.3) 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 B and E-K) the pre-construction survey will include:

- 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 overwintering 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 J).
- 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 the clearing phase.

- Baseline noxious weed surveys would be carried out at least four weeks prior to commencement of clearing operations and the Weed and Pathogen Management Plan (Appendix P) 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 two threatened flora species, *Eucalyptus tetrapleura* and *Olax angulate* will be undertaken by Roads and Maritime. Preparation of receiving sites to commence in accordance with the approved Translocation Strategy April 2015. 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 Roads and Maritime Ecologist. Similarly, the SAPs will be updated following pre-construction surveys and distributed to the project team.

▪ 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 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 N.

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 E) 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 may be placed outside the Limit of Clearing (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 H) 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 I) states that an ecologist should be present during all vegetation clearing and habitat removal activities. 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 N). 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 (OEH 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.

5.2.2 Nest Boxes

Nest boxes would be installed in accordance with the Nest Box Management Plan (Appendix A). The plan calls for the installation of 70% of the proposed nest boxes prior to the commencement of construction with the remainder to be installed post commencement of construction. The type and location of each nest box will be determined by the project ecologist in accordance with the Nest Box Plan.

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 Roads and Maritime 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 Roads and Maritime.

Table 6-1 Flora and fauna management and mitigation measures

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
GENERAL					
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 7.2 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. Clearance limits within COA must be adhered to.		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 O) 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 is being finalised based upon the final detailed design. Approval has been sought to commence construction prior to final approval of the strategy.		Pre-construction/ Construction	Environment Manager	Submissions/PIR (B55)
FF6	Monitoring requirements are contained within the individual Threatened Species Management Plans.		Pre-Construction / Construction	Environment Manager	Submissions/PIR (B1)
FF7	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)
VEGETATION CLEARING, PROTECTION AND MANAGEMENT					
FF8	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		Pre-construction / Construction	Project / Site Engineers / Environment	Submissions/PIR (B13) CoA B1, COAB2

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	and reasonable, remnant vegetation shall be retained between the SSI boundary and the SSI footprint. . (refer Clearing and Grubbing Environmental Work Method Statement)			Manager	
FF9	The pre-clearing process will be consistent with RMS Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA projects (RTA, 2011) and follow the Pre-Clearing Checklist (Appendix L).		Pre-construction / Construction	Project / Site Engineers / Supervisor / Environment Manager	Submissions/PIR (B23)
FF10	To prevent injury and mortality of fauna during the clearing of vegetation and drainage of farm dams 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 N).		Construction	Environment Manager	Submissions/PIR (B32)
FF11	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 / Supervisor / Environment Manager	G36 (Section 4) G40 (Section 2.4)
FF12	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. The installation of fauna exclusion fencing, both temporary and permanent, shall minimise vegetation clearing. This measure should include the timing of installation of the fauna exclusion fencing.		Pre-construction and construction	RMS	Submissions/PIR (B5)
FF13	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		Pre-construction	RMS	Submissions/PIR (B7)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	be safely retained close to the road edge.				
FF14	The design and construction of fauna exclusion fencing, drainage or fauna underpass structures in widened medians and minimise vegetation clearing.		Pre-construction and construction	RMS and Site Engineer	Submissions/PIR (B8)
FF15	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	Project / Site Engineers / Supervisor / Environment Manager	Submissions/PIR (B9)
FF16	Weeds and pathogens will be managed in accordance with the Weed and Pathogen Management Plan (Appendix P).		Construction	Project / Site Engineers / Supervisor / Environment Manager	G36 (Section4) Submissions/PIR (B27)
FF17	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 and Pathogen Management Plan will be in accordance with the Department of Primary Industries Alligator Weed control manual (van Oosterhout, 2007).		Pre-construction		Submissions/PIR (B28)
FF18	The Urban Design and Landscape Management Plan (CoA D20) will be implemented.		Construction	Project / Site Engineers / Supervisor / Environment Manager	Submissions/PIR (B12)
FF19	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 to RMS and the ER and		Pre-construction / Construction	Project / Site Engineers / Supervisor / Environment Manager	CoA B5, CoA B6

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	clearing work stopped to allow for an evaluation of an appropriate response (refer Appendix O)				
FF20	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 / Supervisor / Environment Manager	CoA B3
THREATENED FLORA					
FF21	The measures identified in the Threatened Flora Management Plan (Appendix B) will be implemented.		As specified	Environment Manager	Submissions/PIR (B11)
THREATENED FAUNA					
FF22	The Nest Box Plan (Appendix A) will be implemented.		Pre-construction As specified	Environment Manager	Submissions/PIR (B31)
FF23	The measures identified in the Threatened Frog Management Plan (Appendix E) will be implemented.		Pre-construction As specified	Environment Manager	Submissions/PIR (B11)
FF24	The measures identified in the Koala Management Plan (Appendix H) will be implemented.		Pre-construction As specified	Environment Manager	Submissions/PIR (B11)
FF25	The measures identified in the Threatened Glider Management Plan (Appendix I) will be implemented.		Pre-construction As specified	Environment Manager	Submissions/PIR (B11)
FF26	The measures identified in the Micro-bat Management Plan (Appendix J) will be implemented.		Pre-construction As specified	Environment Manager	Submissions/PIR (B11)
FAUNA HABITATS AND CONNECTIVITY					
FF27	The Connectivity Strategy (Appendix C) will be implemented.		Pre-construction	Environment Manager / Supervisor	Submissions/PIR (B2, B3 and B4)
FF28	The location of exclusion zones will be identified, with temporary fencing or flagging tape to indicate the limits of clearing (in accordance with the RMS Biodiversity Guidelines (RTA, 2011a)) and be installed prior to any works in the vicinity.. Permanent fauna exclusion fencing		Construction	Environment Manager / Supervisor	Submissions/PIR (B24)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	for the project (as described in the Connectivity Strategy), where reasonable and feasible, will be installed prior to clearing.				
FF29	<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"> • Contact vet and/or wildlife carers to ensure they are willing to assist in treating injured animals if necessary • An experienced and licensed wildlife carer and/or ecologist will be present during all habitat removal activities to capture and relocate any encountered fauna • Remove non-habitat vegetation first • Identified habitat (eg hollow-bearing trees) will be left for at least 24 hours after removing non-habitat vegetation to allow fauna to escape. • Remove habitat trees as carefully as possible to avoid injury to any fauna still remaining in trees. • An experienced and licensed wildlife carer and/or ecologist will inspect habitat once it is removed. • 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). • Outcomes of the clearing process will be recorded to relevant personnel (eg environment manager or RMS regional environment staff). 		Construction	Environment Manager / Supervisor	Submissions/PIR (B25)
FF30	Woody debris and bushrock will be re-used on site for habitat improvement where possible as detailed in the Landscape Management Plan(and the Roads and Maritime Biodiversity Guidelines (RTA 2011)		Construction	Environment Manager / Supervisor	Submissions/PIR (B26)

AQUATIC HABITATS

ID	Measure / Requirement	Resources	When to	Responsibility	Reference
FF31	Prior to any disturbance of waterway banks, a thorough inspection by a qualified ecologist will be undertaken for aquatic fauna such as turtle nests.		Construction	Environment Manager	Submissions/PIR (B33)
FF32	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)
FF33	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)
FF34	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)
FF35	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 / Supervisor	Submissions/PIR (B37)
FF36	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 / Supervisor	CoA B13
FF37	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)
FF38	Where feasible and reasonable within the road corridor, existing pools will be retained upstream and downstream of crossings to provide resting and refuge habitat near crossing structures.		Construction	Environment Manager	Submissions/PIR (B39)
FF39	Appropriate plant species will be incorporated into the rehabilitation of disturbed aquatic habitats and drains		Construction	Project / Site Engineers /	Submissions/PIR (B40)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	disturbed as a result of construction.			Supervisor / Environment Manager	
FF40	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 / Supervisor / Environment Manager	Submissions/PIR (B41)
FF41	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 consultation with Environment Protection Agency and Department of Primary Industries (Fisheries).		Construction	Environment Manager	Submissions/PIR (B42)
FF42	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 / Supervisor / Environment Manager	Submissions/PIR (B22)
PESTS AND DISEASES					
FF43	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"> • Survey (soil sampling) to identify the presence of Phytophthora • Chytrid pathogen mitigation will be undertaken in accordance with the approved frog management plan. • A background search of government-maintained websites for the most up-to-date hygiene protocols for each pathogen • Provide vehicle and boot wash down facilities and ensure vehicles and footwear is free of soil before 		Pre-construction / Construction	Project / Site Engineers / Supervisor / Environment Manager	Submissions/PIR (B29) G36 4.17

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	<p>entering or exiting the site</p> <ul style="list-style-type: none"> 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 Construction works will be programmed to move from uninfected areas to any known infected areas Restrict vehicles to designated tracks, trails and parking bays A Weed and Pathogen Management Plan (Appendix P) has been prepared to manage pests and diseases within the site. 				
FF44	<p>If pathogens are identified on site:</p> <ul style="list-style-type: none"> Testing may be required to confirm the presence of pathogens Advice from government departments will be sought on practical hygiene management measures Fenced exclusion zones will be identified to restrict access into contaminated areas. 		Construction	Project / Site Engineers / Supervisor / Environment Manager	Submissions/PIR (B30) G36 4.17
BRIDGE AND CULVERT DESIGN					
FF45	<p>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.</p>		Pre-construction	Project / Site Engineers / Supervisor / Environment Manager	Submissions/PIR (B14)
FF46	<p>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</p>		Pre-construction	Project / Site Engineers / Supervisor / Environment Manager	Submissions/PIR (B15)
FF47	<p>Each permanent waterway crossing is to be designed to ensure no physical, hydraulic and behavioural barriers to</p>		Pre-construction	Project / Site Engineers /	Submissions/PIR (B17)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	<p>aquatic fauna movements. Impacts would be minimised by ensuring that:</p> <ul style="list-style-type: none"> • The natural stream flow and velocity are maintained as closely as possible • Surface level of any causeway is the same or lower than the natural stream bed to reduce interference with flow • Habitat within a culvert is as natural as possible (eg allow rock and bed materials to infill the culvert base) • There is the maximum light penetration • 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 • 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 • Pools would be constructed or retained upstream and downstream of the waterway crossings to provide resting and refuge habitat near the crossing structures 			Supervisor / Environment Manager	
FF48	<p>Bridge structures would be designed in light of the following principles:</p> <ul style="list-style-type: none"> • Bridges are to be single span bridges with piers located outside the main channel • 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 (eg Broadwater National Park) 		Pre-construction	Project / Site Engineers / Supervisor / Environment Manager	Submissions/PIR (B18)

TEMPORARY AND PERMANENT WATERWAY DIVERSIONS / CROSSINGS

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
FF49	Where temporary access tracks are required over drainage lines with no flow, fords may be installed.		Construction	Project / Site Engineers / Supervisor / Environment Manager	Submissions/PIR (B19)
FF50	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 / Supervisor / Environment Manager	Submissions/PIR (B20)
FF51	<p>General temporary waterway access track mitigation measures would be undertaken:</p> <ul style="list-style-type: none"> • Temporary crossings would be constructed from clean fill using pipe or box culvert cells to carry flows. • 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. • 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). • Scour protection works would be established at temporary crossings as required • At the completion of construction, the temporary crossings would be removed and rehabilitated. 		Construction	Project / Site Engineers / Supervisor / Environment Manager	Submissions/PIR (B21) CoA B8
WATER QUALITY					
FF52	<p>Operational spill basins are to be installed at key locations such as the Wells Crossing Flora Reserve, Wells Crossing and Halfway Creek and other key drainage lines that lead directly into threatened fish habitat.</p> <p>Basins will be designed and constructed to minimise the vegetation clearing requirements. The project ecologist will inspect all proposed sites to identify vegetation to be retained.</p>		Construction / Operation	Project / Site Engineers / Supervisor / Environment Manager	Submissions/PIR (B44)

ID	Measure / Requirement	Resources	When to	Responsibility	Reference
FF53	Chemicals and fuels would be appropriately stored and banded, away from waterways and drainage lines.		Construction	Project / Site Engineers / Supervisor / Environment Manager	Submissions/PIR (B45)
FF54	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 / Supervisor / Environment Manager	Submissions/PIR (B47)
STOCKPILE AND ANCILLARY FACILITIES MANAGEMENT					
FF55	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 / Supervisor / Environment Manager	Submissions/PIR (B48)
FF56	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 / Supervisor / Environment Manager	Submissions/PIR (B51)
FF57	Ancillary facility - Section 2 site 1a: <ul style="list-style-type: none"> Flag and avoid hollow bearing trees Revegetation of the section of the site in the road reserve or the entire site (if practicable). 		Construction	Supervisor / Environment Manager	Submissions/PIR (B52a)
FF58	Ancillary facility - Section 2 site 5a: <ul style="list-style-type: none"> Avoid isolated trees and flag and avoid hollow bearing trees where possible. Site to remain cleared to benefit emus. 		Construction	Supervisor / Environment Manager	Submissions/PIR (B52b)
FF59	Ancillary facility - Section 2 site 6a and 6b: <ul style="list-style-type: none"> Site to remain clear (not vegetated) to benefit emus. 		Construction	Supervisor / Environment Manager	Submissions/PIR (B52c)

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 and pathogen control measures.
- 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 OEH annually. All monitoring and reporting is to be independently overseen by the project ecologist.

A copy of the ecological monitoring reports shall be provided to the EPA, DP&E and DoE (in relation to EPBC listed species and communities).

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.*
- *Glider Crossing Inspection Report*
- *Fauna Fencing Inspection Report*

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 CFFMP 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 CFFMP 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

N/A

Appendix E
Threatened Frog Management Plan

Appendix F

Rainforest Invertebrates Management Plan (Not used on this project)

Appendix G

Emu Management Plan (Not used on this project)

Appendix H
Koala Management Plan

Appendix I
Glider Management Plan

Appendix J
Micro-bat Management Plan

Appendix K
**Lowland Rainforest Management Plan (Not
used on this project)**

Appendix L
Pre-clearing checklist



Pre Clearing Checklist/Approval

CIV-EN-FRM-0250



Approver: Systems and IT Manager

Reviewer: HSE Manager

Reviewed: 16/06/2015

Project:			Project No:	
Vegetation Clearing Date:			Completion Date	
Clearing Locations				
Ch from	Ch to	Road Name	Location (e.g. East side)	Comments

Action	Yes	No
Are all works in the approved area/ covered by the approved works, approved design refinement, CEMP and EPL (note there are boundary refinements underway).		
Does clearing meet all G 40 clause 2.4 hold point release for clearing requirements, including vegetation to be cleared been clearly delineated and verified by independent surveyor, having a clearing EWMS in place and establishing an internal hold point release system?		
Does clearing meet G 40 clause 2.4 clearing requirements for hold point release for clean water diversions?		
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?		
Has consistent colour flagging used throughout the project and are works within the approved clearing buffers that meet CMC flagging requirements?		
Have Sensitive Area Plans been checked and are there any additional issues requiring attention?		
All trees / vegetation to be retained identified by survey and exclusion areas fenced off? Is Environment Protection signage beside threatened species and heritage issues in place?		
Have relevant fauna rescue organisation been contacted and advised of the proposed clearing to ensure adequate resources available?		
Have habitat trees been identified and appropriately marked by the Project Ecologist.		
Has the 48-hour wait period for habitat trees elapsed? Note no clearing of any habitat trees can be undertaken before 48 hrs without consultation with RMS and the regulatory agencies.		
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?		
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.		
Have the limit of Clearing and Grubbing at waterways being minimised where identified in RMS specifications for bridges, or as otherwise agreed by agencies and approved by RMS.		
Will vegetation to be cleared be initially retained in waterways, either trees or cut stump, or the waterway lined or other measures. Refer bridges above.		
Does the work involve fencing, and what measures have been adopted to avoid impacts on vegetation, threatened species, EEC and heritage outside the boundary or in vegetation remaining inside the boundary.		
Any specific targeted surveys required in this work area? Has required pre clearing flora and fauna survey been undertaken?		



Pre Clearing Checklist/Approval

CIV-EN-FRM-0250



Approver: Systems and IT Manager

Reviewer: HSE Manager

Reviewed: 16/06/2015

Are there any applicable measures outlined in the Koala MP for this clearing and if so how are these addressed?		
Are there any applicable measures outlined in the Biodiversity Mitigation Strategy for this clearing?		
Are there any applicable measures outlined in the Threatened Glider MP for this clearing and if so how are these addressed?		
Are there any applicable measures outlined in the Threatened Frog MP for this clearing and if so how are these addressed? If the clearing is included in the SAPs as frog habitat, what measures are proposed to reduce impacts to frogs?		
Are there any applicable measures outlined in the Threatened Bats for this clearing and if so how are these addressed?		
Are there any applicable measures outlined in the Threatened Flora MP for this clearing and if so how are these addressed?		
Are there any applicable measures outlined in the Nest Box Plan for this clearing and if so how are these addressed?		
Are there any applicable measures outlined in the Traslocation Strategy for this clearing and if so how are these addressed?		
Has weed management been undertaken?		
Have weed and pathogen infested areas been clearly marked?		
Is the Project Ecologist present, including for all habitat tree felling?		
Are any animals present? (If Yes, relocation required)		
Are any active nests present? (If Yes, relocation required)		
Have checks for animals occurred at the appropriate times before clearing? (Dawn, dusk etc.)		
Are the habitat trees managed to place habitat trees on the ground as lightly as possible. G 40 requires a rotating harvester head to do this.		
Have all relevant workers been toolboxed on limit of clearing, fauna handling procedures, importance of avoiding clearing incidents and any other issues?		
Has the plant operator undertaking the clearing walked and identified the clearing limits with high visibility tape		
Has a PESCP Plan been created and have these controls been installed and RMS G 38 hold point released?		
For any controls after clearing, are these being installed immediately after clearing, before any rainfall?		
Are controls installed/ planned for the management of mulch to avoid tannin impacts.		
Any other issues to add/ change.		
Comments: (Over page if required)		



Pre Clearing Checklist/Approval

CIV-EN-FRM-0250



Approver: Systems and IT Manager	Reviewer: HSE Manager	Reviewed: 16/06/2015
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Work is not to commence without Environmental Manager/Officer signature.

Ecologist:	
Environmental Manager/Officer:	

Appendix M
Working Around Trees Guideline



Introduction

Under legislation we have an environmental duty to not cause harm to any trees or vegetation. This guide has been prepared to provide a summary of the standards for protecting and working around trees to ensure our environmental duty has been met.

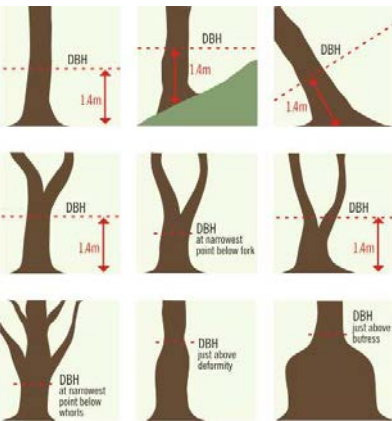
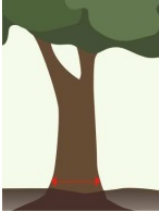
This guide is based on the Australian Standard "Protection of Trees on Development Sites" (AS 4970-2009) and is not designed to replace the standard or any other legislative or contractual requirements.

Planning works

To ensure trees are protected for the life of the project and beyond, Tree Protection Zones (TPZ) and Structural Root Zones (SRZ) should be factored into designs, plans and programs.

The AS 4970-2009 provides a sound base from which plans can be drafted. The Standard should be used in conjunction with advice from Arboricultural consultants, which ensures all aspects of tree protection are taken into account.

Ensure TPZs, SRZ and exclusion zones are calculated and included on project erosion and sediment control plans, project drawings, sensitive area maps, Site Specific Environmental Management Plans (CIV-EN-FRM-0192). You can use the table below or the calculator on the Queensland Arboricultural Association Inc. website to determine whether your works will be within the TPZ or the SRZ. Communicate protection requirements to Supervisors and crews.

Zone	Details	Calculation	Impacts and Risks	Contact an arborist
<p>Tree Protection Zone (TPZ)</p>	<p>A TPZ is the minimum area set aside for the protection of a tree.</p> <p>It is the distance from the trunk set aside for the protection of a tree's canopy and roots to provide for the viability and stability of the tree during construction activities.</p>	<p>The TPZ is determined by the diameter of trunk at breast height (DBH) (DBH = diameter 1.4 metres from ground).</p> <p>TPZ = Diameter at Breast Height X 12</p>  <p>Figure 1: Example of how to calculate different types of DBH.</p>	<p>Once 50% of a trees root mass is removed/lost, the eventual death of the tree is a forgone conclusion.</p> <p>Damage to and removal of roots larger than 50mm can injure or kill the tree.</p> <p>Damage to tree trunks may result in future decay or a fine.</p> <p>The storage of soils/material under trees can compact soil, limit water and oxygen uptake, damage roots and cause tree death.</p> <p>The majority of roots are found within 1 metre of the surface, most within the top 600mm.</p>	<p>To determine exact location and extent of roots.</p> <p>If works encroach on more than 10% of the TPZ.</p> <p>If excavations are to occur within TPZ.</p>
<p>Structural Root Zone (SRZ)</p>	<p>Within the TPZ is the SRZ. The SRZ is the area considered essential for a trees' stability.</p> <p>The SRZ should only be calculated if major disturbance of the TPZ is being considered.</p>	<p>The SRZ is determined by the diameter of the trunk immediately above the root buttress.</p> <p>SRZ = Diameter above root buttress X 5</p>  <p>Figure 2: Example of how to calculate diameter above root buttress.</p>	<p>Instability of root structure, causing death and or failure of tree.</p> <p>May result in damage to nearby buildings, infrastructure and injure crew or the public.</p> <p>Damage to tree trunks may result in future decay or a fine.</p>	<p>If works are to occur within the SRZ.</p> <p>If soil levels are to be changed within the SRZ.</p>



Construction works

1. Establish exclusion fencing and root protection prior to works commencing.
2. Communicate exclusion zones to all crew members.
3. Cover areas where tree roots are subject to traffic with plywood.
4. Store machinery, materials and equipment outside of the TPZ.



Figure 3: Spoil stored within drip line of tree.



Figure 4: Tree protected via fencing with no materials stored within the drip line.

5. Trim and prune branches to avoid them being ripped and damaged by machinery. Refer to the "HOW TO" box below for trimming and pruning methods.
6. Excavation with machinery is only to occur outside the TPZ where possible.
7. Prior to using an excavator or other machinery around trees, ensure damage to trunks, roots and branches is avoided by observing their location and exclusion zones.
8. For necessary works within the TPZ hand trench or excavate to avoid machinery damage to roots, whilst being supervised by an arborist.
9. Works are not to occur within the SRZ without being supervised an arborist.
10. Report any tree damage to the Environmental Rep and or contact an arborist. Quick remedial action can usually prevent long term damage to the tree.

HOW TO: Trim and Prune Branches

1. Use the appropriate tools: lopper, chain saw, vehicle mounted saw, correct PPE, etc.
2. Heavy machinery should not be used for pruning or trimming. An ecologist or arborist is to be contacted if a large branch is to be cut-back.
3. If limbs bearing hollows or that having nests are to be removed, they are to be inspected by a qualified fauna spotter-catcher prior to removal.
4. Use the "three cut" method trimming branches (Figure 6).

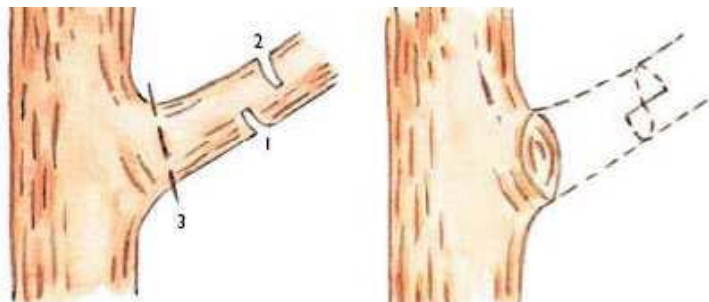


Figure 5: Three cut method: 1) The under cut. 2) The upper cut to remove the branch. 3) The final trim cut.

For More Information

- AS 4970-2009 "Protection of Trees on Development Sites".
- Tre Protection Zone Calculator, Queensland Arboriculture Association Inc. <http://www.qaa.net.au/calculations.php>

Appendix N
Fauna Handling and Rescue Procedure



Purpose

This procedure explains the actions to be undertaken in the event fauna (including injured, shocked, dependent juvenile or other animal) are discovered that require handling or rescue during vegetation and soil clearance and ongoing construction activities. This procedure is applicable to all native and introduced species that are found on the project site.

Induction / Training

Personnel involved in any aspect of fauna handling or rescue, or those activities where this may be required, will be trained in the requirements of this procedure. Training will include inductions, toolbox talks, pre-starts and targeted training as required.

Scope

This procedure is applicable to all activities that may lead to fauna handling or rescue, such as clearing operations, on the Halfway Creek to Glenugie Project.

Procedure

Discovery of wildlife on project site during construction activities

If wildlife is discovered on the project site during site construction activities and there is a risk these activities may harm the animal or pose risk to site personnel, the following steps will be taken.

1. Stop all work in the vicinity of the fauna and immediately notify Superintendent who is then to notify the Environmental Manager or Project Ecologist, if the latter is present onsite.
2. Preferably allow fauna to leave the area without intervention.
3. If immediately available, use a licensed fauna ecologist or wildlife carer with specific animal handling experience to carry out any fauna handling.
4. If no ecologist or wildlife carer is available on site and the animal is able to be handled, to minimise stress to native fauna and/or remove the risk of further injury before a licensed fauna handler arrives onsite, the Environmental Officer shall:
 - a) If time permits, call ecologist or fauna rescue for advice.
 - b) Cover larger animals with a towel or blanket and place in a cardboard box and/or canvas bag.
 - c) Place smaller animals in a cotton bag, tied at the top.
 - d) Keep the animal in a quiet, cool, ventilated and dark location away from noisy construction activities.
 - e) Aquatic fauna are to be placed in plastic aquaria or a plastic bag with sufficient amount of water. Frogs will be transported in moistened plastic bags (1 frog/bag) with a small amount of leaf litter. The translocation of frogs shall be in accordance with the Hygiene Protocol for the Control of Disease in Frogs (see below)..

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 FAWNA / WIRES representative(s).

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 when moving from one site to another.
 - ii. Where necessary in high risk areas, spraying/flushing vehicle tyres with a disinfecting solution.
 - 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.
5. If the animal cannot be handled (i.e. venomous reptiles):
 - a) Exclude all personnel from the vicinity with fencing and/or signage.
 - b) Record the exact location of the animal/s and provide to the Project Ecologist or appropriate rescue agency (i.e. FAWNA / WIRES).
 6. If not already done, call the appropriate rescue agency immediately and follow any advice provided by the agency. Once the rescue agency arrives at the site, they are responsible for the animal. Any decisions regarding the care of the animal will be made by the rescue agency. The relevant fauna rescue services and local veterinary surgeries contact details are as follow:



Organisation	Contact Number
Environmental Manager	0438186746A
Project Ecologist	TBA
WIRES	02 66527119
RSPCA Coffs Harbour	02 66513311
Grafton Vet (Riverbank Animal Hospital)	02 66423083
FAWNA	02 65814141

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.

7. If the fauna species is identified as a threatened species that is not a species identified in the CFFMP, the Environmental Officer or Environmental Manager must:
 - a) Immediately cease all work likely to affect the threatened species.
 - b) The Environmental Manager shall contact the Roads and Maritime Representative to inform of the situation.
 - c) The Environmental Manger shall then contact the following stakeholders, in this order, to determine the appropriate corrective actions and additional safeguards to be undertaken:
 - Project Ecologist.
 - EPA Threatened Species Unit (02 66598273).
 - Environmental Representative
 - Others as instructed by the Roads and Maritime Representative or EPA.

The adequacy of existing safeguards will be reviewed in consultation with the above stakeholders.

8. Environmental Manager to record find in Roads and Maritime Environmental Incident Report where required following consultation with the Roads and Maritime Representative. All relevant characteristics of the fauna find should be recorded to the extent practicable (i.e. visual signs of behaviour; habitat; health signs; sex, time date, weather etc).
9. Following consultation with all relevant stakeholders, the Environmental Manager shall implement any corrective actions and additional safeguards.
10. Following confirmation by the Environmental Manager that all appropriate safeguards have been implemented, construction works shall recommence.
11. Relocation of fauna adjacent to the footprint will be undertaken where possible by the Project Ecologist or wildlife rescuer and will be recorded during clearing as part of the ecologists clearing report or on the Weekly Environmental Inspection Checklist for non-clearing activities. If the animal is not injured or stressed, it may be released nearby in an area that is not to be disturbed by the project construction works, in accordance with the following procedures:
 - a) Sites identified as suitable release points by the Project Ecologist or wildlife rescuer.
 - b) Release site will contain similar habitat and occur as close to the original capture location as possible.
 - c) If the species is nocturnal, release will be carried out at dusk.
 - 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.

Project Ecologist responsibilities for fauna handling and rescue

The Project Ecologist will follow the relevant steps detailed below:

1. Surveys and rescue will be undertaken in accordance with the two stage clearing process:
 - b) During Stage 1 (under-scrubbing and non habitat tree removal) 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. normally adjacent to the clearing footprint). The species, number, sex, age, class and general health of each individual is to be recorded for later reporting. The handling procedures are described below.
 - c) During Stage 2 (habitat tree removal at least 24 hours after Stage 1) all fauna captured will be relocated into areas of suitable habitat adjacent to the Project site. The species, number, sex, age, class and general health of each individual is to be recorded for later reporting. The handling procedures are described below.

Note -Habitat trees are to be felled using equipment that allows habitat trees to be carefully felled with minimal impact (e.g. claw extension).



2. Relocation of fauna captured during the clearing and associated works will generally take place in areas of suitable habitat immediately adjacent to the Project site taking into account:
 - a) The release site contains similar habitat and occurs as close to the original area as possible;
 - b) If the species is nocturnal, release will normally be carried out at dusk;
 - c) Release would generally not be undertaken during periods of heavy rainfall except for aquatic fauna; and
 - d) Non-native fauna will be euthanised.

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.
3. 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, cool, 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 FAWNA / WIRES representative(s)

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).
4. In the event an animal is injured the following fauna rescue services and local veterinary surgeries contact details are detailed in 4.1(6) above. In the event the rescue service and/or local veterinary service cannot be contacted, the most appropriate euthanasia 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.
5. If the fauna species is identified as a threatened species that is not a species identified in the FFMP, notify the Environmental Officer or Environmental Manager who will follow steps 4.1(7) to 4.1(11)

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.

Appendix O

Unexpected Threatened Species / EECs Finds
Procedure

Project description: Upgrade of the Pacific Highway, Halfway Creek to Glenugie

Project address: Halfway Creek, New South Wales

Contract number:

CMC Job number: CN1001



- Building The Future -

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Unexpected threatened species/EECs finds procedure

CN1001-CIV-EN-PRO-0051

New South Wales

Approval				
Revision	Date	Name	Position	Signature
0	26/03/15	Mark Chilton	HSE Manager	
1				
2				

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Introduction

Purpose

This procedure outlines the necessary actions to take when a threatened flora or fauna species is unexpectedly found on site, or where an area of vegetation is considered to be an endangered ecological community (EEC) but is not mapped as such. It forms part of the Flora and Fauna Management Sub Plan for the upgrade of the Pacific Highway from Halfway Creek to Glenugie (HC2G) (the Project). This section of road is Section 2 of the Woolgoolga to Ballina (W2B) Pacific Highway upgrade project, approved by the Minister for Planning and Environment in June 2014.

Relevant legislation, guidelines, licences and approvals

The following legislation, guidelines and standards are considered relevant to soil and water management for the project:

Instrument	Details
Legislation	<i>Threatened Species Conservation Act 1995</i> <i>Environmental Planning and Assessment Act 1979 (NSW)</i> <i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i> <i>Fisheries Management Act 1994 (NSW)</i>
Guidelines	Roads and Maritime <i>Practice Note: Clearing and Fauna Management – Pacific Highway Projects (May 2012)</i> . NSW National Parks & Wildlife Service. 2001. <i>Policy for the Translocation of Threatened Fauna in NSW: Policy and Procedure Statement No. 9</i> Threatened Species Unit, Hurstville NSW. Occupational Health and Safety guidelines
Contract documents	RMS QA Specification G36 – Environmental Protection (Management System). Submissions/Preferred Infrastructure Report (SPIR)
Other related documents	CEMP for Section 2, especially <i>Construction Flora and Fauna Management Sub Plan (Appendix B2)</i> . <i>Emergency Response Sub Plan</i> <i>Environmental Incident Classification and Reporting Procedure (Roads and Maritime, September 2014)</i>

Responsibilities

Role/Position	Responsibilities
All staff	<ul style="list-style-type: none"> Complete a site induction prior to commencement of work and review educational materials on identification of potentially occurring threatened species and EECs. Report any unexpected finds to your immediate supervisor, or if unavailable, to CMC's HSE manager or Project Manager. Implement and comply with this procedure.
Project Manager	<ul style="list-style-type: none"> Ensure implementation of the procedure. Lead by example – develop a 'beyond compliance' culture within the team. Provide necessary resources and technical support for implementation of procedure. This requires that photographs and information on potentially occurring threatened species are incorporated into induction information for all staff that will be working on the site and that this information is readily available on site (e.g. in work sheds, as reminders during tool box talks etc.) Ensure non-conformances/corrective actions have been investigated and closed out appropriately.
HSE Manager (or delegate)	<ul style="list-style-type: none"> Develop appropriate materials on identification of possible threatened species and EECs for inclusion in site inductions and as reference material for display in work sheds or other areas regularly used for work breaks.
Site Supervisors	<ul style="list-style-type: none"> Implementation of requirements outlined in procedure if unexpected threatened species finds are reported to you or you encounter one yourself. Ensure all staff including sub-contractors are inducted prior to commencement of works and that

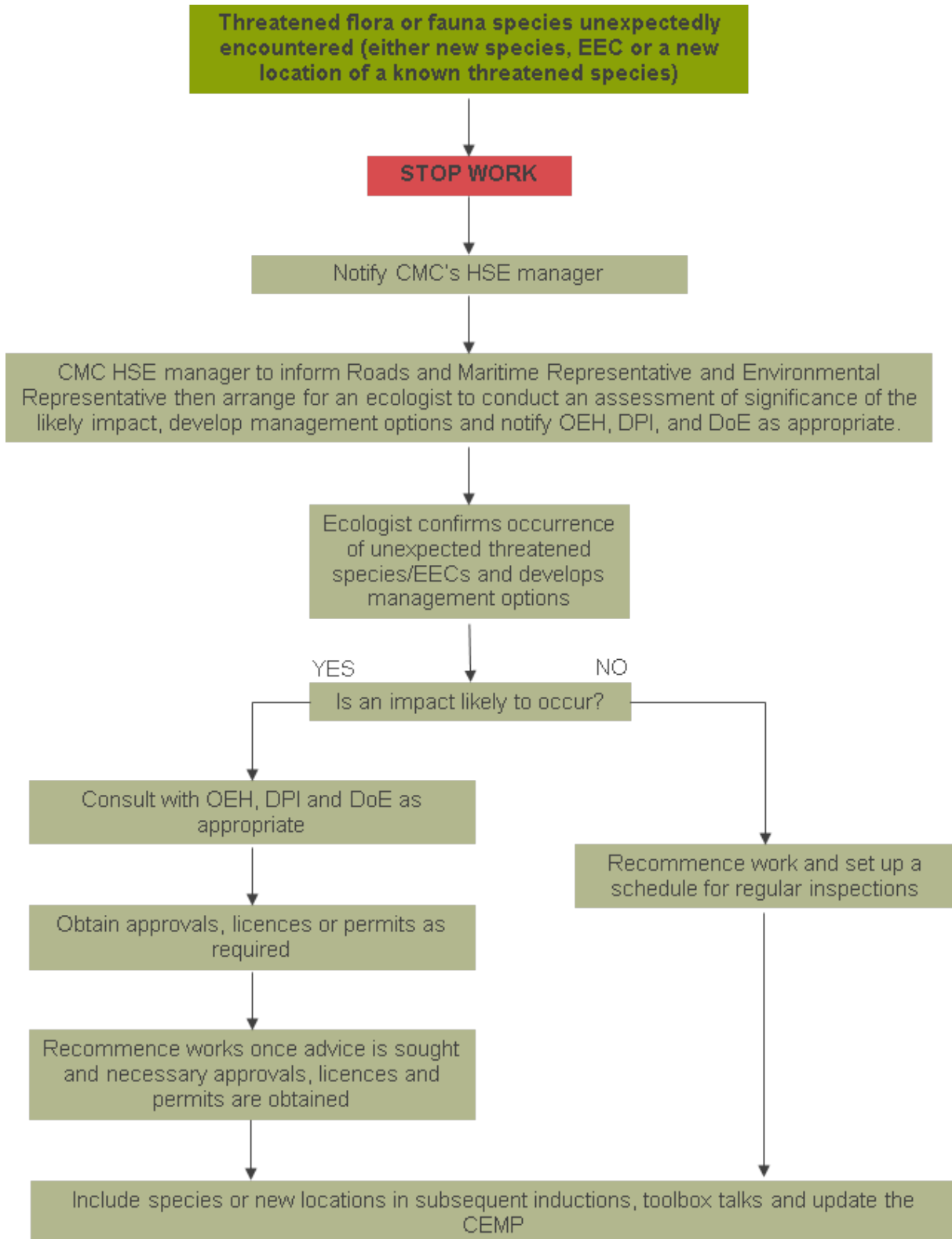
Unexpected threatened species or EEC find procedure

CN1001-CIV-EN-PRO-0051

Role/Position	Responsibilities
	<p>induction includes information on this procedure.</p> <ul style="list-style-type: none">· Notify the Project Manager of any unexpected finds.· Notify the Project Manager of incidents/non-conformances.

Procedure

When a suspected threatened flora or fauna species or EEC is encountered or suspected, cease work immediately and contact the either the Project Manager or HSE Manager. CMC's HSE Manager will arrange for an ecologist to conduct an environmental assessment to confirm the finding, and determine the likelihood of impact of the project on the threatened species/EEC. If an impact is likely to occur, the HSE Manager or delegate would consult with the appropriate government bodies such as NSW Office of Environment and Heritage (OEH), NSW Department of Primary Industries (DPI) or Commonwealth Department of Environment (DoE) to obtain the necessary approvals, licences or permits. Once these approvals are obtained, work would recommence, taking into account any variations in procedures within or near to the threatened species or its habitat. Information on managing risks to the species would be included in subsequent inductions, and toolbox talks. The CEMP would also be updated to reflect these changes (RTA 2011).



Contact List

This procedure provides information on what is required to be done for any unexpected finds of threatened species/EECs. Table 1 provides names and contacts of those roles mentioned as well as others that may be required.

Table 1 Contact list for unexpected finds of threatened species/EECs

Role/Position	Name	Contact Number
RMS Project Manager	Stuart Austin	02 6604 9364 0457 589 675
CMC Project Manager	Alistair Pagan	0417605476
CMC Environmental Manager	Martin Mulhearn	0438186746
Site Supervisor	James Barry	0448946181
Office of Environment and Heritage	Peter Higgs	02 6641 1500
Veterinary surgeon	Riverbank Vet Hospital	02 6642 3083
Wildlife carer	WIRES (Switchboard)	13 000 WIRES or 13 00 094 737
	WIRES (Grafton Branch)	(02) 6643 4055

Appendix P
Weed and Pathogen Management Plan



Activity	Weed and Pathogen Management Strategy		
Project	Pacific Highway, Halfway Creek to Glenugie	Project number	CN1001
Project Manager	Alistair Pagan	Project Engineer	Luke Davey
Environmental Rep	Mark Chilton	Current as at	05/05/2015

Document control

File name	Weed Management Strategy
Report name	Halfway Creek to Glenugie - <i>Weed Management</i>
Revision number	1

Plan approved by:

Alistair Pagan

Martin Mulhearn

Steven Alford

Project Manager

Environmental Manager

RMS representative

Revision history

Revision	Date	Description	Approval
0	05/02/15	Draft for review	
1	01/05.15	With feedback	
2			



1. Overview

As per the Ecosure Vegetation Survey the following table contains a list of potential weed and pest infestations within or adjacent to the project boundaries: (see maps pages 5 – 9)

Scientific Name	Common Name	Noxious weed status	WoNs	Number of locations	No of plants (est)	Total area m ²
<i>Ambrosia artemisiifolia</i>	annual ragweed	Class 5	No	31	3809	1036.6
<i>Baccharis halimifolia</i>	groundsel bush	Class 3	No	22	103	1533.2
<i>Bryophyllum delagoense</i>	mother of millions	Class 3	No	2	120	260
<i>Senecio madagascariensis</i>	fireweed	Class 4	Yes	13	15	1.3
<i>Lantana camara</i>	lantana	Class 4	Yes	14	59	2123.3

In addition to species listed in the EIS and declared by Clarence Valley Council, Ecosure noted the following potentially problematic weeds in the study area:

- *Setaria*, South African pigeon grass (*Setaria sphacelata*). Common along roadside. Could spread further, especially in wetter areas, e.g. riparian zones, swamp forest (especially NR254 which naturally has an open canopy).
- Easter cassia (*Senna pendula*). Rare; single individuals found. Could spread into native forest communities.
- Broad-leaved paspalum (*Paspalum mandiocanum*). Dominant under some denser tree canopies close to sources of added nutrients (e.g. rest area toilet blocks) and some creek banks. Could spread to similar habitats within the study area and adjacent vegetation.
- Coolatai grass (*Hyparrhenia hirta*). Single small patch found along roadside. Has the potential to dominate roadside vegetation, and can easily displace native plant species. Also poses a serious fire threat. Coolatai grass has already taken over large areas in north-western NSW and northern tablelands and is now spreading on the coast.
- Rhodes grass/feathertop Rhodes grass (*Chloris gayana/C. virgata*). Common along road verge, could spread to more open native forest communities.

Pest control operator on this site is:

- Vemco

2. Weed control classes

The study area includes Class 2, 3, 4 and 5 noxious weeds. The control requirements for each of these classes include:

Class 2: are plants that pose a potentially serious threat to primary production or the environment of a region to which the order applies and are not present in the region or are present only to a



limited extent. The plant must be eradicated from the land and the land must be kept free of the plant. The weeds are also "notifiable" and a range of restrictions on their sale and movement exist.

Class 3 are plants that pose a potentially serious threat to primary production or the environment of a region to which the order applies, are not widely distributed in the area and are likely to spread in the area or to another area. The plant must be fully and continuously suppressed and destroyed.

Class 4 noxious weeds are plants that pose a potentially serious threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area. The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction.

Class 5 noxious weeds are plants that are likely, by their sale or the sale of their seeds or movement within the State or an area of the State, to spread in the State or outside the State. There are no requirements to control existing plants of Class 5 weeds. However, the weeds are "notifiable" and a range of restrictions on their sale and movement exists.

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*).

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.

Myrtle Rust

Myrtle Rust is a plant disease caused by the exotic fungus *Uredo rangelii* (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.

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).

Frog Chytrid Fungus

Frog Chytrid Fungus (*Batrachochytrium dendrobatidis*) is a water-borne 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.



3. Weed Mitigation Measures

Aspect	Control measures								Reference	Timing	Responsible person
Weed survey	A weed survey and weed management strategy for the site will be developed and implemented in consultation with the Council. Weed management methods will be in line with those specified by DPI.									Prior to commencement	Environment Rep
Clothing and footwear	Ensure clothing and footwear is free of seeds before stepping in and out of vehicles.									During construction	All persons
Plant and equipment	Ensure all plant and equipment is free of plant and/or animal pests including weed seed or other propagules (e.g. cuttings) and soil prior to accessing the site.									Prior to accessing site and during construction	Site Supervisor Plant Operators
	Material which may contain pests shall be removed and contained for appropriate disposal as instructed by the Environment Rep.										
	Plant & equipment shall be inspected and cleaned at designated wash-bays.										
	Complete Pest Plant Hygiene and RIFA free declarations for each inspection of vehicle and mobile plant.										
	Vehicles shall be inspected on a random basis.									During construction	Environment Rep
Vehicle movement	Vehicle movement will be restricted to existing roads and tracks unless authorised by the Client.									During construction	All persons
Imported material & Topsoil	Soils, aggregate, mulch plant/turf/seed stock, etc. shall not be accepted on-site without ' Weed Hygiene Declaration Form'.									During construction	Site Supervisor
	Weed free topsoil is to be conserved on site for landscape rehabilitation where possible.									Prior to acceptance on site.	Site Supervisor
	Material which may contain pests shall be removed and contained for appropriate disposal as instructed by the Environment Rep.									During construction	Site Supervisor
Vehicle cleandown facilities	Location	Telephone	Vehicle size	Height limit	Hose detail	Cost	Surface	Hrs		During construction	Site Supervisor
	TBA										
Washing facilities for plant and	The wash-bay shall be constructed in accordance with relevant sections of the Queensland Guideline for the Construction of Vehicle and Machinery Washdown Facilities.										



Aspect	Control measures					Reference	Timing	Responsible person
equipment	Wash-down shall occur at an approved location. Ensure wheels, tracks and body of all construction vehicles entering public roads are free of heavy dust, dirt, mud, etc.						Prior to accessing site and during construction	Site Supervisor Plant Operators
	As a minimum on-site facilities shall be: <ul style="list-style-type: none"> located in areas easily accessible for ongoing maintenance located greater than 200 metres from a watercourse, drainage line or environmentally sensitive area designed to contain weed seeds, sediments, oils and greases designed to prevent vehicle recontamination 							
Weed treatment schedule	Weed	Control method	Chemicals	Location	Timing			Weed Contractor
	TBA							
Weed treatment	Confirmed infestations of weeds within a working area on site must be treated prior to commencement of works.						During construction	Site Supervisor
	Ensure pest plants are not growing in areas of foot traffic. Slashing of weed, if required, shall be undertaken prior to seeding.						During construction	Site Supervisor
	Application of herbicides shall only be carried out under the authority of a licensed pest control contractor and in accordance with . in accordance with the requirements of G36.						Prior to and during construction	Procurement Officer
	Where herbicide will be applied to hazardous areas, as defined by the Act, the Contractor shall obtain a copy of the distribution permit prior to carrying out the works.						Prior to and during construction	Environment Rep
	Avoid and/or minimise the use of herbicides and pesticides within or near wetland areas and waterways.						During construction	Site Supervisor
Inspections/ monitoring	Weekly inspections must be conducted to determine the success of weed management procedures.						During construction	Environment Rep
	Vehicles shall be inspected on a random basis.							
Reporting	Report monitoring results, incidents and corrective action to the Principles Representative in accordance with EMP						During construction	Environment Rep
	The Client shall be notified of any outbreaks of declared plants and other environmental weeds, or pest animals.						During construction	Environment Rep



Control of Pathogens

Overall Management Measures

Pathogens will be managed 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.

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.

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;
- 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

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.



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:

- 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.

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® (or equivalent) & disinfected with Castrol Farmcleanse® (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[®] (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[®] (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[®] (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[®] and then sterilised with a solution of Castrol Farmcleanse[®] (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 RTA 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.

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.

Aquatic Weeds

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. An ecological should undertake an assessment of any aquatic weeds.

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.

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*.

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*.

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).

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.

Inspection and Monitoring

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 (m²) 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.



Pathogen Monitoring

Monitoring for Frog Chytrid Fungus will be conducted as part of the threatened frog population monitoring programs. 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.

Other Inspections and Monitoring

All plant, vehicles, equipment must be checked as required by the Plant and Vehicle Weed Hygiene Guide (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 CMC plant supervisor when machinery is onsite.

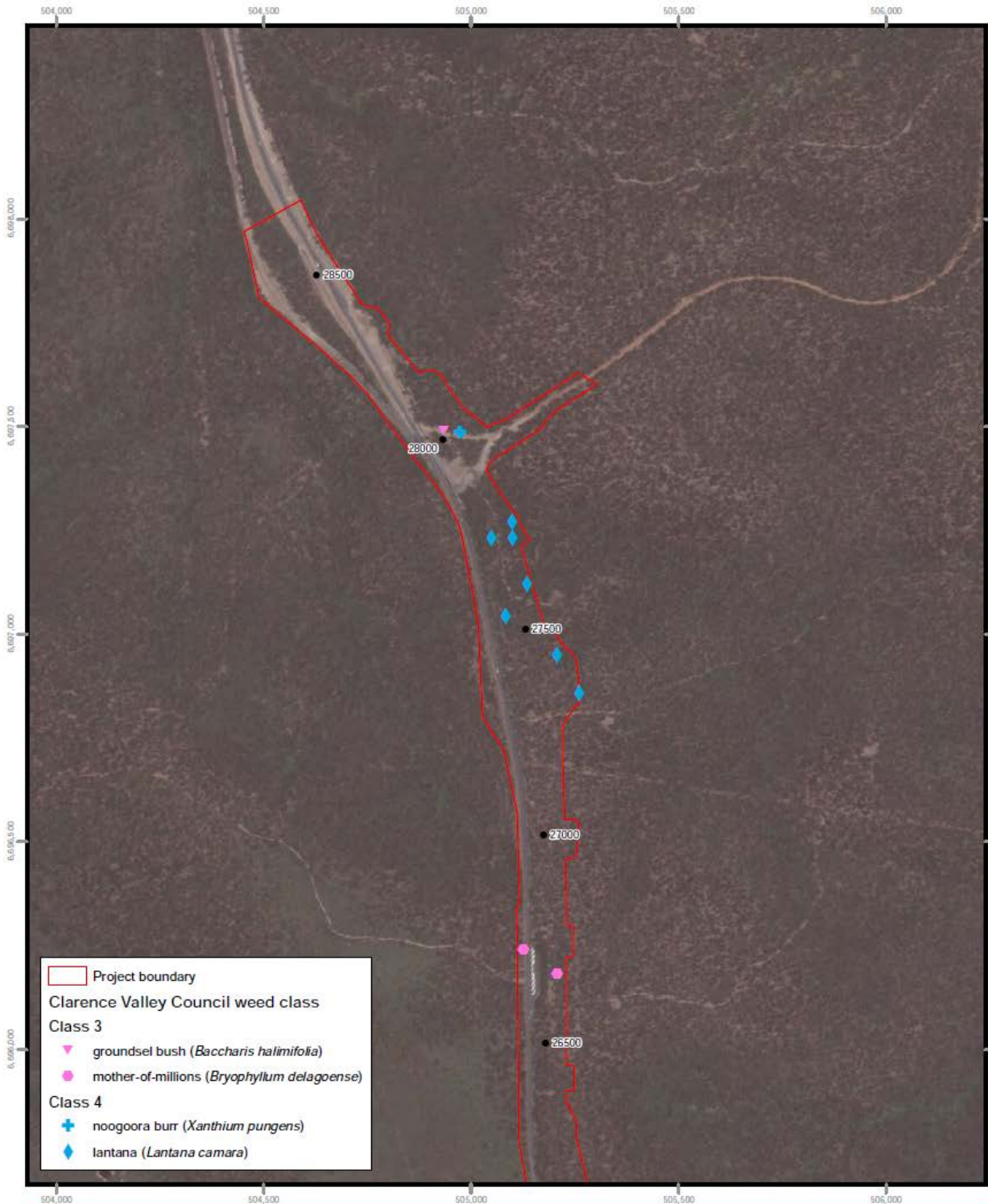
A copy of the signed declaration will be retained by the Environment Manager.

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

Refer to Qld Government Website for supporting information on vehicle clean down and vehicle inspections:

https://www.daff.qld.gov.au/__data/assets/pdf_file/0011/58178/IPA-Cleandown-Procedures.pdf

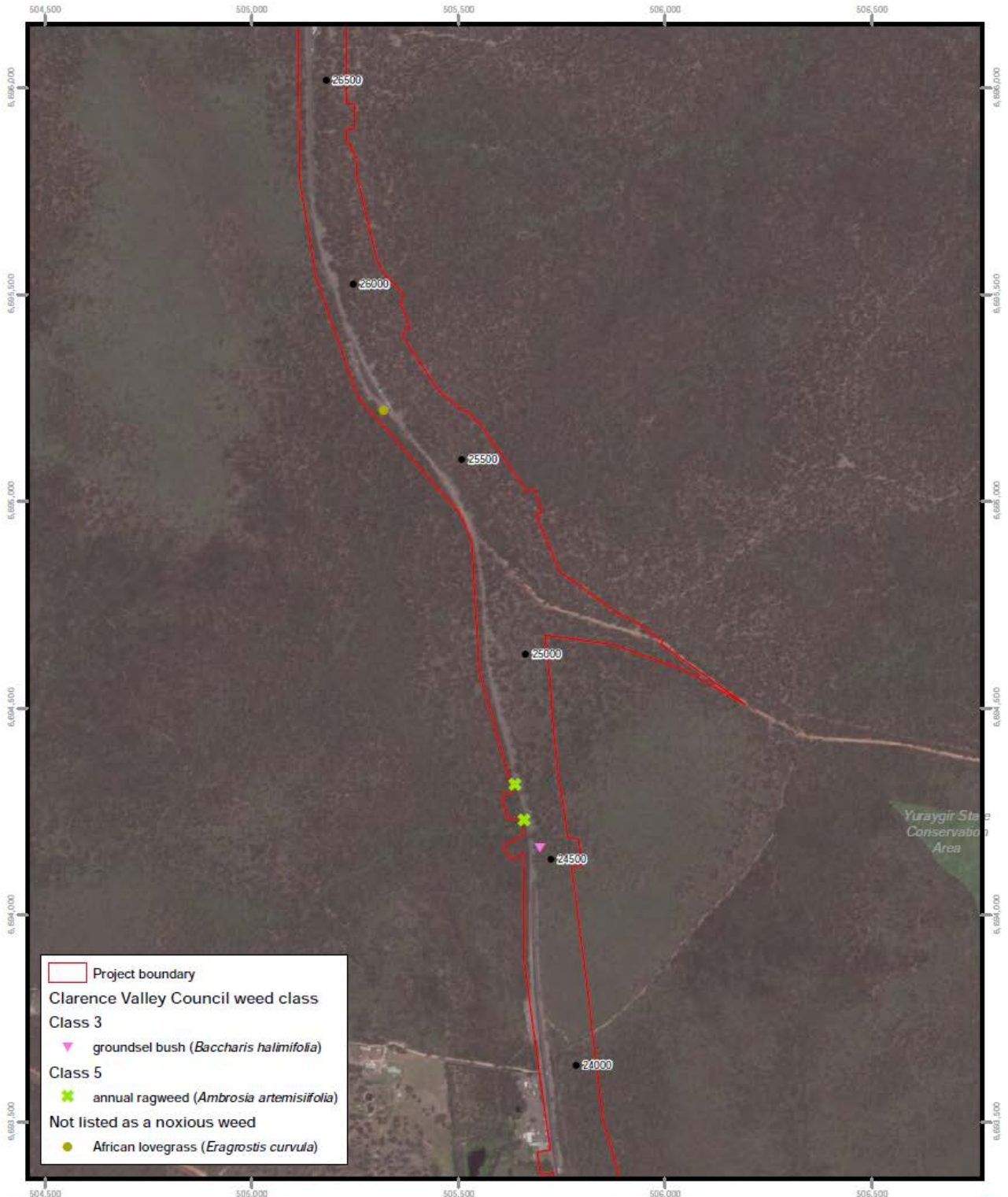
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		 Scale: 1:12,000 when printed at A4	Data Sources: - NSW Roads and Maritime Services, 2013 - NSW Parks and Wildlife Services - © Ecosure Pty Ltd, 2014 - Aerial Image: DigitalGlobe, 2011		Figure 1(a): Weed locations <i>Roads and Maritime Services</i> Woolgoolga to Ballina Pacific Highway upgrade - vegetation surveys and habitat tree assessment Glennugie to Halfway Creek, NSW
GE311_MP_012_WeedLocations_R1 Job Number: GE311 Approved Project Manager: EL 11/06/2014					
R1	MD	AH	ISSUED TO CLIENT	11/06/2014	
R0	MD	AH	ISSUED TO CLIENT	23/06/2014	
REV	BY	CHK	DESCRIPTION	DATE	

Coordinate System: GDA 1994 MGA Zone 56
 Projection: Transverse Mercator
 Datum: GDA 1994
 Units: Metre

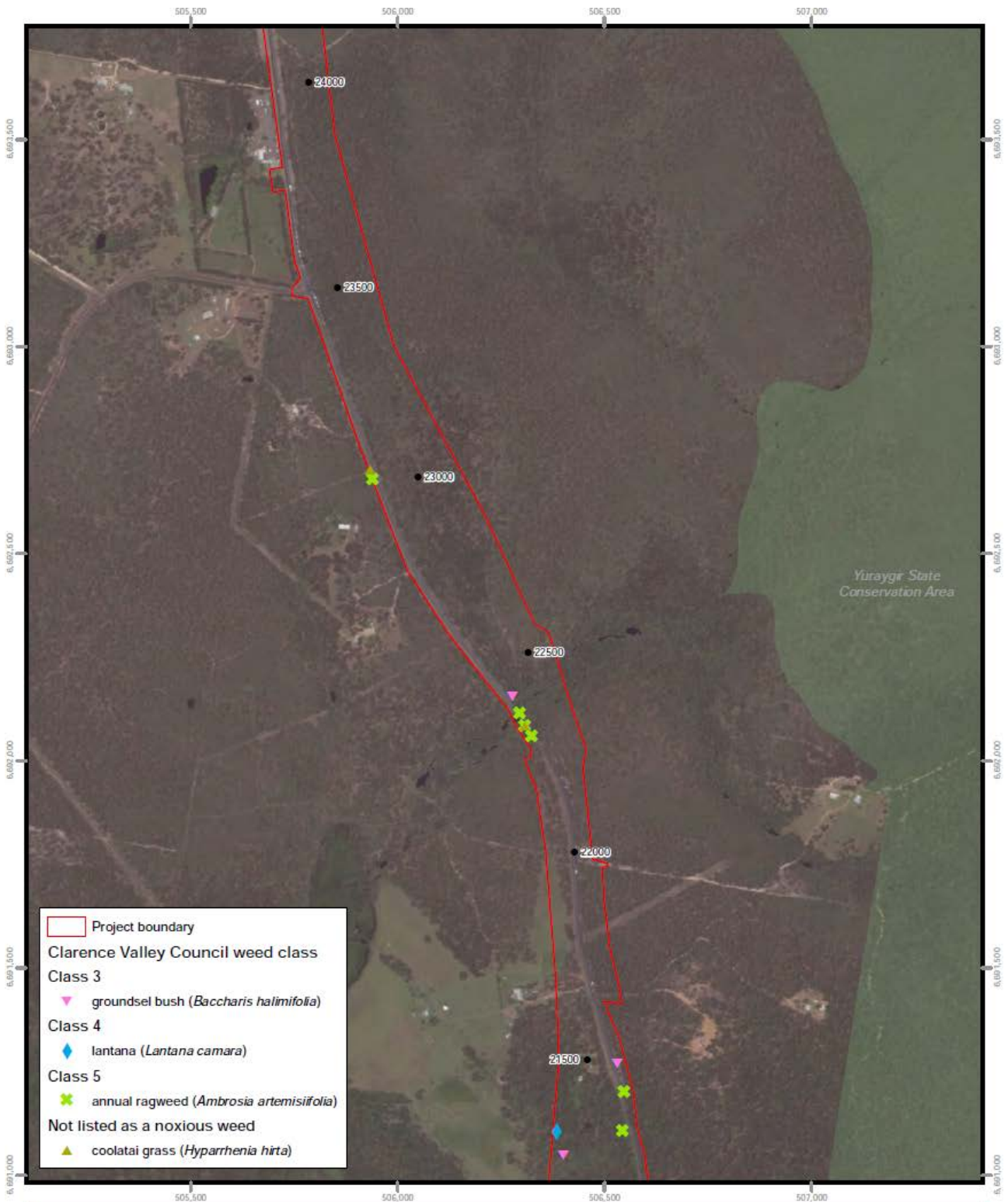
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Project boundary
 Clarence Valley Council weed class
 Class 3
▼ groundsel bush (*Baccharis halimifolia*)
 Class 5
✕ annual ragweed (*Ambrosia artemisiifolia*)
 Not listed as a noxious weed
● African lovegrass (*Eragrostis curvula*)

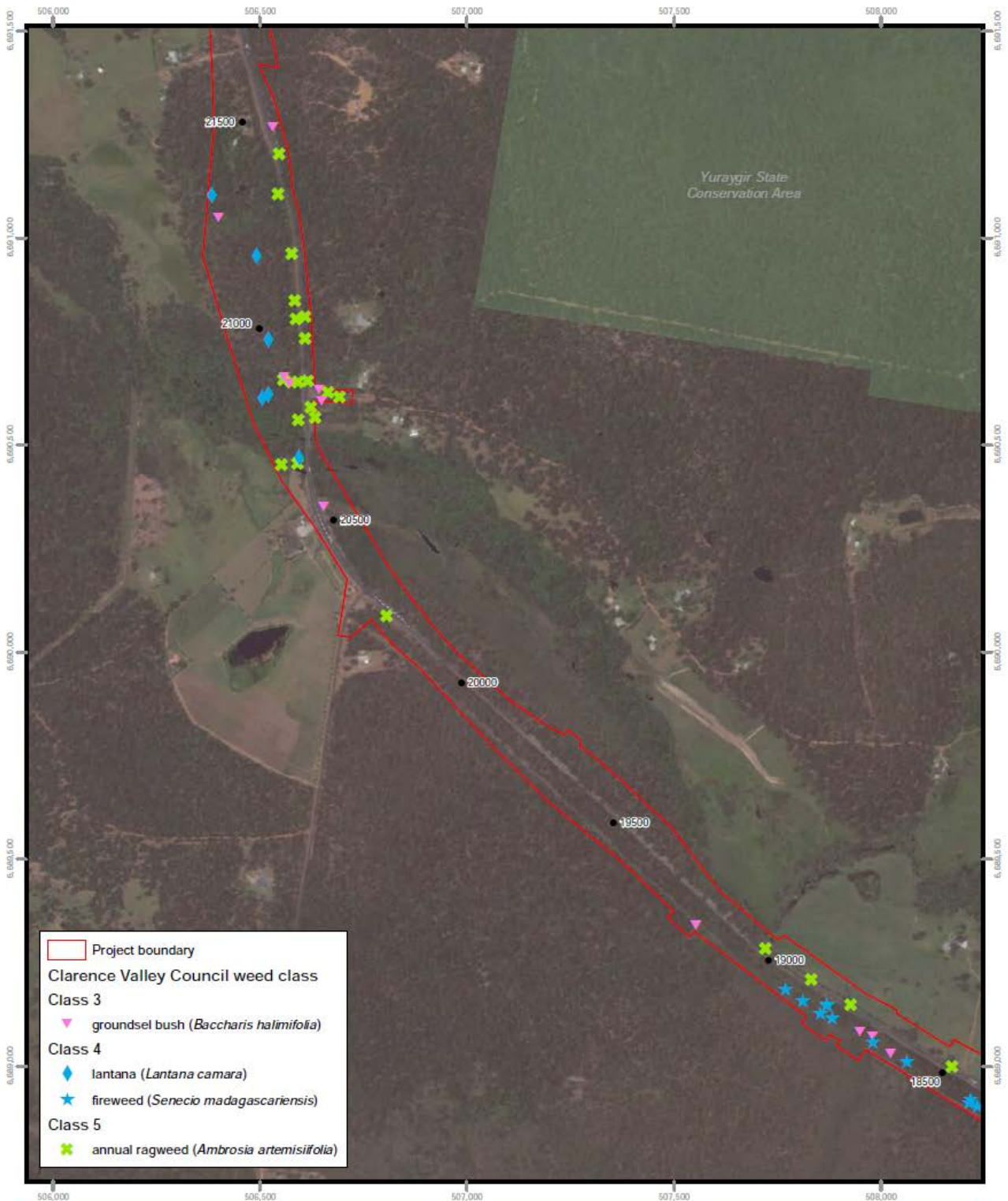
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Figure 1(c): Weed locations							
Roads and Maritime Services Woolgoolga to Ballina Pacific Highway upgrade - vegetation surveys and habitat tree assessment Glenugie to Halfway Creek, NSW							

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Project boundary

Clarence Valley Council weed class

Class 3

- groundsel bush (*Baccharis halimifolia*)

Class 4

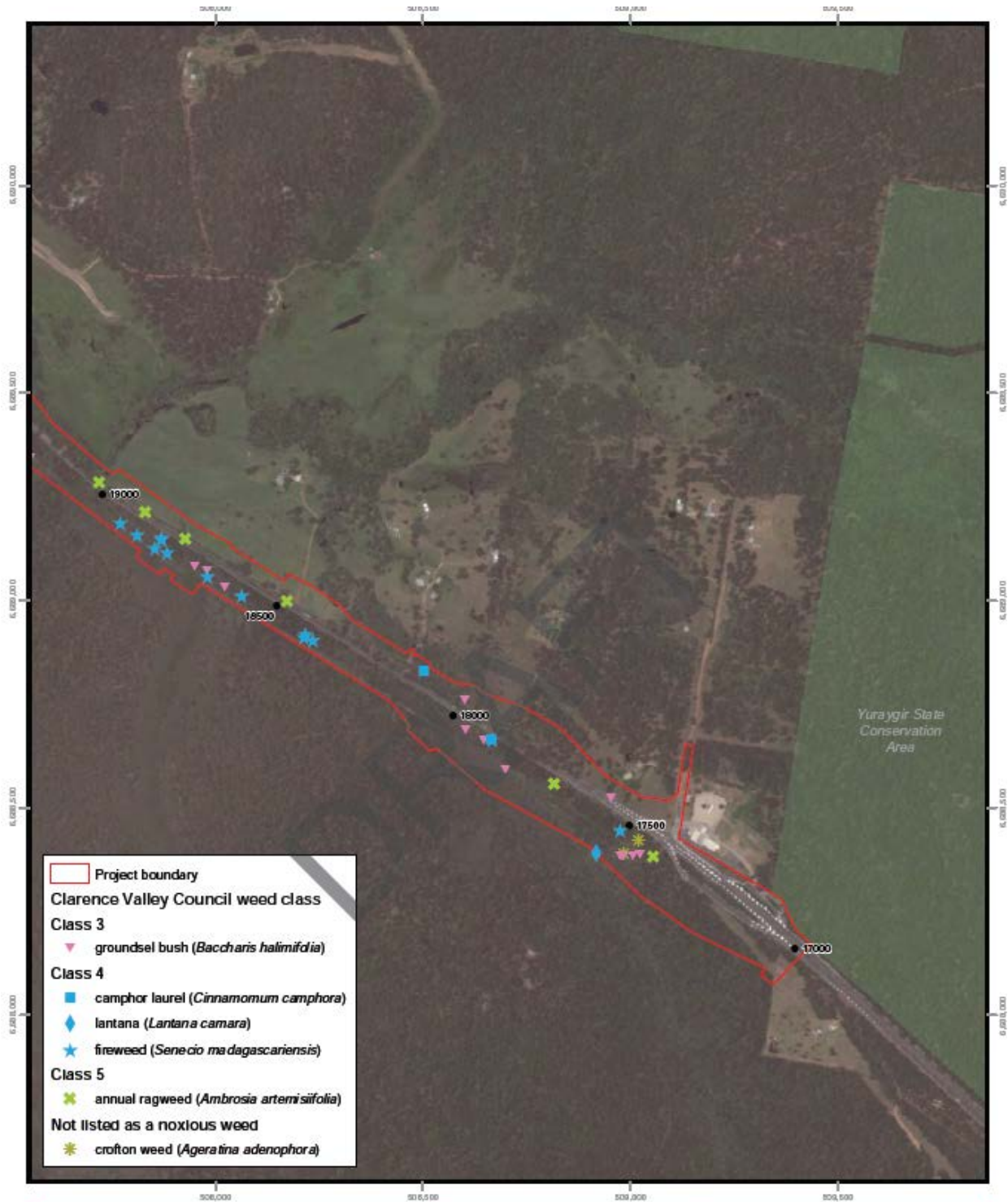
- lantana (*Lantana camara*)
- fireweed (*Senecio madagascariensis*)

Class 5

- annual ragweed (*Ambrosia artemisiifolia*)

				<p>Data Sources:</p> <ul style="list-style-type: none"> - NSW Roads and Maritime Services, 2013 - NSW Parks and Wildlife Services - © Ecosure Pty Ltd, 2014 - Aerial Image: DigitalGlobe, 2011 			<p>Figure 1(d): Weed locations</p> <p><i>Roads and Maritime Services</i></p> <p>Woolgoolga to Ballina Pacific Highway upgrade - vegetation surveys and habitat tree assessment</p> <p>Glengurie to Halfway Creek, NSW</p>											
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	Project boundary
Clarence Valley Council weed class	
Class 3	
	groundsel bush (<i>Baccharis halimifolia</i>)
Class 4	
	camphor laurel (<i>Cinnamomum camphora</i>)
	lantana (<i>Lantana camara</i>)
	fireweed (<i>Senecio madagascariensis</i>)
Class 5	
	annual ragweed (<i>Ambrosia artemisiifolia</i>)
Not listed as a noxious weed	
	crofton weed (<i>Ageratina adenophora</i>)

				<p>Data Sources:</p> <ul style="list-style-type: none"> - NSW Roads and Maritime Services, 2013 - NSW Parks and Wildlife Services - © Ecosure Pty Ltd, 2014 - Aerial Image: DigitalGlobe, 2011 		<p>Figure 1(e): Weed locations</p>																
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Appendix A Plant and Weed and Hygiene Guide

Appendix M
Working Around Trees Guideline

Appendix N
Fauna Handling and Rescue Procedure

Appendix O

Unexpected Threatened Species / EECs Finds
Procedure

Appendix P
Weed and Pathogen Management Plan

Appendix Q
N/A

Appendix R
N/A

Appendix S Mitigation Framework

Appendix T Flora Translocation Strategy