APPENDIX B2

Construction Flora and Fauna Management Plan

Woolgoolga to Ballina

Pacific Highway Upgrade (sections 3 to 11)

OCTOBER 2015

Document control

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Glossary / Abbreviations

CFFMP	Construction Flora and Fauna Management Plan
CEMP	Construction Environmental Management Plan
MCoA	NSW Minister for Planning Condition of Approval
DPI	Department of Primary Industries (Fishing and Aquaculture)
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPBC-CoA	*Environment Protection and Biodiversity Conservation- Conditions of Approval*
EWMS	Environmental Work Method Statements
DoE	Department of the Environment
DP&E	Department of Planning & Environment
FM Act	*Fisheries Management Act 1994*
MCoA	NSW Minister's Condition of Approval
NPW Act	*National Parks and Wildlife Act 1974*
NW Act	*Noxious Weeds Act 1993*
OEH	Office of Environment and Heritage
PC	Pacific Complete
the Project	Woolgoolga to Ballina Sections 3 -11
RMS	Roads and Maritime Services
SAP	Sensitive Area Plans
Secretary	Secretary of the Department of Planning and Environment
SPIR	Submissions / Preferred Infrastructure Report
SSI	State significant infrastructure
TEC	Threatened Ecological Community
TSC Act	*Threatened Species and Conservation Act 1995*
Weeds	Plants that may threaten agricultural land adjacent to the Project, have detrimental effects on the natural environment or impact human health. Includes noxious weed species under the *Noxious Weeds Act 1993* as categories W1, W2, W3 or W4.

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 Woolgoolga to Ballina Pacific Highway Upgrade (sections 3 to 11) (the Project).

This CFFMP has been prepared to address the requirements of the Minister's Conditions of Approval (MCoA), the Federal Minister's Conditions of Approval under the EPBC Act (EPBC-MCoAs) updated mitigation and management measures listed in the Pacific Highway Upgrade Woolgoolga to Ballina Submissions / Preferred Infrastructure Report (Nov 2013) and all applicable legislation.

There are three tie-in projects within the project limits, namely the Glenugie Upgrade, Devils Pulpit and Ballina Bypass projects. These tie-in projects have been approved separately by the Minister for Planning. Relevant conditions of approval for these projects have been referenced in the W2B 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 (SPIR) (November 2013), with applicable management measures incorporated into this CFFMP.

1.3 Environmental management systems overview

The CFFMP is part of the Construction Environmental Management Plan for the Project. In accordance with MCoA D26(e) this Plan has been developed in consultation with the NSW Environment Protection Authority, Department of Primary Industries (Fisheries) and the Commonwealth Department of Environment. Ongoing consultation would be in accordance with Chapter 6 of the CEMP.

Relevant 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 project 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 EPBC CoA and MCoA outlined in Table 3.1 and the management measures detailed in the EIS and SPIR.
- 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.
- No unapproved disturbance to flora and fauna outside the approved construction footprint, clearing limit and associated access tracks and site compounds.
- No increase in distribution of weeds currently existing within the project areas.
- No new weeds introduced to the project areas.
- No transfer of plant diseases or pathogens to or from the project work areas.
- Minimise net loss of significant habitat resources including hollow logs and tree nesting hollows, with materials cleared from the construction area re-used in adjacent areas where possible.
- Effective rehabilitation / revegetation that ensures different successional stages of rehabilitation are achieved.
- Minimise risk of fauna mortality during construction.
- No pollution or siltation of aquatic ecosystems, wetlands, threatened ecological communities or threatened species habitat.
- Minimise barriers to fauna movement and fish passage.

3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislation

Legislation relevant to flora and fauna management includes:

- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *National Parks and Wildlife Act 1974* (NPW Act).
- *Threatened Species and Conservation Act 1995* (TSC Act).
- *Fisheries Management Act 1994* (FM Act).
- *Native Vegetation Act 2003.*
- *Noxious Weeds Act 1993* (NW Act).
- *Pesticides Act 1999.*
- *Animal Research Act 1985.*
- *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.
- Australian Nursery & Garden Industry. 2012 *Australian Nursery Industry: Myrtle Rust (Uredo rangelii) Management Plan - Version 2,* Sydney NSW.
- Relevant recovery plans, priority action statements and best practice guidelines.

3.2 Minister's Conditions of Approval

The MCoA relevant to this Plan are listed in Table 3.1 and EPBC-CoA are listed in Table 3.2.

Table 3.1 Conditions of Approval relevant to the CFFMP

MCoA No.	Condition requirements	Document reference
	BIODIVERSITY	
B1	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: (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 (*Phascolarctos cinereus*) primary and secondary habitat shall be limited to a total area of 375 hectares.	Table 6-1
B2	Where feasible and reasonable, remnant vegetation shall be retained between the SSI boundary and the SSI footprint.	Table 6-1
B3	Native vegetation shall be established in or adjacent to disturbed areas within the SSI boundary to provide habitat for wildlife following the completion of construction in the vicinity of the disturbed area, consistent with the Urban Design and Landscape Plan required under condition D20.	This plan
B4	Light spill from the SSI shall be avoided on Pink Underwing Moth and Atlas Rainforest Ground Beetle habitat, where feasible and reasonable.	Table 6.1 Appendix F

MCoA No.	Condition requirements	Document reference
B5.	**Pre clearing** 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. All clearance of Koala habitat trees is to be undertaken in the presence of a Koala spotter.	Section 5.4
B6.	Incidental or unanticipated threatened flora and fauna finds shall be immediately reported and clearing work stopped in the vicinity of the find to allow for an evaluation of an appropriate response in accordance with the Construction Flora and Fauna Management Plan.	Appendix N Appendix O Table 6.1
B7.	**Oxleyan Pygmy Perch Habitat** High risk construction activities in known Oxleyan Pygmy Perch habitat shall be avoided during the Oxleyan Pygmy Perch spawning period, and on days when the relevant Bureau of Meteorology site predicts a 90% chance of 10mm of rain or more, unless otherwise agreed by DPI (Fisheries NSW).	Appendix J Table 6-1
B8.	Temporary bridge or arch structures in known Oxleyan Pygmy Perch habitat shall be used if the crossing is intended to be in place for more than 3 months.	Table 6-1 Appendix J
B9.	Where temporary crossings in known Oxleyan Pygmy Perch habitat are proposed with culverts or pipes, the Applicant shall, in consultation with DPI (Fisheries): (a) determine the size of the culverts or pipes to facilitate fish passage; and (b) identify the minimum size of clean rock to be used to ensure that rock material will not wash into the waterway in periods of high flows. Temporary culvert or pipe crossings shall be removed prior to the start of the Oxleyan Pygmy Perch spawning period.	Table 6-1 Appendix J
B13.	The Applicant shall minimise riparian vegetation clearing during construction and undertake a targeted rehabilitation program post construction to restore in-stream and riparian habitat to at least the pre-construction condition or better, unless otherwise agreed by DPI (Fisheries). All areas disturbed by the SSI that are in the vicinity of known Oxleyan Pygmy Perch habitat waterways shall be stabilised prior to the Oxleyan Pygmy Perch spawning period.	Table 6-1 Appendix J

MCoA No.	Condition requirements	Document reference
WATERCROSSINGS		
B38.	Watercourse crossings shall be designed and constructed in consultation with the DPI (Fisheries), EPA, 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.	Table 6-1 Appendix J Appendix C
B73.	The sites for ancillary facilities that are associated with the construction of the SSI and that have not been identified and assessed in the documents listed in condition A2 shall: (a) be located more than 50 metres from a waterway (100 metres for a *State Environmental Planning Policy No. 14* wetland or know Oxleyan Pygmy Perch habitat waterway); (b) Not impact on connectivity structures or vegetation leading to a connectivity structure; (e) Be located in areas of low ecological significance and require no clearing of native vegetation; (f) Be located more than 50 metres from threatened species and threatened ecological communities and their habitats.	Table 6-1 Appendix J Appendix E Appendix C Ancillary Facilities Management Plan
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING		
D6	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.	Appendix A

MCoA No.	Condition requirements	Document reference
D7	**Translocation Strategy** 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 EPA and DoE, and to the satisfaction of the Secretary. The Strategy shall include: (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 R
D8	**Threatened Species Management Plans** 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 EPA, DPI (Fisheries) and DoE, and to the satisfaction of the Secretary, and shall include but not necessarily be limited to: (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	Table 6-1 Appendix B, E, F, G, H, I, J, K, S, T

MCoA No.	Condition requirements	Document reference
	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 construction and operation of the SSI, including the proposed timing, and duration of that monitoring; (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	

MCoA No.	Condition requirements	Document reference
	the EPA, DPI (Fisheries) and DoE; and (l) provision for annual reporting of monitoring results to the Secretary and the EPA, DPI (Fisheries) and DoE, or as otherwise agreed by those agencies. 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. The Plans must be submitted and approved by the Secretary prior to commencement of construction of the relevant stages of the action, and implemented prior to commencement of construction of the relevant stages, unless otherwise agreed by the Secretary.	
D9	**Koala Management Plan** As part of the Threatened Species Management Plans required under condition D8, the Applicant shall prepare and implement a **Koala Management Plan** to demonstrate the ongoing survival of the Koala populations at Coolgardie/Bagotville, Broadwater and Woombah/Illuka. The Plan shall be prepared by a suitably qualified and experienced species expert and shall include, but not necessarily be limited to: (a) results of detailed surveys to determine: (i) the population status of the Coolgardie/Bagotville, Broadwater and Woombah/Illuka Koala populations; (ii) habitat use and movement patterns of Koala populations within five kilometres of the proposed upgrade, or such area as determined by the independent ecologist; and (iii) 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	Appendix H

MCoA No.	Condition requirements	Document reference
	area of survey specified under condition D9(a)(ii) to the satisfaction of the independent ecologist; (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; (c) a detailed description, including the location and design, of all proposed avoidance and mitigation measures; (d) justification that the location and design of mitigation measures: (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; (ii) include permanent fencing of the entire SSI for the length of the distribution of the Coolgardie/Bagotville, Broadwater and Woombah/Iluka populations and for two kilometres beyond the distribution of the Coolgardie/Bagotville, Broadwater and Woombah/Iluka population, following the highway or to the nearest natural barrier to Koala movement (e.g. river), after baseline surveys are complete in accordance with condition D9(a) and prior to operation; (iii) result in the complete, safe crossing of fauna crossings by the Koala. Fauna crossings shall be provided at a sufficient frequency to ensure that habitat connectivity is maintained or improved from pre-construction conditions, as determined by the independent ecologist and agreed by EPA; (iv) provide sufficient opportunities for species dispersal and re-colonisation as determined by the independent ecologist and EPA; (v) are in areas that, and are at a sufficient frequency to, achieve (i) - (iv), 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	

MCoA No.	Condition requirements	Document reference
	accordance with the advice of the independent ecologist and EPA; (vi) all koala underpass structures shall have a minimum height and width of 2.4 metres and a maximum length of 40 metres, or a minimum height and width of 3 metres and a maximum length of 50 metres. The underpass/culvert entrance shall be located at ground level, and no higher in the fill. Structures that provide passage over the road shall have a minimum width of 30 metres and shall be treated with contiguous habitat features; (vii) 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); (viii) effectively minimise the risk of predation from dogs in both dedicated and combined crossings; (ix) provide dry passage for dedicated fauna crossings and for combined fauna crossings to the satisfaction of EPA and DoE, at a flood immunity level determined in accordance with condition D2(c)(j) (x) provide habitat linkages to crossing structures from adjacent Koala habitat; and (xi) ensures that pathways to connectivity structures are not impeded by ancillary facilities, rest areas, service roads or local roads; (e) if the mitigation measures discussed in condition D9(d) cannot be demonstrated to be effective to the satisfaction of the Secretary, in consultation with EPA and DoE, provision for the Plan to be revised to include the design and construction of a minimum of one dedicated underpass or land bridge every 500 metres. Underpass structures shall have a minimum height and width of three metres and a maximum 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	

MCoA No.	Condition requirements	Document reference
	mitigation measures and the ongoing survival of the Coolgardie/Bagotville, Broadwater and Woombah/Iluka Koala populations. Monitoring shall: (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 effective for three consecutive monitoring periods, or as agreed by the Secretary, to the satisfaction of the independent ecologist and EPA; and (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; (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 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 EPA 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: (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 (ii) reassessment of all revegetation areas and frequent reporting and maintenance including addressing failures;	

MCoA No.	Condition requirements	Document reference
	(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: (i) the legal protection and conservation management of additional areas of existing habitat that actively regenerated and secured into conservation management; and/or (ii) strategic revegetation of cleared areas to improve connectivity; and/or (iii) development of a supplementary feeding program and/or breeding program; and/or (iv) development of a long term predator control program; and (k) evidence of consultation with species experts, EPA and DoE in addressing the requirements of this condition, and demonstration of how comments provided by the species experts, EPA and DoE, as a result of this consultation, have been addressed. 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.	
D26(e)	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 EPA, DPI (Fisheries) and DoE, and shall include, but not necessarily be limited to: (i) details of pre-construction surveys undertaken by a suitably qualified and experienced ecologist to verify the SSI footprint based on detailed design; (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	Section 5.4 Sitemap Portal Table 6-1

MCoA No.	Condition requirements		Document reference
		(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 ecologist to identify locations where they would be present; to oversee clearing activities and facilitate fauna rescue and re-location; and consideration of timing of vegetation clearing with consideration to the avoidance of clearing native vegetation during the breeding/nesting periods of threatened species, where feasible and reasonable;	Appendix N
	(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 *Phytophthora cinnamomi* and myrtle rust (*Puccinia psidii 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;	Table 6-1
	(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, A, E, J, S, T,
	(ix)	consideration of the Threatened Species Management Plans;	
	(x)	a description of how the effectiveness of these management measures would be monitored and linked to the monitoring undertaken as part of the Threatened Species Management Plans;	Appendix B, E, F, G, H, I, J, K, S, T

MCoA No.	Condition requirements	Document reference
	(xi) a procedure for dealing with unexpected EEC/threatened species identified during construction, including cessation of work and notification of the EPA, DPI (Fisheries) and DoE, determination of appropriate mitigation measures in consultation with these agencies (including relevant re-location measures) and updating of ecological monitoring and/or biodiversity offset requirements; and	Appendix O
	(xii) mechanisms for the monitoring, review and amendment of this plan.	Section 8

Table 3.2 Commonwealth EPBC Conditions of Approval relevant to the CFFMP

EPBC-CoA No.	Condition requirements	Document reference
EPBC-2	In order to minimise impacts to threatened species and communities, and migratory species, the approval holder must: a) Adhere to the clearance limits outlined in the NSW approval condition B1; b) Undertake pre-clearance surveys in accordance with the NSW approval condition B5; c) Undertake all soil and water management measures in accordance with NSW approval condition B34; and d) Design and construct any additional ancillary facilities in accordance with the requirements of NSW approval B73 to ensure that no impacts occur to threatened species and communities, and migratory species or their habitat.	Table 6-1
EPBC-3	In order to minimise impacts to the Oxleyan Pygmy Perch the approval holder must undertake the action in accordance with NSW approval conditions B7, B8, B9, B13, B40, B41 and B42.	Appendix J
EPBC-4	In order to minimise impacts to the Giant Barred Frog, the approval holder must undertake the action in accordance with the requirements of NSW approval condition B39.	Appendix E
EPBC-5	In order to ensure the long-term viability of the Ballina Koala population, the approval holder must engage a suitably qualified expert to undertake population viability modelling of the Ballina Koala population over a time period of no less than 50 years, taking into account the impacts resulting from the road upgrade in Section 10. This modelling should consider the current proposed route and any proposed avoidance or mitigation measures as appropriate.	Appendix H

EPBC-CoA No.	Condition requirements	Document reference
EPBC-6	The approval holder must have the modelling required by Condition 5 peer reviewed by a second suitably qualified expert.	Appendix H
EPBC-7	In addition to the Koala Management Plan(s) required by NSW approval conditions D8 and D9, to ensure that an unacceptable impact will not occur to the Ballina Koala population, the approval holder must submit for the Minister's approval, a Ballina Koala Plan no less than 3 months prior to commencement of Section 10. The Minister will only approve the plan and the commencement of Section 10 of the action, if the impacts to the Ballina Koala population are demonstrated to be acceptable within the Ballina Koala Plan. The Ballina Koala Plan must include: a) The modelling required by Condition 5 and the results of this modelling, and the peer review required by Condition 6; b) Discussion of the future viability of the Ballina Koala population; c) In the context of relevant environmental social and economic considerations, any additional avoidance, mitigation or offsets, beyond those required by the NSW approval conditions, proposed to minimise the impacts to the Ballina Koala populations; and d) Evidence that any additional avoidance and mitigation measures proposed have been considered in the modelling required in Condition 5. The approval holder must not commence Section 10 unless the Ballina Koala Plan has been approved by the Minister. The approved Plan must be implemented.	Appendix H
EPBC-8	The approval holder must develop a Koala Management Plan(s) pursuant to the requirements of the of NSW approval conditions D8 and D9 for each relevant stage(s). The koala Management Plan must minimise impacts to the Koala to the satisfaction of the Minister and must be submitted to the Minister for approval. The relevant stage(s) cannot commence until the Koala Management Plan for that stage is approved by the Minister. The approved Plan(s) must be implemented.	Appendix H
EPBC-9	The Koala Management Plan, relevant to Section 10, must be consistent with the approved Ballina Koala Plan and can only be submitted to the Minister for approval after the Ballina Koala Plan has been approved by the Minister.	Appendix H
EPBC-10	Should further offsets be required in accordance with NSW approval condition D9(d)j or be proposed as part of the Ballina Koala Plan, these must be in accordance with the EPBC Offsets Policy.	Biodiversity Offset Strategy and Package
EPBC-11	The approval holder must develop a Threatened Mammal Management Plan(s) pursuant to the requirements of NSW approval condition D8 for each stage impacting on the Spotted-tail Quoll and the Long-nosed Potoroo. The Threatened Mammal Management Plan must minimise	Appendix T

EPBC-CoA No.	Condition requirements	Document reference
	impacts to the Spotted-tail Quoll and the Long-nosed Potoroo to the satisfaction of the Minister and must be submitted to the Minister for approval. The relevant stage(s) cannot commence until the Threatened Mammal Management Plan for that stage is approved by the Minister. The approved Plan(s) must be implemented.	
EPBC-12	The approval holder must develop a Threatened Flora Management Plan(s) pursuant to the requirements of NSW approval condition D8 for each stage impacting on EPBC Act listed flora species. The Threatened Flora Management Plan must minimise impacts to EPBC Act listed flora species to the satisfaction of the Minister and be submitted to the Minister for approval. The relevant stages cannot commence until the Threatened Flora Management Plan(s) for that stage is approved by the Minister. The approved plan(s) must be implemented.	Appendix B
EPBC-13	The approval holder must develop a Connectivity Strategy(ies) pursuant to the requirements of the NSW approval conditions D2 for each stage impacting on Threatened species and ecological communities. The Connectivity Strategy must minimise impacts to Threatened species and ecological communities to the satisfaction of the Minister and must be submitted to the Minister for approval. Commencement of the relevant stage(s) cannot occur until the Connectivity Strategy for that stage is approved by the Minister. The approved strategy(ies) must be implemented.	Appendix C

EPBC-14	In order to minimise impacts to threatened species and communities, and migratory species, the approval holder must develop and implement all Frameworks, Strategies, Plans or Programs, in accordance with the requirements of the following NSW approval conditions;
	a) The Mitigation Framework required by the NSW approval condition D1;
	b) The Connectivity Strategy required by NSW approval condition D2 and the requirements of NSW approval condition B12;
	c) The Threatened Species Management Plans required by NSW approval conditions D8 and D9;
	d) The Construction Soil and Water Quality Management Plan required by NSW approval condition D26(c);
	e) The Construction Flora and Fauna Management Plan required by NSW approval condition D26(e);
	f) The Borrow Site Management Plan required by NSW approval condition D22;
	g) The Water Quality Monitoring Program required by NSW approval condition D12;
	h) The Ancillary Facilities Management Plan required by NSW approval condition D21.
		CEMP
		Connectivity Strategy
		Appendix B, E, F, G, H, I, J, K, S, T
		CEMP
		This Plan
		CEMP

EPBC-15	The approval holder must prepare and implement a Biodiversity Offset Strategy and Biodiversity	Biodiversity Offset

EPBC-CoA No.	Condition requirements	Document reference
	Offset Package that compensates for any residual significant impacts on threatened species and communities. The Biodiversity Offset Strategy and Biodiversity Offset Package must meet the requirements of the EPBC Offsets Policy and must be submitted to the Minister for approval.	Package
EPBC-16	The Biodiversity Offset Strategy and Biodiversity Offset Package must be prepared in accordance with the requirements NSW approval conditions D3, D4 and D5.	Biodiversity Offset Package
EPBC-17	Commencement cannot occur until the Biodiversity Offset Strategy required by Condition 15 is approved by the Minister, Commencement of the relevant stage(s) cannot occur until the information required by the NSW approval condition D4 is approved by the Minister.	Biodiversity Offset Package
EPBC-18	The Biodiversity Offset Package required by Condition 15 must be approved by the Minister and the approved Biodiversity Offset Package must be implemented within 24 months of the approval of the Biodiversity Offset Strategy.	Biodiversity Offset Package

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, Working Paper: Biodiversity Assessment, SPIR, Supplementary Biodiversity Assessment, baseline surveys and threatened species management plans. The project boundary and relevant ecological data is shown on the sensitive area maps (SAPs) included in SiteMap Portal.

4.1 Environmental aspects

4.1.1 Threatened ecological communities

A total of seven Threatened Ecological Communities (TEC) listed under the NSW TSC Act and two TECs listed under the EPBC Act have been located in the study area and are included in Table 4.1.

Table 4.1 Threatened Ecological Communities recorded within project area

Threatened Ecological Community	EPBC Act	TSC Act	Relevant Section
Coastal Cypress Pine Forest of the NSW North Coast Bioregion	-	Endangered	8,9,10,11
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions	-	Endangered	3,4,8,9
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	-	10
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	-	Endangered	10
Lowland Rainforest in NSW North Coast and Sydney Basin Bioregions	-	Endangered	3,10,11
Lowland Rainforest in Subtropical Australia	Critically Endangered	-	10,11
Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion	-	Endangered	All
Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner	-	Endangered	3,4,5,6,7,8,9,10
Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions	-	Endangered	3,4,5,8,9,10,11

The location of these TEC 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 to occur within the project corridor, and their conservation status, are listed in Table 4.2. These species listed are the result of the EIS / SPIR findings and have been updated based on subsequent baseline surveys.

Table 4.2 Threatened or otherwise significant plant species recorded in the project area.

Common name	Scientific name	EPBC Act	TSC Act	Relevant Section[1]
Sandstone rough-barked apple	*Angophora robur*	Vulnerable	Vulnerable	3,4
White laceflower	*Archidendron hendersonii*	-	Vulnerable	10
Hairy-joint grass	*Arthraxon hispidus*	Vulnerable	Vulnerable	3,8,10
Carronia Vine[2]	*Carronia multisepalea*[2]	-	-	10
Stinking Cryptocarya	*Cryptocarya foetida*	Vulnerable	Vulnerable	10
Water nutgrass	*Cyperus aquatilis*	-	Endangered	6,7
Green-leaved rose walnut	*Endiandra muelleri subsp. bracteata*	-	Endangered	4,10
Four-tailed grevillea	*Grevillea quadricauda*	Vulnerable	Vulnerable	3
Slender screw fern	*Lindsaea incise*	Endangered	Endangered	3, 6
Rough-shelled bush nut	*Macadamia tetraphylla*	-	Vulnerable	8,10
Maundia	*Maundia triglochinoides*	-	Vulnerable	3,7
Weeping paperbark	*Melaleuca irbyana*	-	Endangered	7
Yellow-flowered King of the Fairies	*Oberonia complanata*	-	Endangered	8
Soldiers Crest Orchid	*Oberonia titania*	-	Vulnerable	10
Knotweed	*Persicaria elatior*	Vulnerable	Vulnerable	4,5
Singleton mint bush	*Prostanthera cineolifera*	Vulnerable	Vulnerable	6
-	*Rotala tripartita*	-	Endangered	6
Siah's Backbone	*Streblus pendulinus*	Endangered	-	4,8,10
Smooth-barked Rose Apple	*Syzygium hodgkinsoniae*	Vulnerable	Vulnerable	10

1: Species occurrence within Sections has been taken from Appendix B, Table 4.2 and Appendix K, Table 5.3.
2: Carronia Vine (*Carronia multisepalea*) is not classified as threatened species under the TSC Act or EPBC Act, however, this species is a significant host plant for the endangered Southern Pink Underwing Moth (*Phyllodes imperialis smithersi*).

The significant plant species; Carronia Vine (*Carronia multisepalea*) was identified in baseline surveys in section 10 with potential habitat also identified in section 11. Carronia Vine is a significant host plant species for the survival of the endangered Southern Pink Underwing Moth (*Phyllodes imperialis smithersi)*. Specific mitigation measures for Carronia Vine are highlighted in section 5.4.4 and described in the Threatened Invertebrate Management Plan (Appendix F). Baseline surveys also identified the presence of *Pararistolochia praevenosa* – the host plant for the locally significant Richmond Birdwing Butterfly (*Ornithoptera richmondia).* Both the host plant (*P. praevenosa)* and Richmond Birdwing Butterfly are not considered to be threatened under the NSW TSC Act or EPBC Act, however, mitigation measures undertaken for the Pink Underwing Moth and the significant host plant species *C. multisepalea* would likely benefit the Richmond Birdwing Butterfly and *P. praevenosa* as they occur in similar habitats.

The location of flora species identified in the project corridor is shown on the Sensitive Area Plans included in SiteMap portal.

4.1.3 Fauna habitats

Seven fauna habitat types were identified by the EIS. These are listed below (Table 4-3) and shown on the Sensitive Area Maps included at Appendix A5 of the CEMP.

Table 4.3 Fauna habitat types recorded in the project area.

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 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. 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.
Wet and riparian forests and floodplain eucalypt habitat	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. 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. 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.
Swamp forest habitat	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 (Eucalyptus robusta) 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. 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.
Wetland habitats	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 (*Lepironia articulata*) and Common Reed (*Phragmites australis*). Jointed Baumea (*Baumea articulata*), Common Baumea (*Baumea rubiginosa*) and Tall Knotweed (*Persicaria lapathifolium*) are also common occurrences. Bungwahl Fern (*Blechnum indicum*) and Bristly Knotweed (*Persicaria strigosa*) dominate the lower strata, with Swamp Rice Grass (*Leersia hexandra*), Rough Ground Fern (*Hypolepis muelleri*) and Triglochin (*Triglochin procerum*) commonly occurring. 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.
Wet and dry heath habitat	Heath-Sedgelands are floristically rich and occurs as a heath and shrubland with occasional stunted trees to 10 metres high. Dominant species include Heath Banksia

Name	Habitat features
	(*Banksia oblongifolia*), Swamp Grasstree (*Xanthorrhoea fulva*) and White Paperbark (*Melaleuca sieberi*), with occasional emergent trees including Scribbly Gum, Broad-leaved Paperbark and Ball Honeymyrtle (*M. nodosa*). The ground layer comprises leaf litter and bare ground. Heath-sedgeland habitat provides habitat for a range of terrestrial fauna groups, including frogs, reptiles, nectivorous birds and small terrestrial mammals. Threatened species considered likely to occur include Wallum Froglet and Wallum Sedgefrog. Emergent trees, banksias and paperbarks within this habitat may also provide foraging habitat for Squirrel Glider, Grey-headed Flying- fox and the Ground Parrot.
Lowland rainforest	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. The dominant tree cover consists of Bangalow Palms (*Archontophoenix 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

A total of 43 Threatened fauna (including aquatic fauna) species were identified in the study area from the targeted field surveys (Table 4.4) in project sections 3.11. In addition, threatened fauna that have a medium to high likelihood of occurring within the project boundary of sections 3.11 are also shown in Table 4.4.

Table 4.4: Threatened fauna confirmed and likelihood of occurrence in project area.

Common name	Scientific name	EPBC Act	TSC Act	Confirmed Sections[1]	Medium-High Likelihood Sections[1]
Birds					
Australasian Bittern	*Botaurus poiciloptilus*	Endangered	Endangered	3	4, 7, 8, 9, 10, 11
Australian Painted Snipe	*Rostratula australis*	Vulnerable, Migratory	Endangered		All Sections
Barking Owl	*Ninox connivens*	-	Vulnerable		All Sections
Barred Cuckoo-shrike	*Coracina lineata*	-	Vulnerable		6, 7, 8, 9, 10, 11
Black Bittern	*Ixobrychus flavivollis*	-	Vulnerable		3, 6, 7, 9

Common name	Scientific name	EPBC Act	TSC Act	Confirmed Sections[1]	Medium-High Likelihood Sections[1]
Black-chinned Honeyeater	*Melithreptus gularis*		Vulnerable	3	6, 7
Black-necked Stork	*Ephippiorhynchus asiaticus*	-	Endangered	3, 4, 5	All Sections
Brolga	*Grus rubicundus*	-	Vulnerable	3, 4, 5, 10, 11	All Sections
Brown Treecreeper	*Climacteris picumnus*	-	Vulnerable	3, 6, 7	4, 5
Bush Stone-curlew	*Burhinus grallarius*	Endangered			3
Coastal Emu	*Dromaius novaehollandiae*	-	Endangered Population	3, 4	5
Comb-crested Jacana	*Irediparra gallinacea*	-	Vulnerable		3, 4, 5, 6, 7, 8, 9, 10, 11
Double-eyed Fig-parrot	*Cyclopsitta diophthalma coxeni*	Endangered	Critically endangered		9, 10, 11
Eastern Grass Owl	*Tyto longimembris*	-	Vulnerable	9, 10	All Sections
Eastern Osprey	*Pandion haliaetus*	Migratory	Vulnerable	3, 4, 5, 9, 10, 11	All Sections
Freckled Duck	*Stictonetta naevosa*	-	Vulnerable		3, 5
Glossy Black-cockatoo	*Calyptorhynchus lathami*	-	Vulnerable	3, 7, 10	All Sections
Grey-crowned Babbler	*Pomatostomus temporalis temporarlis*	-	Vulnerable	3, 6, 7, 8, 9, 10, 11	4
Ground Parrot	*Pezoporus wallicus*	-	Vulnerable		8, 9, 10
Little Eagle	*hieraaetus*	-	Vulnerable		All Sections
Little Lorikeet	*Glossopsitta pusilla*	-	Vulnerable		All Sections
Magpie Goose	*Anseranas semipalmata*	-	Vulnerable	3	4, 5, 6, 8, 9, 10, 11
Mangrove Honeyeater	*Lichenostomus fasciogulari*	-	Vulnerable	10	4, 5, 9, 11
Masked Owl	*Tyto novaehollandiae*	-	Vulnerable	6, 11	All Sections
Pale-vented Bush Hen	*Amauromis molucanna*	-	Vulnerable		9, 10, 11
Powerful Owl	*Ninox strenua*	-	Vulnerable	3, 7, 10	All Sections
Red Goshawk	*Erythrotriorchis radiates*	Vulnerable	Critically endangered		All Sections
Regent Honeyeater	*Zanthomyza phrygia*	Endangered, Migratory	Endangered		All Sections
Rose-crowned Fruit-dove	*Ptilinopus regina*	-	Vulnerable	10	All Sections
Square-tailed Kite	*Lophoictinia isura*	-	Vulnerable		All Sections
Superb Fruit-dove	*Ptilinopus superbus*	-	Vulnerable		All Sections
Swift Parrot	*Lathamus discolor*	Endangered, Migratory	Endangered		All Sections
Wompoo Fruit-dove	*Ptilinopus magnificus*	-	Vulnerable		6, 7, 8, 9, 10, 11
Microchiropteran bats					
Beccari's Freetail-bat	*Mormopterus beccari*	-	Vulnerable		All Sections
Eastern Bent-wing Bat	*Miniopterus schrebersii oceanensis*	-	Vulnerable	6, 7, 8, 9, 10, 11	All Sections
Eastern Cave	*Vespadelus*	-	Vulnerable	6, 7, 8, 9,	All Sections

Common name	Scientific name	EPBC Act	TSC Act	Confirmed Sections[1]	Medium-High Likelihood Sections[1]
Bat	*troughtoni*			10, 11	
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	-	Vulnerable	3	All Sections
Eastern Freetail-bat	*Mormopterus norfolkensus*	-	Vulnerable	6, 7, 8, 9, 10, 11	All Sections
Eastern Long-eared Bat	*Nyctophilus bifax*	-	Vulnerable	6, 7, 8, 9, 10, 11	All Sections
Golden-tipped Bat	*Kerivoula papuensis*	-	Vulnerable	9, 10, 11	All Sections
Greater Broad-nosed Bat	*Scoteanax rueppellii*	-	Vulnerable	9, 10, 11	All Sections
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	-	Vulnerable	3, 6, 7, 8	All Sections
Large-eared Pied-bat	*Chalinolobus dwyeri*	Vulnerable	Vulnerable		3, 4, 5, 6, 7
Little Bent-wing Bat	*Miniopterus australis*	-	Vulnerable	All Sections	
Southern Myotis	*Myotis macropus*	-	Vulnerable	5, 6, 7, 8, 9, 10, 11	All Sections
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	-	Vulnerable	9, 10, 11	All Sections
Megachiropteran bats					
Common Blossom-bat	*Syconycteris australis*	-	Vulnerable	6, 7, 8, 9, 10, 11	
Grey-headed Flying-fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable	All Sections	
Mammals					
Brush-tailed Phascogale	*Phascogale tapoatafa*	-	Vulnerable	3, 4, 6, 7, 8	All Sections
Common Planigale	*Planigale maculata*	-	Vulnerable	10	3, 6, 7, 8, 9, 11
Eastern Pygmy-possum	*Cercartetus nanus*	-	Vulnerable		All Sections
Koala[2]	*Phascolarctos cinereus*[2]	Vulnerable	Vulnerable	3, 5, 7, 9, 10	All Sections
Long-nosed Potoroo[3]	*Potorous tridactylus tridactylus*[3]	Vulnerable	Vulnerable	6, 7, 10	3, 8, 9, 11
Rufous Bettong	*Aepyprymnus rufescens*	-	Vulnerable	3	4, 5, 6, 7, 8
Spotted-tailed Quoll	*Dasyurus maculatus*	Endangered	Vulnerable		All Sections
Squirrel Glider	*Petaurus norfolcensis*	-	Vulnerable	3, 4, 5, 7, 8, 9, 10	All Sections
Yellow-bellied Glider	*Petaurus australis*	-	Vulnerable	3, 6, 7	All Sections
Frogs					
Wallum Froglet	*Crinia tinnula*	-	Vulnerable	3, 6, 7, 8, 9, 10, 11	All Sections
Giant Barred Frog[2]	*Mixophyes iterates*[2]	Endangered	Endangered	7	3, 6
Green-thighed Frog	*Litoria brevipalmata*	-	Vulnerable	3, 5,7, 8	4, 6,
Olongburra Frog[3]	*Litoria olongburensis*[3]	Vulnerable	Vulnerable	8, 9, 10	7, 11
Reptiles					
Pale-headed Snake	*Hoplocephalus bitorquatus*	-	Vulnerable		3, 6, 7, 8

Common name	Scientific name	EPBC Act	TSC Act	Confirmed Sections[1]	Medium-High Likelihood Sections[1]
Stephens' Banded Snake	*Hoplocephalus stephensii*	-	Vulnerable	3	6, 7, 8
Fish					
Eastern Freshwater Cod	*Maccullochella ikei*	Endangered	Endangered		3, 4, 5, 10
Oxleyan Pygmy Perch[2]	*Nannoperca oxleyana*[2]	Endangered	Endangered	6, 7, 8, 9	3, 10
Purple-spotted Gudgeon[4]	*Mogurnda adspersa*	-	Endangered		
Invertebrates					
Atlas Rainforest Ground Beetle	*Nurus atlas*	-	Endangered	10	
Coastal Petaltail	*Petalura litoera*	-	Endangered		3 ,4, 5, 7, 8, 9, 10
Pink Underwing Moth[2]	*Phyllodes imperialis*[2]	Vulnerable	Vulnerable	10	9, 11

Note:

- 1: Confirmation and likelihood of records were taken from EIS Appendix D – Table D2
- 2: Amendments of confirmation of certain species were updated based off Appendix J in S/PIR
- 3: Species confirmed within close proximity to project boundary as stated in EIS(Section 3.9.4) and supplementary surveys
- 4: Purple Spotted Gudgeon was not identified during first round monitoring and are considered unlikely to inhabit the highway corridor in sections 6-9 or 11 (Threatened Fish MP Rev2).

4.1.5 Aquatic fauna

Species recorded in freshwater and estuarine habitats during investigations for the EIS are shown in Table 4-5. Targeted pre-construction surveys in Sections 6-9 undertaken in 2013 and 2014 (GeoLINK 2013, 2014), recorded the threatened species Oxleyan Pygmy Perch from a number of waterways intersecting Sections 7, 8, and 9 the project, and also at a number of control sites, including:

- Section 7: Unnamed waterway south of Serendipity Rd (chainage 114.000)
- Section 7: Tabbimoble Floodway No. 1 (chainage 115.300)
- Section 8: Unnamed waterway south of MacDonalds Creek (chainage 134.600)
- Section 8: MacDonalds Creek tributary (chainage 135.520)
- Section 8: MacDonalds Creek (chainage 136.600)
- Section 8: Unnamed waterway (dam) within Broadwater National Park (chainage 139.600)
- Section 8: Numerous sites within Broadwater National Park along McDonalds Creek and tributaries (control sites)
- Section 9: Montis Gully tributary upstream of chainage 141.180
- Section 9: Montis Gully (dam) tributary upstream of chainage 141.500
- Section 9: Montis Gully tributary upstream of chainage 141.890.

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Table 4.5: Aquatic Fauna in the project area.

Habitat	Species
Freshwater Pheasant Creek, Glenugie Creek (unnamed tributary), Coldstream River, Black Snake Creek, Pillar Valley Creek, Chaffin Creek, Champions Creek, Tabbimoble Creek (upstream of weir), Nortons Gully, Oaky Creek, Tuckombil Canal (upstream of weir), Macdonalds Creek, Mororo Creek, Tuckean Broadwater, Montis Gully, Eversons Creek, Richmond River, Tuckean Swamp, Randals Creek.	16 freshwater fish species were recorded: olive perchlet, short-finned eel, long-finned eel, blue catfish, freshwater herring, striped gudgeon, empire gudgeon, fire tail gudgeon, carp gudgeon, dwarf flathead gudgeon, unidentified gobies, crimson-spotted rainbow fish, ornate rainbow fish, 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. Four aquatic invertebrates were recorded: freshwater shrimp, freshwater yabbie, school prawn and greentailed prawn. One introduced species, plague minnow, was recorded.
Estuarine Edwards Creek, Shark Creek, South Arm (Clarence River), James Creek, Clarence River, Serpentine Channel, North Arm (Clarence River), Tabbimoble Creek (downstream of weir), Duck Creek, Emigrant Creek.	Seven estuarine / marine fish species were recorded: Estuary perchlet, Small-mouthed hardy head, Sea mullet, Estuary perch, Yellowtail bream, Banded toadfish and Bullrout. No state or nationally threatened species. Four aquatic invertebrates were recorded: soldier crab, mud crab, school prawn and greentailed prawn.

The fisheries habitat classification for each of the waterways referred to above is provided in Table 4-6. 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.

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Table 4.6: Fisheries habitat classifications in the project area.

Project section	Waterway	Classification
3	Pheasant Creek	Class 3
	Unnamed tributary of Glenugie Creek	Class 3
	Coldstream River	Class 1
	Black Snake Creek	Class 1
	Pillar Valley Creek	Class 1
	Unnamed tributary of Pillar Valley Creek	Class 3
	Chaffin Creek	Class 1
	Unnamed tributary of Chaffin Creek	Class 3
	Champions Creek	Class 2
4	Edwards Creek	Class 3
	Shark Creek	Class 1
5	Unnamed tributary of James Creek	Class 3
	Clarence River	Class 1
	Serpentine Channel	Class 1
	North Arm (Clarence River)	Class 1
	Mororo Creek	Class 3
6	Mororo Creek	Class 3
	Tabbimoble Creek	Class 1
	Tabbimoble Overflow	Class 1
7	Tabbimoble floodway no. 1	Class 1 (OPP recorded in 2014)
	Unknown creek in Tabbimoble State Forest	Class 1
	Unnamed drainage lines near Station 124.5	Class 2
	Unnamed drainage lines near Station 121.7-122.2	Class 2
	Nortons Gully	Class 2
	Oaky Creek	Class 2
8	Tuckombil Canal (becomes Evans River)	Class 1
	Unnamed watercourse	Class 1
	Unnamed tributary of Macdonalds Creek	Class 1
	Macdonalds Creek	Class 1
9	Montis Gully	Class 2
	Unnamed tributary of Montis Gully	Class 1 (OPP recorded in 2014)
	Eversons Creek	Class 2
10	Tuckean Swamp (upstream of Richmond River)	Class 3
	Tuckean Broadwater (upstream of Richmond River)	Class 3
	Richmond River	Class 1
	Unnamed tributaries of Bingal Creek	Class 3
	Saltwater Creek	Class 3

Project section	Waterway	Classification
	Randals Creek	Class 2
11	Duck Creek	Class 1
	Emigrant Creek	Class 1

Classification in accordance with NSW DPI Fisheries Guidelines

OPP – Oxleyan Pygmy Perch

4.1.6 Migratory species

A total of nine EPBC Act listed migratory species were confirmed from field surveys between Sections 3 to 11 (as described in Table 10-12 in the EIS and reproduced as Table 4.7). An additional five migratory species are considered to have a medium to high likelihood of occurring in the study area, these being the Australian Painted Snipe, Spectacled Monarch, White-bellied Sea Eagle, Swift Parrot and Regent Honeyeater.

Table 4.7: Migratory fauna species confirmed or predicted in project area.

Migratory species	EPBC Act status	Preferred habitat	Presence
Eastern Osprey (*Pandion haliaetus*)	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** in several locations associated with project sections 3-6 and 9-11. Predicted across the entire study area.
Great Egret (*Egretta alba*)	Marine; Migratory (CAMBA, JAMBA)	Prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands.	**Confirmed** in project section 8. High likelihood that the species occurs across the entire study area. This species is commonly reported in the Clarence Valley wetlands (Smith 2011), which is traversed by Section 3-5.
Cattle Egret (*Ardea ibis*)	Marine; Migratory (CAMBA, JAMBA)	Is found in grasslands, woodlands and wetlands particularly in coastal areas. It also uses pastures and croplands, especially where drainage is poor. Is often seen with cattle and other stock.	**Confirmed**, recorded in all project sections 3-5 and 9-11 associated with grazing paddocks particularly in floodplains. Predicted across the entire study area and commonly reported in the Clarence valley wetland (Smith, 2011) which is traversed by section 3-5.
White-bellied Sea-Eagle (*Haliaeetus leucogaster*)	Marine; Migratory (CAMBA)	Forages over large open fresh or saline waterbodies, coastal seas and open terrestrial areas (Higgins, 1999; Simpson & Day, 1999). Breeding habitat consists of tall trees, mangroves, cliffs, rocky outcrops, silts, caves and crevices and is located along the coast or major rivers. Breeding habitat is usually in or close to water, but may occur up to a kilometre away (Marchant & Higgins, 1993).	Predicted along the length of the study area mostly in floodplain, wetland, riverine or estuarine habitats associated with the Clarence River and Richmond River.

Migratory species	EPBC Act status	Preferred habitat	Presence
Satin Flycatcher (*Myiagra cyanoleuca*)	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 6- 8 in dense forest. Predicted throughout the study area in all forested habitats.
White Throated Needletail (*Hirundapus caudacutus*)	Marine; Migratory(CAMBA, 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).	Small flock **confirmed** near Shark Creek in project section 4. Predicted throughout the study area in all forested habitats.
Rainbow Bee-eater (*Merops ornatus*)	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 (*Lathamus discolor*)	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 (*Xanthomyza phrygia*)	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 (*Monarcha melanopsis*)	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 (*Rhipidura rufifrons*)	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.
Lathams Snipe (*Gallinago harwickii*)	Marine; Migratory(CAMBA, JAMBA, ROKAMBA)	Occurs in permanent and ephemeral wetlands, usually inhabiting open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies) (Frith et. al, 1977). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity	One individual **confirmed** in project section 3 in the Coldstream wetlands. Predicted throughout the study area particularly in floodplain areas of the Richmond River, Clarence River

Migratory species	EPBC Act status	Preferred habitat	Presence
		(Frith et al, 1977)	and Corindi River.
Australian Painted Snipe (*Rostratula australis*)	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 *lignum Muehlenbeckia* or canegrass or sometimes tea-tree (Melaleuca).	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 (*Monarcha trivirgatus*)	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.

4.1.7 Endangered populations recorded in the project area.

The field surveys and background research conducted for the project identified that the endangered coastal emu population (Schedule 1, Part 2 of the TSC Act) was present in the study area in project sections 3 and 4.

The endangered coastal emu population comprises three sub-populations, the largest centred on Yuraygir National Park and surrounds on the southern side of the Clarence River estimated at between 80 and 120 individuals. The remaining sub-populations occur north of the river centred on Bundjalung National Park and Bungawalbin Nature Reserve. Table 2-1 in the Coastal Emu Management Plan (reproduced below Table 4-8) describes the current status of the three sub-populations and their proximity to the project.

Table 4.8: Summary of Coastal Emu Sup-populations in the Mid North Coast

Sub-population and range	Predicted sub-population size	Intersection with project corridor
Yuraygir sub-population: South of the Clarence River to Red Rock including Yuraygir National Park in the east and surrounding landscapes such as Clarence River floodplain to the west, north to Gulmarrad-Maclean, and south to Pillar valley and Red Rock through low hills and floodplain.	Largest group estimated at between 50-120 individuals fluctuating from counts over the last 12 years.	The range and habitat of this sub-population intersects with proposed Sections 3 and 4 of the upgrade.
Bundjalung sub population: North of the Clarence River, largely over Bundjalung National Park from Iluka to Evans Head.	Smallest population, only 20 birds estimated in 2006. No emus counted in 2010-2014 censuses, current population unknown and considered possibly extinct.	Not directly affected.
Bungawalbin sub-population: North of the Clarence River and south of the Richmond River. Ranges over Bungawalbin Nature Reserve and National Park, main camp and surrounds.	Estimated at < 60 birds.	Not directly affected, existing highway may be a barrier to connectivity with Bundjalung sub-population.

Source – Coastal Emu Management Plan (Version 2.1)

5 Environmental aspects and impacts

5.1 Construction activities

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

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

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

5.2 Ecological impacts

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

- Loss of native vegetation including threatened flora and threatened ecological communities and their habitats.
- Loss of terrestrial, riparian and aquatic habitat for protected and threatened fauna.
- Direct mortality of protected and threatened fauna as a result construction works within the project area.
- 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, wind turbulence and microclimate from the road corridor.
- 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 Table6.1 aim to minimise the above likely and potential impacts on those threatened flora and fauna species and threatened ecological communities identified in Table 4.2.

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.

5.3 Targeted surveys

As per MCoA D26 (e) (i) pre construction surveys have been undertaken within all areas that are to be cleared as part of the project. The surveys have been undertaken by suitably qualified and experienced ecologists and were undertaken to collect comprehensive and up-to-date data on the distribution and abundance of threatened flora within the project area, mark threatened flora in the field to support future identification and support management actions, determine monitoring locations and collect baseline data to inform the development of the Translocation Strategy.

The targeted surveys for the project have been completed and are summarised in Appendices B, E, F, G, H, I, J, K, P, S & T of this plan. They included:

- A targeted survey for threatened fauna and demarcation of habitat containing threatened fauna shelter or nesting resources. The outcome of this assessment was the 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 was verified.
- Recommendations on additional survey requirements.

  Baseline noxious weed surveys to inform the Noxious Weed and Pathogen Plan (Appendix P).

Targeted surveys for threatened plants have been completed and pre-construction surveys have been limited to defining the boundaries of populations for exclusion fence installation. Threatened plants within 20m of the construction footprint to be retained (*in situ*) have been identified, mapped and marked prior to commencement of construction. Translocation of threatened flora species will be undertaken in accordance with the *Threatened Flora Translocation Management Plan* (Appendix R). This strategy sets out timing and duration of translocation actions including collection of plant and seed material, nursery growing-on schedules, transplanting of seedlings and habitat maintenance schedules. All seeds and other propagation material will be collected from threatened plants prior to clearing works.

5.4 Pre-clearing surveys

Pre-clearing surveys will be undertaken prior to commencement of construction activities and will include:

- Pre-clearing surveys will be undertaken by an experienced ecologist and will be consistent with Roads and Maritime Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA projects (RTA, 2011a).
- 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.
- 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 clearing limit prior to clearing commencing – the project contractor/environmental contractor is responsible part for management of exclusion zones.

    - Threatened Frog temporary fencing needs to be placed in accordance with the requirements of the Threatened Frog Management Plan (Appendix E) Emu Fencing strategy to be completed and commence implementation of temporary emu fencing 6 months prior to construction
- Identify areas that may be used as a movement corridor by threatened fauna and determine if temporary exclusion fence is necessary.
- Pre-clearing surveys will be undertaken and recorded in specific reports for each survey. Any additional mitigation measures identified in the survey reports will be incorporated into relevant Contractor EMPs, EWMS and procedures by contractors prior to the commencement of any construction work.
- The interactive, live mapping tool for the project, *SiteMap*, will be updated with information from these surveys. Where necessary certain Sensitive Area Plans (SAPs) will also be updated.

In some circumstances (i.e. threatened frog habitats, glider, Long-nose Potoroo 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 (Appendix T for Potoroo trapping). The Threatened Frog Management Plan (Appendix E) includes specific details on pre-clearing and clearing survey requirements for relevant threatened frog species, can be seen in section 5.4.2. including:

- Surveys where threatened frog habitat has been identified or is within 50m of clearing footprint
- Pre-clearing surveys would occur after frog exclusion fencing is installed
- At least 1hr of survey per hectare
- nocturnal surveys during suitable weather conditions; dip-netting for tadpoles; and diurnal active searches.

5.4.1 Threatened Frogs

Relocation of threatened frogs should only occur after recipient sites have been identified and temporary frog exclusion fence been installed.

- Install temporary exclusion fencing at all threatened frog habitats seven days before commencement of clearing. Targeted frog surveys required prior to installation and supervision by ecologist during installation.

The Threatened Frog Management Plan (Appendix E) includes specific details on pre-clearing and clearing survey requirements for relevant threatened frog species, these include:

- Surveys where threatened frog habitat has been identified or is within 50m of clearing footprint
- Pre-clearing surveys would occur after frog exclusion fencing is installed
- At least 1hr of survey per hectare
- Nocturnal surveys during suitable weather conditions; dip-netting for tadpoles; and diurnal active searches.
- Immediately prior to clearing/disturbance activities in threatened frog habitat or adjacent to habitat an ecologist will conduct active searches – these consist of 15 minute searches per hectare

5.4.2 Threatened Fauna

In addition to the capture and relocation of fauna important habitat features such as hollow logs and limbs and large rocks will be placed outside the clearing limits to provide supplementary habitat. The placement of material will 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 clearing limits).

- 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 *Koala Management Plan* (Appendix H) also specifies that: an ecologist will undertake surveys of the schedule clearing area prior to vegetation clearing (i.e. early in the morning prior to the commencement of vegetation clearing activities) to identify trees in which a Koala is present and any adjacent trees with overlapping crowns.
- The *Threatened Glider Management Plan* (Appendix I) states that an ecologist will be present during all vegetation clearing and habitat removal activities.
- The *Threatened Mammal Management Plan* (Appendix T) states that an ecologist will be on-site during all clearing activities to capture and relocate fauna.

In areas of know Long-nosed Potoroo habitat trapping will be undertaken each night if necessary prior to clearing. An experienced ecologist(s) shall set traps targeting Long-nosed Potoroo in areas that are to be cleared the following day. Traps will be checked at first light ahead of any clearing activities occurring with captured animals relocated into adjacent habitat 50 -150m from the clearing boundary. This process will be repeated until all clearing in the Long-nosed Potoroo habitat is completed. Habitat of Long-nosed Potoroo is identified in Appendix T of the Threatened Mammal Management Plan.

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.

5.4.3 Fauna capture and handling

Fauna capture and handling will follow accepted procedures and be in accordance with licence conditions, Animal Care and Ethics Committee Approvals and relevant Codes of Practice (e.g. NSW Code of Practice for Injured, Sick and Orphaned Protected Fauna (EPA 2011). Fauna will be released into areas of suitable habitat as close as possible to their point of capture and, if necessary, appropriate property access arranged. 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.

5.4.4 Threatened Invertebrates

Baseline targeted survey and pre-construction surveys for the Southern Pink Underwing Moth and Atlas Rainforest Ground Beetle have been completed for the Project. The *Threatened Invertebrate Management Plan* (Appendix F) specifies that: additional pre-clearing field inspections will be undertaken by an experienced ecologist to ensure that no host plants fall within the clearing limits once it has been accurately defined and marked in

the field with survey pegs. Results from baseline targeted surveys have identified known potential habitat areas in the project footprint.

An ecologist will check potential foraging habitat for Southern Pink Underwing Moth within the Project on each day prior to commencement of any clearing activity to ensure that no host plants or individuals of the moth fall within the clearing zone. This survey is also described in Section 6.3.4 of the *Threatened Invertebrate Management Plan.*

5.4.5 Coastal Emu

The *Coastal Emu Management Plan* (Appendix G) specifies pre-clearing checks for emu nests in the construction corridor prior to the commencement of construction. This may occur at early works sites as a priority and later across the construction corridor according to the priority stages of the upgrade to be determined. The pre-clearing process targets all fauna habitat and is a requirement of the CEMP. Searches of emu activity and emu nests will form a part of this process, and is particularly relevant in Sections 3 and 4 of the project. All other site specific management measures for emus will be followed as stated in the *Coastal Emu Management Plan* (Appendix G).

5.4.6 Threatened bats

- Implement bat roost exclusion at nominated drainage structures being replaced or extended. Timing of exclusion restricted to between late Aug – early Oct or mid Apr – end May to avoid breeding and over-wintering periods for microbats. Roost exclusion not to occur during forecast periods of heavy rain. The integrity of exclusion device and nearby bat boxes should be inspected the day after exclusion occurs.
- Undertake checks for microbats prior to works on each drainage structure as described in *Threatened Bat Management Plan* (Appendix S), this includes:
    - Pre-work inspection one day prior to starting work on subject drainage structure and also on the day of work

5.4.7 Nest Boxes

Nest boxes will be installed in accordance with the *Nest Box Plan* (Appendix A). The distribution of nest boxes will be determined in the field by the project ecologist. Installation of 70% of nest boxes will occur prior to the clearing phase. Installation of the remaining 30% will occur within three months after clearing once exact number of habitat trees removed is known.

In addition to nest boxes detailed in the Nest Box Plan (Appendix A), the installation of nest boxes for microbats surrounding drainage structures will need to be installed prior to any construction on specified structures outlined in the Microbat Management Plan Sections 3-11 (Appendix S). Timing for installation for bat boxes is to occur preferably 12 months in advance to construction activities around drainage structures identified in Appendix S.

5.5 Vegetation clearing

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 will be surveyed immediately (proceeding night & day of clearing) prior to clearing, to:

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

Stage 2 – Habitat Tree Removal

Habitat trees (HBT) will be retained for 48 hours, or two nights, after stage 1 clearing is completed. HBT will be felled carefully using a harvester with a rotating head or a bulldozer. Importantly, the equipment used to fell trees will 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 will 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 will be taken to a local vet for treatment. Further details on the *Working Around Trees Guideline* are provided in Appendix M.

Clearing requirements are provided in the Biodiversity Guidelines Guide 1 (Roads and Traffic Authority (2011)). The following clearing requirements apply to threatened plant species:

- All threatened plants identified for translocation will be translocated prior to clearing works being undertaken, as outlined in the translocation strategy
- All threatened plants identified to be retained at the edge of the clearing limits/constriction zone (in situ) will be protected during construction
- Where individual threatened plants occur on the edge of a planned clearing zone and the clearing cannot be avoided, pruning of the trees branches or cutting tree trunks and leaving stumps in the ground, to regrow or sucker from the base, will be done where possible
- All relevant construction staff will be made aware of the presence of individual threatened plants and populations of threatened species and the importance of protecting and avoiding impacts to individuals during construction
- Only individual plants marked with flagging tape colour-coded or identified for removal will be removed; and
- In the event of an unexpected discovery of a threatened and/or rare plant species, the construction staff are to follow the RMS *Unexpected Threatened Species Finds Procedure* (Appendix O). If the plant individual or population is a new species discovery it will be added to the species list and management measures will be reviewed and updated where required for the species.

5.6 Unexpected Threatened Species Finds Procedure

If any threatened species or threatened ecological community is unexpectedly encountered during construction activities, site personnel need to follow the Unexpected Threatened Species Finds Procedure outlined in Appendix O.

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)(S/PIR), the Conditions of Approval and relevant RMS documents. Specific measures and requirements to address impacts on flora and fauna are outlined in Table 6.1. The mitigation measures outlined in Table 6-1 are directly taken from the S/PIR, any threatened flora and fauna sub management plans take precedence over the S/PIR measures. For specific detailed mitigation measures on threatened flora and fauna see the reference management plan in appendices.

6.2 Biodiversity offsets

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

Table 6.1 Construction flora and fauna management and mitigation measures

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
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	Pacific Complete Environment Manager Project Contractor's Environmental Representative	Good practice	All Sections
FF2	Any works required outside the construction footprint will be referred to the Environment Manager for advice on further assessment and approval requirements in accordance with Section 3.7 of the CEMP.		Construction	Pacific Complete Environment Manager Project Contractor's Environmental Representative Project Contractor's Project Engineer / Foreman	Good practice	All Sections
FF3	In the event that threatened species or threatened ecological communities are unexpectedly identified during construction the Unexpected Threatened Species /TECs Finds Procedure (Appendix O) will be followed.		Construction	Pacific Complete Site Environmental Officer Project Contractor's Environmental Representative	Good practice	All Sections
FF4	A project ecologist will be appointed prior to the commencement of construction		Pre-construction	Pacific Complete Environment Manager Project Contractor's Environmental Representative	Good practice	
VEGETATION CLEARING, PROTECTION AND MANAGEMENT						
FF5	The clearing of native vegetation shall be minimised with the objective of reducing impacts to any threatened species or TECs where feasible and reasonable. Where feasible and		Pre-construction / Construction	Pacific Complete Environment Manager Project Contractor's Environmental	Submissions/PIR (B13) MCoA B1 MCoA B2	All Sections

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	reasonable, remnant vegetation shall be retained between the SSI boundary and the SSI footprint.			Representative Project Contractor's Project Engineer / Foreman	EPBC-2	
FF6	The pre-clearing process will be consistent with Roads and Maritime Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA projects (RTA, 2011a) and include: • Pre-clearing surveys by an experienced ecologist for large bird nests, particularly for listed species such as the Black-necked Stork, Eastern Osprey, Square-tailed Kite and Little Eagle during the nesting and breeding season (July to December) and tree roosting (e.g. Southern Myotis)or cave dwelling bats in trees or existing culvert/bridge structures. If the species is present in or directly adjacent to the project footprint (including ancillary facilities), measures to manage any species be considered, if required. • Mapping the location of any threatened flora and/or fauna species, Threatened Ecological Communities and habitat. • Construction traffic will be restricted to defined access tracks, fenced prior to the start of construction and maintained until construction is complete.		Pre-construction / Construction	Project Contractor's Environmental Representative Project Contractor's Project Engineer / Foreman	Submissions/PIR (B23)	All Sections
FF7	To prevent injury and mortality of fauna		Construction	Pacific Complete Site	Submissions/PIR	All Sections

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	during the clearing of vegetation and drainage of farm dams, an experienced and licensed wildlife carer and/or ecologist will be present to capture and relocate fauna where required. Further details regarding fauna handling and vegetation clearing procedures are provided in the Roads and Maritime Biodiversity Guidelines (RTA, 2011a).			Environmental Officer Project Contractor's Environmental Representative	(B32)	
FF8	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	Pacific Complete Site Environmental Officer Project Contractor's Environmental Representative Project Contractor's Project Engineer / Foreman	G36 (Section 4) G40 (Section 2.4)	All Sections
FF9	Fauna exclusion fencing locations and design will be further developed in accordance with the design principles outlined in the Connectivity Strategy in Appendix A of the Working paper – Biodiversity.		Pre-construction and construction	Pacific Complete Environment Manager Pacific Complete Design Manager	Submissions/PIR (B5) Appendix C	All Sections
FF10	Fauna exclusion fencing in low-lying floodplains between stations 35.0 and 80.2 will where feasible and reasonable, be placed higher on fill embankments to reduce damage from flooding.		Construction	Pacific Complete Environment Manager Pacific Complete Design Manager	Submissions/PIR (B6)	3 & 4
FF11	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		Pre-construction	Pacific Complete Environment Manager Pacific Complete Design Manager	Submissions/PIR (B7)	All Sections

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	trees are able to be safely retained close to the road edge.					
FF12	The design and construction of fauna exclusion fencing, drainage or fauna underpass structures in widened medians minimise vegetation clearing.		Pre-construction and construction	Pacific Complete Environment Manager Pacific Complete Design Manager Project Contractor's Environmental Representative Project Contractor's Project Engineer / Foreman	Submissions/PIR (B8)	7
FF13	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	Pacific Complete Environment Manager Pacific Complete Construction Personnel Project Contractor's Environmental Representative Project Contractor's Project Engineer / Foreman	Submissions/PIR (B9)	7
FF14	A weed management plan will be developed as part of the CEMP, in accordance with the Roads and Maritime Biodiversity Guidelines (RTA, 2011a) and the Introductory Weed Management Manual (Richards, 2004).		Construction	Pacific Complete Environment Manager Project Contractor's Environmental Representative	G36 (Section4) Submissions/PIR (B27)	All Sections
FF15	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 Noxious Weed and Pathogen Management Plan will be in accordance with the Department of Primary Industries Alligator Weed control manual (van Oosterhout, 2007).		Pre-construction	Pacific Complete Environment Manager	Submissions/PIR (B28)	7, 8, 9, 10

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
FF16	A landscape management plan will be developed to provide specific details for the re-establishment of native vegetation on batters, cut faces, surrounding sediment basins and other areas disturbed during construction. This includes details for the appropriate removal and restoration of temporary creek crossings. The landscape management plan will be developed in line with Roads and Maritime Biodiversity Guidelines (RTA, 2011a), the design principles identified in the Connectivity Strategy and the design principles in Working paper – Urban design, landscape character and visual impact.		Construction	Pacific Complete Environment Manager Project Contractors Environmental Representative	Submissions/PIR (B12)	All Sections
FF17	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. If incidental or unanticipated threatened flora and fauna finds are identified, work shall cease in the vicinity of the find to allow for an evaluation of an appropriate response (refer Appendix O)		Pre-construction / Construction	Pacific Complete Environment Manager Project Contractors Environmental Representative	MCoA B5, MCoA B6, EPBC-2	All Sections
FF18	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 Contractors Environmental Representative Project Contractor's Project Engineer / Foreman	MCoA B3	All Sections

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
THREATENED FLORA						
FF19	The measures identified in the Threatened Flora Management Plan (Appendix B) will be implemented.		As specified	Pacific Complete Environment Manager Project Contractors Environmental Representative	Submissions/PIR (B11)	All Sections
FF20	The measures identified in the Threatened Rainforest Communities and Rainforest Plants Management Plan (Appendix K) will be implemented.		As specified	Pacific Complete Environment Manager Project Contractors Environmental Representative	Submissions/PIR (B11)	All Sections
FF21	The project footprint and placement of sedimentation basins will be evaluated to minimise impacts to Slender Screw Fern and native vegetation.		Pre-construction	Pacific Complete Environment Manager Pacific Complete Design Manager	Submissions/PIR B54)	6
FF22	All clearing of Koala habitat trees is to be undertaken in the presence of a Koala spotter.		Pre-construction / Construction	Pacific Complete Environment Manager Project Contractors Environmental Representative	MCoA B5, EPBC-2	All Sections
THREATENED FAUNA						
FF23	The Nest Box Plan (Appendix A) will be implemented.		Pre-construction As specified	Pacific Complete Environment Manager Project Contractors Environmental Representative	Submissions/PIR (B31) MCoA D6	All Sections
FF24	The measures identified in the Threatened Invertebrates Management Plan (Appendix F) will be implemented.		Pre-construction As specified	Pacific Complete Environment Manager Project Contractors Environmental Representative	Submissions/PIR (B11) MCoA D8	10 & 11
FF25	The measures identified in the Coastal Emu Management Plan (Appendix G)		Pre-construction As specified	Pacific Complete Environment Manager	Submissions/PIR (B11)	3 & 4

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	will be implemented.			Project Contractors Environmental Representative	MCoA D8	
FF26	The measures identified in the Oxleyan Pygmy Perch Management Plan (Appendix J) will be implemented.		Pre-construction As specified	Pacific Complete Environment Manager Project Contractors Environmental Representative	Submissions/PIR (B11) MCoA D8	6, 7, 8 & 9
FF27	The measures identified in the Threatened Bat Management Plan (Appendix S) will be implemented.		Pre-construction As specified	Pacific Complete Environment Manager Project Contractors Environmental Representative	MCoA D8	All Sections
FF28	The measures identified in the Threatened Mammal Management Plan (Appendix T) will be implemented.		Pre-construction As specified	Pacific Complete Environment Manager Project Contractors Environmental Representative	MCoA D8	All Sections
FF29	The measures identified in the Threatened Frog Management Plan (Appendix E) will be implemented.		Pre-construction As specified	Pacific Complete Environment Manager Project Contractors Environmental Representative	Submissions/PIR (B11) MCoA D8	All Sections
FF30	The measures identified in the Koala Management Plan (Appendix H) will be implemented.		Pre-construction As specified	Pacific Complete Environment Manager Project Contractors Environmental Representative	Submissions/PIR (B11) MCoA D8 MCoA D9	6, 7, 8, 9, 10
FF31	The measures identified in the Glider Management Plan (Appendix I) will be implemented.		Pre-construction As specified	Pacific Complete Environment Manager Project Contractors Environmental Representative	Submissions/PIR (B11) MCoA D8	All Sections
FF32	The following safeguards will be		Pre-construction /	Pacific Complete	Serpentine Channel	Section 5

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	implemented to reduce impacts on flying-foxes at the Serpentine Channel: • An inspection will be conducted within the breeding season (September to March) prior to starting any project construction work in the area. • A pre-construction inspection of the site will be undertaken by an Ecologist within 24 hours of starting works in the area to confirm whether roosting Grey-headed Flying-fox are present. • Fortnightly inspections will be undertaken of the Serpentine Channel roost area while works are underway to monitor for the presence of flying-foxes. • Monthly inspections will be undertaken of the Serpentine Channel roost area following completion of construction work in the area for a period of six months. • If Grey-headed Flying-fox are roosting at the site during the period from September through to March, a buffer of greater than 40 metres will be established between the works and the roosting flying-foxes. • Any works within the 40 metre buffer zone will only be done under consultation with an Ecologist. • Should significant disruption occur to the roosting individuals, works will be suspended and the Ecologist will be consulted regarding appropriate management measures.		Construction	Environment Manager Project Contractors Environmental Representative	Flying-fox Roost Assessment (Geolink July 2015)	

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	• All personnel involved in the proposed works will be provided information about flying-fox identification, informed of the importance of minimising disturbance to the flying-fox and the required safeguards prior to starting works. • If Grey-headed Flying-fox are recorded roosting at Serpentine Channel when works are scheduled to be done within the area, a Grey-headed Flying-fox Management Plan will be developed specific to the site, to ensure that potential impacts on Grey-headed Flying-fox are managed appropriately during the construction.					
FAUNA HABITATS AND CONNECTIVITY						
FF33	The Connectivity Strategy will be further developed during detailed design, in consultation with relevant State and Commonwealth agencies, building upon the Connectivity Strategy in Appendix A of the Working paper – Biodiversity and the Supplementary Biodiversity Assessment in Appendix J of the Submissions / Preferred Infrastructure Report. All fauna connectivity structures will be developed in accordance with the design principles outlined in the Connectivity Strategy in Appendix A of the Working paper – Biodiversity and the Supplementary Biodiversity Assessment in Appendix J of the		Pre-construction	Pacific Complete Environment Manager Pacific Complete Design Manager	Submissions/PIR (B2, B3 and B4) MCoA D2	All Sections

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	Submissions / Preferred Infrastructure Report. Opportunities for improved connectivity for koala and Long-nosed Potoroo will be further investigated between station 144.2 and station 146.6.					
FF34	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)). Permanent fauna exclusion fencing for the project (as described in the Connectivity Strategy), where reasonable and feasible, will be installed prior to clearing and can function as exclusion fencing.		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractors Forman	Submissions/PIR (B24)	All Sections
FF35	A staged habitat removal process will be implemented consistent with the RMS Biodiversity Guidelines (RTA, 2011a).		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractors Project Engineer	Submissions/PIR (B25)	All Sections
FF36	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 2011a).		Construction	Project Contractors Environmental Representative Project Contractors Foreman	Submissions/PIR (B26)	All Sections
FF37	Light spill shall be avoided on Pink Underwing Moth and Atlas Rainforest Ground Beetle habitat, where feasible and reasonable.		Pre-construction / Construction	Pacific Complete Environment Manager Pacific Complete Design	MCoA B4	10 & 11

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
				Lead Pacific Complete Site Environmental Officer Project Contractors Environmental Representative		
AQUATIC HABITATS						
FF38	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	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative	Submissions/PIR (B33)	All Sections
FF39	Where possible, streams will be crossed perpendicular to flow, with crossing sites selected to avoid unstable banks, bends in the channel, deep pools and confluences with other channels.		Pre-construction	Pacific Complete Environment Manager Pacific Complete Design Manager	Submissions/PIR (B34)	All Sections
FF40	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	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractors Project Engineer/Foreman	Submissions/PIR (B35)	All Sections
FF41	All construction materials used for permanent watercourse crossings (rocks and gravel) are to be free of fine particles to minimise turbidity.		Construction	Project Contractors Environmental Representative Project Contractors Project Engineer	Submissions/PIR (B36)	All Sections
FF46	In stream and riparian disturbance will be minimised and sediment, woody snags or debris removed from a stream or stream channel will be minimised. Trimming or 'lopping' of branches and		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental	Submissions/PIR (B37) MCoA B13	All Sections

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	logs will be considered as a first option before moving.			Representative Project Contractors Project Foreman		
FF42	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). All areas disturbed by the SSI that are in the vicinity of known Oxleyan Pygmy Perch habitat waterways shall be stabilised prior to the Oxleyan Pygmy Perch spawning period.		Construction	Pacific Complete Construction Personnel Project Contractors Environmental Representative Project Contractors Project Foreman	MCoA B13	All Sections In relation to Oxleyan Pygmy Perch – 7,8 & 9
FF43	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, where feasible and reasonable.		Construction	Project Contractors Environmental Representative Project Contractors Project Foreman	Submissions/PIR (B38) MCoA B13	All Sections
FF44	Where feasible and reasonable within the road corridor, existing pools will be retained upstream and downstream of crossings within known habitat of the Oxleyan Pygmy Perch to provide resting and refuge habitat near crossing structures.		Construction	Pacific Complete Construction Personnel Project Contractors Environmental Representative	Submissions/PIR (B39)	7, 8 & 9
FF45	Appropriate plant species will be incorporated into the rehabilitation of disturbed aquatic habitats and drains as a result of construction.		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractors Project Engineer/ Foreman	Submissions/PIR (B40)	All Sections
FF46	All sediment and erosion control		Construction	Pacific Complete Site	Submissions/PIR	All Sections

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	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.			Environmental Officer Project Contractors Environmental Representative Project Contractors Project Engineer/ Foreman	(B41)	
FF47	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	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractors Project Engineer/ Foreman	Submissions/PIR (B42) MCoA D6 (c)(vii)	All Sections
FF48	No in-stream work will occur in known Oxleyan Pygmy Perch habitat during the Oxleyan Pygmy Perch spawning season (October to April inclusive) or within 24 hours of the commencement of any rainfall event (>10 millimetres). High risk construction activities would be avoided in known Oxleyan Perch habitat on days when the relevant Bureau of Meteorology site predicts a 90% chance of 10mm of rain or more, unless otherwise agreed by DPI (Fisheries NSW).		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractors Project Engineer	Submissions/PIR (B43) MCoA B7	7, 8 & 9
FF49	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.		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractors Project Engineer/ Foreman	Submissions/PIR (B22)	All Sections
PESTS AND DISEASES						

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
FF50	Measures to prevent the introduction and/or spread of pests and disease causing agents such as bacteria and fungi will be incorporated into the CEMP, in accordance with the Roads and Maritime Biodiversity Guidelines (RTA, 2011a) and include, where relevant: • 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 entering or exiting the site • 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 areas • A Noxious Weed and Pathogen Management Plan (Appendix P) has been prepared to manage pests and diseases within the site.		Pre-construction / Construction	Pacific Complete Environment Manager Project Contractors Environmental Representative	Submissions/PIR (B29) G36 4.17	All Sections
FF51	If pathogens are identified on site: • Testing may be required to confirm the presence of pathogens • Advice from government departments will be sought on		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative	Submissions/PIR (B30) G36 4.17	All Sections

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	practical hygiene management measures • Fenced exclusion zones will be identified to restrict access into contaminated areas.			Project Contractors Project Engineer/ Foreman		
BRIDGE AND CULVERT DESIGN						
FF52	Instream structures such as bridges and culverts are to be designed and managed to minimise any potential impact to flow regimes and fish passage, in accordance with Fairfull and Witheridge (2003). Use of bridges or bebo arch is the preferred structure for Class 1 (major fish habitat) waterways.		Pre-construction	Pacific Complete Environment Manager Pacific Complete Design Manager	Submissions/PIR (B14) MCoA B40	All Sections
FF53	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 at the following locations: • Unnamed waterway station 114.0 • Oaky Creek station 122.5 • Nortons Gully Station 123.6 • Unnamed waterway station 133.4 • Unnamed waterway station 134.7 • Tributary of Macdonalds Creek at station 135.5 • Montis Gully tributary at station 141.8 • Eversons Creek Station 143.6		Pre-construction details to be provided in the Connectivity Strategy required by CoA D1	Pacific Complete Environment Manager Pacific Complete Design Manager	Submissions/PIR (B15)	7 & 8
FF54	All drainage structures between station		Pre-construction	Pacific Complete	Submissions/PIR	8 & 9

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	134.5 to 143.0 will be reviewed in consultation with Department of Primary Industries (Fisheries) to ensure suitable connectivity for threatened fish species is maintained.		details to be provided in the Connectivity Strategy required by CoA D1	Environment Manager Pacific Complete Design Manager	(B16) MCoA B38	
FF55	Each permanent waterway crossing is to be designed to ensure no physical, hydraulic and behavioural barriers to aquatic fauna movements. Impacts would be minimised by ensuring that: • 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 (e.g. 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 • Bridges will be designed and sized to ensure peak flood velocities are not increased by more than 1 metre per second than the existing flood event, where Oxleyan Pygmy Perch have been confirmed.		Pre-construction	Pacific Complete Environment Manager Pacific Complete Design Manager	Submissions/PIR (B17) MCoA B38 MCoA B41	All Sections
FF56	Bridge structures will be designed to minimise impacts to flow regimes and fish passage. Where feasible and reasonable the following principles will		Pre-construction	Pacific Complete Environment Manager Pacific Complete Design	Submissions/PIR (B18) MCoA B41	All Sections Specifically applicable to sections 7, 8 &

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	apply: • Bridges piers to be located outside the main channel • Bridge structures to be designed to prevent an increase of backup of water during times of flood, that will enable Plague Minnow to access waterbodies where they are currently not found (e.g. Broadwater National Park) • Construction would not alter or reduce flow where there are existing or potential Oxleyan Pygmy Perch populations (primarily within Sections 7, 8 and 9)			Manager		9
TEMPORARY AND PERMANENT WATERWAY DIVERSIONS / CROSSINGS						
FF57	Where temporary access tracks are required over drainage lines with no flow, fords may be installed.		Construction	Pacific Complete Design Manager Pacific Complete Construction Personnel Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractors Project Engineer/Foreman	Submissions/PIR (B19)	All Sections
FF58	Where possible, existing crossings will be used. Where this is not feasible or reasonable, the temporary crossings will be designed to minimise impacts on the existing aquatic ecology and water quality.		Construction	Pacific Complete Design Manager Pacific Complete Construction Personnel Pacific Complete Site Environmental Officer Project Contractors Environmental	Submissions/PIR (B20)	All Sections

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
				Representative Project Contractors Project Engineer/Foreman		
FF59	Temporary waterway access track mitigation measures include: • Installation and subsequent decommissioning of temporary crossings will be undertaken outside of Oxleyan Pygmy Perch spawning seasons (October to April), where Oxleyan Pygmy Perch have been confirmed. Wherever possible, temporary bridge or arch structures in known Oxleyan Pygmy Perch habitat shall be used if the crossing is intended to be in place for more than 3 months. • Temporary crossings will be constructed from clean fill using pipe or box culvert cells to carry flows. • All temporary works (e.g. crossings, flow diversion barriers) will be removed as soon as practicable and in a way that does not promote future channel erosion. • The preferred temporary structure for crossing waterways will be consistent with Witheridge (2002). • Scour protection works will be established at temporary crossings as required • At the completion of construction, the temporary crossings will be removed and rehabilitated.		Construction	Pacific Complete Design Manager Pacific Complete Construction Personnel Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractors Project Engineer/Foreman	Submissions/PIR (B21) MCoA B8 MCoA B38	All Sections
FF60	Where temporary crossings in known Oxleyan Pygmy Perch habitat are proposed with culverts or pipes, the		Pre-construction	Pacific Complete Environment Manager	MCoA B9	6, 7, 8 & 9

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	Applicant shall, in consultation with DPI (Fisheries): a) determine the size of the culverts or pipes to facilitate fish passage; and b) identify the minimum size of clean rock to be used to ensure that rock material will not wash into the waterway in periods of high flows. c) Temporary culvert or pipe crossings shall be removed prior to the start of the Oxleyan Pygmy Perch spawning period.			Pacific Complete Design Manager		
WATER QUALITY						
FF61	Operational spill basins are to be installed at key locations i.e. near Broadwater National Park and other key drainage lines that lead directly into threatened fish habitat.		Construction / Operation	Pacific Complete Design Manager Pacific Complete Construction Personnel	Submissions/PIR (B44)	All Sections
FF62	Chemicals and fuels will be appropriately stored and bunded, away from waterways and drainage lines.		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractors Project Engineer/Foreman	Submissions/PIR (B45)	All Sections
FF63	Discharges from sediment basins and/or treatment wetlands located in Oxleyan Pygmy Perch habitat that do not meet the water quality parameters for Oxleyan Pygmy Perch (to be determined through pre-construction water quality monitoring) will not be discharged directly into waterways, with other methods or uses employed to discharge. This could include, but not be limited to:		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractors Project Engineer/Foreman	Submissions/PIR (B46)	7, 8 & 9

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	• Spraying onto adjacent open grass areas or used for construction purposes such as dust. • Treating the water to ensure the pH is between 5.0 and 6.5 and total suspended solids of less than 50 mg/L, before discharging, depending on environmental protection licensing requirements.					
FF64	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	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractors Project Engineer/Foreman	Submissions/PIR (B47)	All Sections
STOCKPILE AND ANCILLARY FACILITIES MANAGEMENT						
FF65	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	Pacific Complete Construction Personnel Project Contractor's Project Engineer / Foreman Project Contractor's Environment Manager	Submissions/PIR (B48) MCoA B42	All Sections
FF66	Specific management measures will be implemented to limit impacts from stockpiling of material for bridgeworks at known and potential areas of Oxleyan Pygmy Perch during the spawning seasons of October to April (refer CSWQMP)		Construction	Pacific Complete Site Environmental Officer Project Contractor's Project Engineer / Foreman Project Contractors Environmental Representative	Submissions/PIR (B49)	7, 8 & 9
FF67	Batch plants will be located at least 300		Construction	Pacific Complete	Submissions/PIR	7, 8 & 9

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	metres away from Oxleyan Pygmy Perch habitat where sediment erosion not runoff into waterways (due to the risk of high alkaline runoff).			Construction Personnel Project Contractor's Project Engineer/Foreman Project Contractor's Environment Manager	(B50)	
FF68	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	Pacific Complete Construction Personnel Project Contractor's Project Engineer/Foreman Project Contractor's Environment Manager	Submissions/PIR (B51) MCoA B73(e) EPBC-2	All Sections
FF69	Ancillary facility - Section 3 Site 1: • This compound site that was used for the Glenugie Upgrade and has been revegetated post-construction. A site inspection and survey is required prior to construction to determine its suitability for future use as an ancillary site. • Avoid mature trees. • Revegetation of the section of the site in the road reserve or the entire site (if practicable).		Construction	Pacific Complete Environment Manager Pacific Complete Construction Personnel	Submissions/PIR (B52d)	3
FF70	Ancillary facility - Section 3 Site 2: • Provide a buffer of 50 metres minimum from creek and sediment fencing where required. • Avoid mature trees. • Revegetation of the section of the site in the road reserve or the entire site (if practicable).		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractor's Project Engineer/Foreman	Submissions/PIR (B52e) MCoA B73(a) EPBC-2	3
FF71	Ancillary facility - Section 3 Site 4: • Ancillary site to be restricted to the		Construction	Pacific Complete Site Environmental Officer	Submissions/PIR (B52f)	3

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	western parts of the site adjoining Wooli Road. • Vegetation in the road reserve along Wooli Road to be protected from disturbance. • The population of the Slender Screw Fern plants is to be avoided. • Existing trails or disturbed areas to be used for access to site. Bostock Road not to be used for access.			Project Contractors Environmental Representative Project Contractor's Project Engineer/Foreman	MCoA B73(f) EPBC-2	
FF72	Ancillary facility - Section 3 Site 8: • Identify and mark *Angophora robur* during pre-clearing and provide exclusion fencing.		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative	Submissions/PIR (B52g)	3
FF73	Ancillary facility - Section 3 Site 9: • Provide buffer to the surrounding forest. • Identify and mark *Angophora robur* during pre-clearing and provide exclusion fencing • Provide sediment fencing on eastern boundary where required. • Avoid and buffer koala feed trees in the northwest corner of the site. Buffer required from edge of the forest to reduce edge effects, sediment fencing where required.		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractor's Project Engineer/Foreman	Submissions/PIR (B52i)	3
FF74	Ancillary facility - Section 5 Site 6: • Consult with OEH on future use of this site post-construction, which may have offset potential with assisted regeneration and could be considered as a potential addition		Construction	Pacific Complete Environment Manager Pacific Complete Site Environmental Officer Project Contractors Environmental	Submissions/PIR (B52j)	5

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	to Mororo Creek Nature Reserve • Flag and buffer habitat patch on southern boundary.			Representative Project Contractor's Project Engineer/Foreman		
FF75	Ancillary facility - Section 5 Additional site 9: • Provide buffer around Mororo Creek and sediment fencing to protect riparian areas • Flag and buffer habitat patch on southern boundary		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractor's Project Engineer/Foreman	Submissions/PIR (B52k)	5
FF76	Ancillary facility - Section 6 Site 3a and 3b: • Mark and avoid small dam in north-west corner of site and buffer activities from a large remnant patch adjoining to the north. • Avoid scattered mature trees where possible.		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractor's Project Engineer/Foreman	Submissions/PIR (B52l)	6
FF777	Ancillary facility - Section 6 site 5: • Site is currently being used as a compound site for the Devils Pulpit upgrade. On completion of construction for that project, the site would be stabilised with a quick growing cover crop to stabilise the site. • A site inspection and survey is required prior to construction to confirm the suitability of the site. • Site to be rehabilitated post-construction.		Pre-construction/Construction	Pacific Complete Environment Manager Pacific Complete Construction Personnel	Submissions/PIR (B52m)	6
FF78	Ancillary facility - Section 7 Site 4: • Provide buffer of minimum 50		Construction	Pacific Complete Site Environmental Officer	Submissions/PIR (B52q)	7

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
	metres from the wetland on northern boundary and sediment fencing where required. Avoid tree removal where possible			Project Contractors Environmental Representative Project Contractor's Project Engineer/Foreman	MCoA B73(a) EPBC-2	
FF79	Ancillary facility - Section 10 site 1b: • Revegetation of the section of the site in the road reserve or the entire site (if practicable).		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractor's Project Engineer/Foreman	Submissions/PIR (B52w)	10
FF80	Ancillary facility - Section 10 site 3b: • Map and avoid strip of trees along northern boundary		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractor's Project Engineer/Foreman	Submissions/PIR (B52x)	10
FF81	Ancillary facility - Section 10 site 4: • Revegetate site post-construction, focus on approaches to land bridge and avoid *Arthraxon hispidus*.		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractor's Project Engineer/Foreman	Submissions/PIR (B52y)	10
INTERCHANGE AT WARDELL						
FF82	Street lighting on the western roundabout at the interchange at Wardell will be designed to reduce light spill during detailed design. This could include using deflection shields around the lights or using a UV light, with reduced UV light emissions.		Pre-construction	Pacific Complete Environment Manager Pacific Complete Design Manager	Submissions/PIR (B56) MCoA B4	10

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference	Sections Applicable
FF83	Further investigation will be undertaken of the road runoff capture and storage to the east side of the existing Pacific Highway between station 158.2 and 159.4 to protect remaining in situ aquatic habitats south of Laws Road.		Pre-construction	Pacific Complete Environment Manager Pacific Complete Design Manager	Submissions/PIR (B57)	10, 11
FF84	Roads and Maritime owned land surrounding the dedicated landbridge at station 156.0 be revegetated in accordance with the connectivity strategy and the landscape management plan.		Construction	Pacific Complete Site Environmental Officer Project Contractors Environmental Representative Project Contractors Project Engineer/ Forman	Submissions/PIR (B58)	10
IMPACTS TO LANG HILL						
FF85	The creekline on the 'Lang Hill' property will be fenced off from cattle and the vegetation allowed to regenerate to improve the habitat conditions downstream.		Construction and operation	Project Contractors Environmental Representative Project Contractors Project Engineer/ Forman	Submissions/PIR (B60)	8

7 Compliance management

Pacific Complete will manage the environmental performance and compliance of contractors by ensuring ongoing awareness training is undertaken and through independent inspections and audits and reviewing reports submitted by contractors.

7.1 Roles and responsibilities

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

7.2 Training

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

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

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

7.3 Monitoring and inspections

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

Monitoring of in-situ threatened plant populations will be undertaken as per the Threatened Flora Management Plan and will be undertaken twice per year (during autumn and spring) during construction. Monitoring of translocated flora populations is to commence once construction phase is started. 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 (i.e. approximately eight years in total).

Monitoring of the translocations sites will be undertaken as per the Flora Translocation Strategy (Appendix R) and would be conducted during and after construction for a minimum of 5 years, a total of approximately 8 years.

In accordance with the Threatened Flora Translocation Strategy, a monitoring report will be prepared and submitted to EPA annually. A copy will also be provided to Department of the Environment, and Department of Planning and Environment. All monitoring and reporting will be independently overseen by the project ecologist.

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

7.3.1 Incident planning and response

Response to incidents will be undertaken as described in Section 7 of the CEMP and in accordance with the *Environmental Incident Management Plan* (refer to Appendix A6 of the CEMP).

An unexpected finds procedure will be required by the Project Contractor as part of their Contractor's environmental management documentation (Appendix O). Should unexpected finds such as threatened species be discovered, all work will stop in the vicinity and the Project Contractor will notify Pacific Complete Environment Manager who will notify the relevant agencies and stakeholders as required.

7.4 Auditing

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

An audit schedule will be developed for the project by the PC Environment Manager and will include internal and third party external audits which will include this CFFMP.

Audit requirements are detailed in Section 8.3 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.*

8 Review and improvement

8.1 Continuous improvement

Continuous improvement of this plan will be achieved by the ongoing evaluation of contractor 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.

Where improvements have been identified through ongoing processes, they will be included in this plan and/or contractor documents to provide continuous improvement.

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 Plans

Appendix B
Threatened Flora Management Plan

Appendix C
Connectivity Strategy

Appendix D
Not used

Appendix E
Threatened Frog Management Plan

Appendix F
Threatened Invertebrates Management Plan

Appendix G
Coastal Emu Management Plan

Appendix H
Koala Management Plan

Appendix I
Glider Management Plan

Appendix J
Threatened Fish Management Plan

Appendix K
Threatened Rainforest Communities and Rainforest Plants Management Plan

Appendix L
Pre Clearing Checklist

Pre-Clearing & Ground Disturbance Checklist and Permit to Clear

Project: Woolgoolga to Halfway Creek	**Inspection Date:**
Note: *Checklist to* be submitted to Pacific Complete Environmental Manager 2 days prior to clearing commencement. Clearing must not commence in any part of the area until this vegetation clearing permit has been approved.	

VEGETATION CLEARING LOCATIONS – ATTACH DRAWINGS / SKETCHES / MAPS

Ch. From	Ch. To	Location	Comments

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

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

Completed by: _____

Signature: _____

Zone Manager Name: _____

Zone Manager Signature: _____

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

HOLD POINT

Environmental Manager Name: _____

Environmental Manager Signature: _____

Appendix M
Working Around Trees Guideline

Working around Trees Guideline

Background / Purpose

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

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

Guideline

General

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

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

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

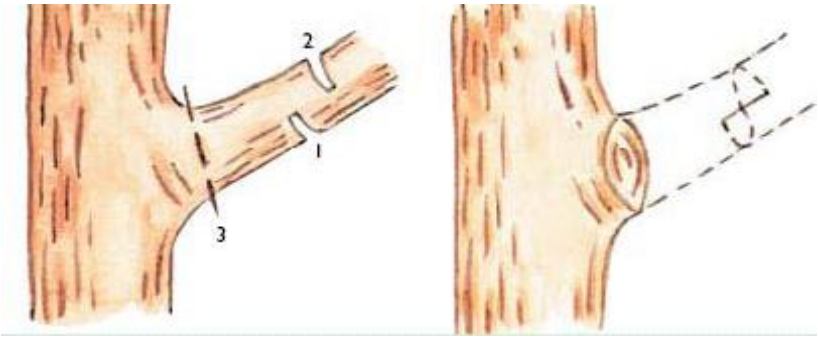
General Construction Near Trees

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

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

Lopping/Pruning Trees

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



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

Figure 1 Three cut method

Excavations Near Trees

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

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

Figure 2: Excavation into the CRZ resulting in major roots being cut. This may result in the tree falling over.

Figure 3: Damage to CRZ has been minimised by shaping the drainage around the CRZ.

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

Tree Removal or Trimming Process

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

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

Site Material Storage

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

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

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

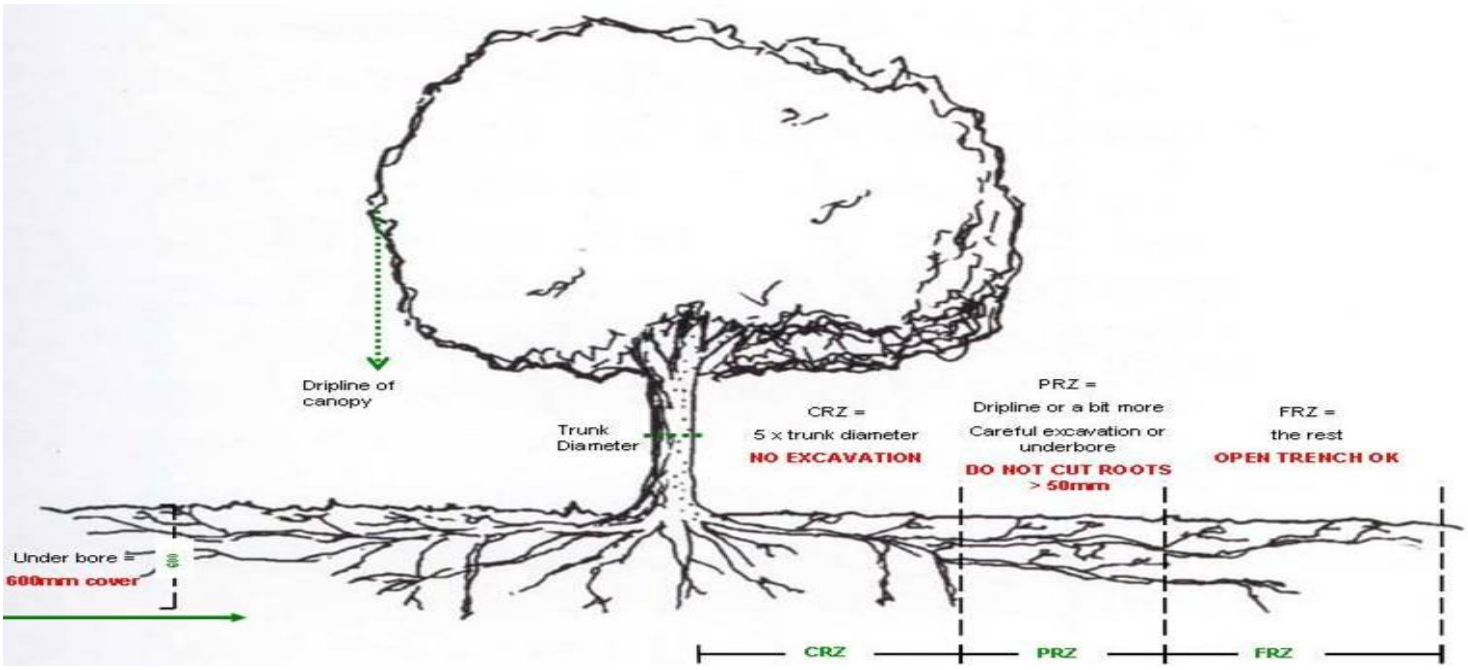


Diagram 1 - Tree drip line & root zone mitigation

Appendix N
Fauna Handling and Rescue Procedure

Fauna Handling and Rescue Procedure

Purpose

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

Scope

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

Induction / Training

All Pacific Complete and Contractor personnel will attend the Project induction, which will include a section on Fauna.

Procedure

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

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

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

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

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

i. Thoroughly cleaning/disinfecting footwear and equipment before entering frog habitat and when moving from one site to another.

ii. In high risk areas, spraying/flushing vehicle tyres with a disinfecting solution and avoid driving through frog habitat.

iii. Cleaning/disinfecting hands between collecting samples/frogs (preference would be given to using bags, rather than bare hands to handle frogs).

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

6. If the animal cannot be handled (i.e. venomous reptiles);

a. Exclude all personnel from the vicinity with fencing and / or signage; and

b. Record the exact location of the individual and provide details to the appropriate rescue agency.

7. Call the Project Ecologist immediately and follow any advice provided. The ecologist may nominate to contact a rescue agency (e.g. WIRES*)* to assist. Any decisions regarding the care of the animal will be made by the ecologist, with advice from the rescue agency as required. Contact details of key personnel are as follows:

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

8. If the fauna species is a threatened species that is not identified in the Construction Flora and Fauna Management Plan, the EO or EM must:

a. Apply the Unexpected Finds Procedure (Appendix N of CFFMP)

b. Immediately cease all work likely to affect the threatened species;

c. The EM shall contact the RMS Senior Environmental Officer (SEO) to inform them of the situation.

d. The EM shall then contact the following stakeholders, in this order, to determine the appropriate corrective actions and additional safeguards to be undertaken:

i. EPA (ph 131555);

ii. Environmental Representative ;and

iii. Others as instructed by RMS or EPA.

e. EM to record find in RMS Environmental Incident Report and Pacific Complete Environmental Issue Report.

f. Following consultation with all relevant stakeholders, the EM shall implement any corrective actions and additional safeguards.

g. Following confirmation by the EM that all appropriate safeguards have been implemented, construction works shall recommence.

9. Relocation of fauna adjacent to the footprint will be undertaken by, or under advice from, the project ecologist or wildlife carer and will be recorded on the Fauna rescue and relocation register. If the animal is not injured or stressed, it may be released nearby in an area that is not to be disturbed by construction, in accordance with the following procedures:

a. Sites identified as suitable release points by the Project Ecologist;

b. Release will be into similar habitat as close to the original area as possible;

c. If the species is nocturnal, release will be carried out at dusk; and

d. Release would generally not be undertaken during periods of heavy rainfall.

e. Hollow-dependent species, particularly those with dependent young, shall be released into a temporary nest box.

Dewatering procedure and aquatic fauna relocation

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

1) Ensure all aquatic fauna relocation works are supervised by a suitably qualified aquatic ecologist.

2) Prior to the commencement of pumping, advice should be sought from the aquatic ecologist on pumping methods and the extent of drawdown.

3) The water level should be pumped down to a level that will allow the safe and effective implementation of capture methods, such as seine nets, dip nets and electrofishing.

4) A fine mesh screen (≤5mm) may be installed on the inlet of the pump or a fish basket used to remove the risk of native aquatic fauna being transferred through pump. A maximum depth of 500mm is typically required before fish salvage can commence but site-specific advice will be required from the aquatic ecologist.

5) Aquatic ecologist is to establish the presence of native and introduced aquatic fauna and plan relocation. Access to adjoining properties may be required for relocation, particularly when dewatering dams. The aquatic ecologist will ensure that native aquatic fauna species are released into suitable habitat as close to the original location as possible.

6) In areas of threatened frog habitat dip-netting for tadpoles will be undertaken prior to substantial water draw-down, as per the Threatened Frog Management Plan.

7) Native fish will be placed in tubs full of water sourced from the salvage site where they will be housed for brief periods before being transferred to the release site. Pest fish will be euthanized using an ice slurry.

8) Tadpoles will be placed in individual clip-seal bags and acclimatized to the release site (i.e. bag placed in waterbody for 30 minutes) before being released.

9) Following completion of relocation, a final check shall be undertaken to find any remaining fish, or dying/dead fish.

10) All euthanized and dead fish will be transported to a licensed landfill facility for disposal.

11) Records will be kept on habitat type, method of water extraction, species, number of individuals and reproductive status of fish encountered.

12) Aquatic ecologist will prepare a report on the relocation, detail the source of the fish, the number and species of fish released and euthanized.

Project Ecologist responsibilities for fauna handling and rescue

The Project Ecologist will follow the relevant steps detailed below:

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

trees are to be felled using equipment that allows trees to be carefully felled with minimal impact (e.g. adequately sized harvester with rotating head).

3. Relocation of fauna captured during the clearing and associated works will take place in areas of suitable habitat as close as possible to the project site, taking into account:

   a) The release site contains similar habitat and occurs as close to the point of capture as possible;

   b) If the species is nocturnal, release will normally be carried out at dusk;

   c) Hollow dependent nocturnal fauna will generally be housed in a nest box, which will be installed temporarily at the release site and unplugged at dusk. The box will be checked and, if unoccupied, retrieved the following day.

   d) Release would not be undertaken during periods of heavy rainfall except for aquatic fauna; and

   e) Non-native fauna will be euthanased in accordance with licence conditions and Animal Care & Ethics Committee Approvals.

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

4. To minimise stress to native fauna and/or remove the risk of further injury the Project Ecologist shall:

   a) Cover larger animals with a towel or blanket and place in a suitable nest box, carry cage or canvas bag.

   b) Place smaller animals in a cotton bag, tied at the top, or suitable nest box.

   c) Place frogs/tadpoles in a plastic bag with a small amount of water and leaf litter. One individual per bag.

   d) Fish and other aquatic life (i.e. turtles) place in plastic aquaria or plastic container with sufficient water.

   e) For terrestrial fauna keep the animal in a quiet, warm, well-ventilated and dark place away from noisy activities.

   f) For aquatic fauna species ensure there is sufficient water and adequate aeration.

   Notes on fauna handling -

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

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

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

5. In the event an animal is injured the following fauna rescue services and local veterinary surgeries contact details are detailed in 5.1(6) above.

   In the event the rescue service and/or local veterinary service cannot be contacted, the most appropriate euthanasia method will be administered by the Project Ecologist (i.e. cervical dislocation for small vertebrates, ice slurry for introduced fish). This is to occur in accordance with applicable guidelines and legislative requirements. If the fauna species is identified as a threatened species that is not a species identified in the FFMP, notify the Environmental Manager immediately.

6. The project ecologist will keep a register of all pre-clearing survey methods (including times, weather conditions, effort and results), fauna species captured (number of individuals, sex,

age class and general health of each individual), release sites and dates, individuals taken into care and release date or fate.

7.

Appendix O
Unexpected Threatened Species / EEC Procedure

Unexpected Threatened Species / EEC Find Procedure

Purpose

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

Induction/Training

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

Scope

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

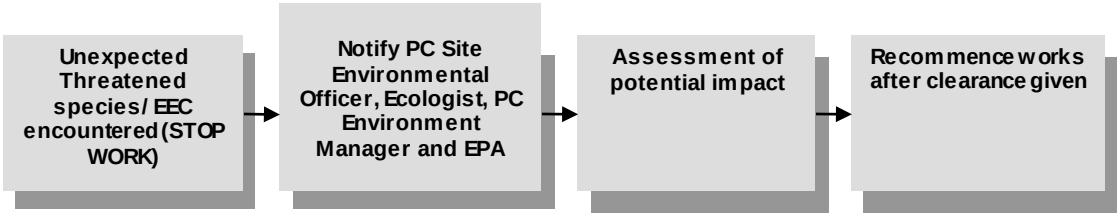


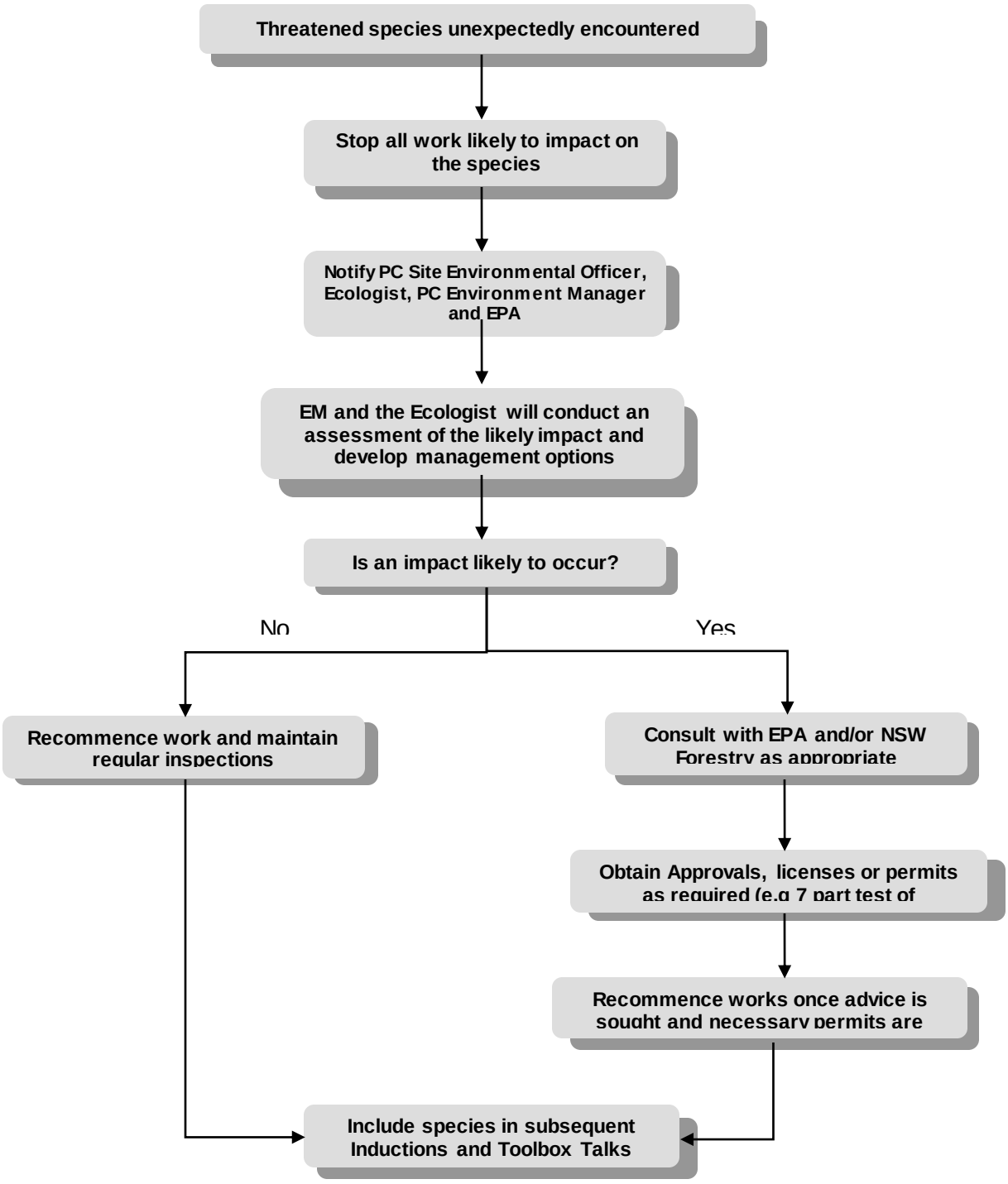
Figure 1 Unexpected Threatened Species & EEC Find Procedure flow chart.

Procedure

1. Threatened Species unexpectedly encountered during excavation/construction activities
If a threatened species, either flora or fauna, is encountered during construction activities: • **STOP ALL WORK** in the vicinity of the find. • Immediately notify the Pacific Complete Site Environmental Officer who will notify the Ecologist, Pacific Complete Environment Manager and the EPA. • Ecologist to confirm identification and that the species is an unexpected find. Agencies will be informed of any unplanned event, death or injury to threatened species during construction.
2. Assessment of Impact
An assessment is to be undertaken by the Ecologist to determine the likely impact to the threatened species and appropriate management options developed. If a species that was not considered in the EIS may be affected by the project an assessment of impacts may be required. The need for such an assessment will be based on advice from relevant state and federal agencies and the assessment
3. Approvals
Pacific Complete will obtain any licences, permits or approvals required if the species is likely to be significantly impacted.
5. Recommencement of Works

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

Include threatened species in subsequent Project Inductions and Toolbox Talks.



Appendix P
Noxious Weed and Pathogen Management Plan

APPENDIX P

Noxious Weed and Pathogen Management Plan

Woolgoolga to Ballina

Pacific Highway Upgrade (Sections 3 to 11)

OCTOBER 2015

Contents

Appendices

Attachment A – Weed and Pest Declaration Checklist

Glossary / Abbreviations

CEMP	Construction Environmental Management Plan
CoA	Condition of approval
EPA	Environment Protection Authority
DP&E	Department of Planning and Environment
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EWMS	Environmental Work Method Statements
FFMP	Construction Flora and Fauna Management Plan
NPW Act	*National Parks and Wildlife Act 1974*
OEH	Office of Environment and Heritage
Project, the	The Woolgoolga to Ballina Pacific Highway Upgrade (sections 3 to 11)
Secretary	Secretary of the Department of Planning and Environment
SWMP	Construction Soil and Water Management Plan
RMS	Roads and Maritime Services
TSC Act	*Threatened Species Conservation Act 1995*

1 Introduction

1.1 Background

This Noxious Weed & Pathogen Management Plan (NWPMP) outlines the management measures, monitoring and reporting requirements relating to noxious weeds and pathogens associated with the construction of the Woolgoolga to Ballina Pacific Highway Upgrade (sections 3 to 11).

This plan operates in conjunction with the Construction Environmental Management Plan (CEMP) and forms part of the Construction Flora and Fauna Management Plan (CFFMP) as an appendix.

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

This Plan has been prepared and is to be implemented in accordance with the *Noxious Weeds Act 1993* and the National Trust Weed Management Manual(Richard 2004). This plan addresses the EPBC-14 and MCoA D26(e)(v)(vii).

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

1.2 Weeds

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

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

The definition of a weed for the purposes of this plan is consistent with the definition of a noxious weed in the *Noxious Weeds Act 1993*, which is a plant declared by an order under Section 7 of the *Noxious Weeds Act 1993* to be a noxious weed. A total of twenty noxious weed species including twelve weeds of national significance (WoNS) have been recorded within the project corridor during pre-clearing surveys conducted as part of the Threatened Flora Management Plan between sections 3 and 11(Biosis 2014; GeoLINK 2015a, 2015b). These species are included in Table 1-1. An additional two species (*Salvina molesta & Eichhomia crassipes)* were added to Table 1-1 as these species were identified within the project area during the EIS although were not identified in the project corridor during pre-clearing surveys. Due to both species being aquatic there is potential that their dispersal along waterways may lead to these species being established in the project corridor.

Alligator Weed (*Alternanthera philoxeroides),* was not directly observed in the project area during targeted searches in sections 8 & 9, although it has been note to occur in Tuckombil Canal (Section 8) (NSW DPI; *pers comm)* and cane drainage channels in section 9 between chainages 140600 and 142300 (Melaleuca Group 2014). It has been identified in project areas of 10 and 11(Australian Museum Consulting 2014).

Salvinia molesta was recorded from Section 3-5 and 9-11 as part of surveys conducted for the EIS. This species was not identified during pre-clearing surveys conducted as part of the Threatened Flora Management Plan.

Water Hyacinth *(Eichhornia crassipes)* was recorded from Section 6-8 in the Clarence River Estuary as part of surveys conducted for the EIS. This species was not identified during pre-clearing surveys conducted as part of the Threatened Flora Management Plan.

Table 1-1: Noxious weeds and weeds of national significance identified in project area.

Species[1]	Common Name	WoNS[2]	Noxious Weeds[3]			Sections								
			CV	RV	B	3	4	5	6	7	8	9	10	11
Acacia nilotica	Prickly Acacia	√	1	1	1	√								
Alternanthera philoxeroides	Alligator Weed	√	2	2	2								√	√
Ambrosia artemisiifolia	Annual Ragweed		5	5	5	√	√	√		√	√	√		
Anredera cordifolia	Madeira Vine	√	4			√	√	√			√	√	√	√
Asparagus aethiopicus	Ground Asparagus	√	4	4	4	√	√	√		√			√	√
Asparagus asparagoides	Bridal Creeper	√	4	4	4				√					
Asparagus plumosus	Climbing Asparagus Fern	√	4	4	4								√	√
Baccharis halimifolia	Groundsel Bush		3	3	3	√	√	√		√	√	√		
Bryophyllum delagoense	Mother-of-millions		3	4	4	√	√	√		√	√	√		
Chrysanthemoides monilifera subsp. monilifera	Boneseed	√	1	1	1				√					
Chrysanthemoides monilifera subsp. rotundata	Bitou Bush	√	4	4	4						√	√		
Cinnamomum camphora	Camphor Laurel		4	4	4	√	√	√		√	√	√	√	√
Eichhornia crassipes[4]	Water Hyacinth	√	4	4	4									
Erythrina crista-galli	Cockspur Coral Tree		3	4	4						√	√		
Lantana camara	Lantana	√	4	4	4	√	√	√	√	√	√	√	√	√
Ligustrum lucidum	Large-leaf Privet		4	4	4								√	√
Ligustrum sinense	Small-leaf Privet		4	4	4						√	√	√	√
Opuntia sp	Prickly Pear	√	4	4	4	√	√	√			√	√		
Rubus fruticosus agg	Blackberry	√	4	4	4		√	√						
Salvinia molesta[5]	Salvinia	√	3	3	3									
Senecio madagascariensis	Fireweed	√	4	4	4	√	√	√		√	√	√	√	√
Xanthium occidentale	Noogoora Burr		4	4	4	√	√	√	√					

Note: Since the production of the EIS and targeted surveys some weed species have been reclassified under the Noxious Weeds (Weed Control) Order 2014 – Weed Control Order No 30. These changes are updated in this report.
1: Species list derived from Threated Flora Management Plan and associated technical reports (does not include weed species in sections 1 & 2)
2: Weeds of National Significance
3: Noxious Weeds Act 1993 - Weed Classes 1 – 5, listed for CV=Clarence Valley; RV=Richmond Valley and B=Ballina Shire
4: Water Hyacinth was recorded from Section 6-8 in the Clarence River Estuary as part of surveys conducted for the EIS. This species was not identified during pre-clearing surveys conducted as part of the Threatened Flora Management Plan.
5: *Salvinia molesta* was recorded from Section 3-5 and 9-11 as part of surveys conducted for the EIS. This species was not identified during pre-clearing surveys conducted as part of the Threatened Flora Management Plan.

1.3 Pathogens

Pathogens addressed in this plan and relevant to the project include Root-rot Fungus (*Phytophthora cinnamomi*), Myrtle Rust (*Uredo rangelii*), Panama Disease (*Fusarium oxysporum*) and Frog Chytrid Fungus (*Batrachochytrium dendrobatidis*). No pathogens have currently been identified in the project area, however, there is a high likelihood for pathogens to occur and therefore implementation of pathogen management should be undertaken throughout all stages of construction.

1.3.1 Root-rot Fungus

Root-rot Fungus (*Phytophthora cinnamomi*) is a soil-borne water mould that produces an infection, which causes a condition in plants called "root rot" or "dieback". It directly threatens a range of individual plant species, and also threatens ecological communities and landscapes (Commonwealth of Australia 2014). Consequently, root-rot fungus has been listed as a Key Threatening Process on the TSC Act and EPBC Act. Machinery associated with vegetation clearing and subsequent construction in affected areas of the project has the potential to transmit the fungus to native vegetation remnants. The use of current best practice hygiene protocols as detailed in RMS Biodiversity Guidelines (Roads and Traffic Authority 2011).

1.3.2 Myrtle Rust

Myrtle Rust is a plant disease caused by the exotic fungus *Uredo rangelii (Office of Environment and Heritage 2011)*. Myrtle rust affects plants in the family Myrtaceae, including the genera Eucalyptus, Angophora, Callistemon, and Melaleuca (Office of Environment and Heritage 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(Office of Environment and Heritage 2011). Reduced recruitment may also have severe impacts on the structure and function of the many natural ecosystems that depend on Myrtaceae (Office of Environment and Heritage 2011). Consequently, the introduction and establishment of myrtle rust has been included in a preliminary listing as a Key Threatening Process on the TSC Act.

1.3.3 Panama Disease

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

1.3.4 Frog Chytrid Fungus

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

2 Environmental controls

2.1 Weed and pathogen management process

Figure 2.1 illustrates the weed and pathogen management approach adopted on the Woolgoolga to Ballina (Sections 3-11) project.

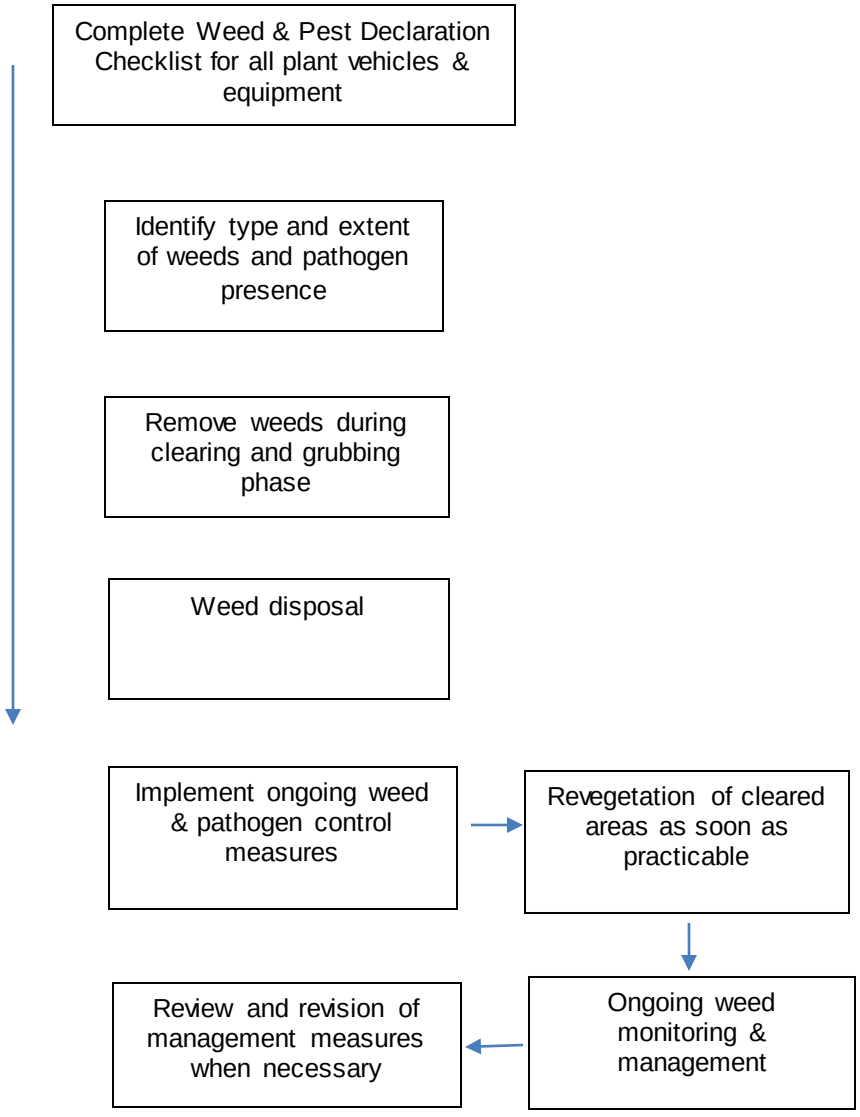


Figure 2-1 Weed and Pathogen Management Process

2.2 Control of weeds

2.2.1 Mechanical control of weeds

Weeds will be controlled primarily through mechanical means.

Example of mechanical control methods will include:

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

Timing
Weeds will be controlled during the clearing and grubbing program.

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

2.2.2 Chemical control of weeds

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

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

Performance indicators

- Herbicide application administered by authorised personnel only, with ChemCert Accreditation AQF 3(in accordance with Workcover requirements); and
- Noxious weeds treated in accordance with the herbicide specific to each species, as listed in the Noxious and Environmental Weed Control Handbook(NSW Department of Primary Industries 2014).

2.2.3 Stockpiling and disposal

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

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

Performance indicators

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

2.2.4 Specific management measures

Specific management measures identified for those noxious weeds identified during the pre-construction survey are identified in Table 2-1. Timing and performance indicators will be implemented as per Section 2.2 of this plan.

Table 2-1: Management measures for noxious weeds present from Woolgoolga to Ballina – sections 3 to 11 only

Scientific name	Common name	Control class	Legal requirement	Management measures	Relevant section
Acacia nilotica	Prickly Acacia	1	The plant must be eradicated from the land and that land must be kept free of the plant	1. Notify relevant weed control authorities of sites containing Prickly Acacia; 2. Removal through mechanical methods, ensure all stumps and root material are removed. 3. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 4. Any new infestations or isolated plants detected during monitoring inspections should be manually removed or sprayed with appropriate herbicide treatment(See Prickly Acacia Manual (Department of Natural Resources Mines and Energy 2004) for more information)	3
Ambrosia artemisiifolia	Annual Ragweed	5	Prevent the spread of the plant within NSW.	1. Notify relevant weed control authorities of sites containing annual ragweed; 2. In response to weed monitoring requirements spot spray actively growing plants using Dicamba at 1.5L in 100L of water or other appropriate herbicide treatment. A surfactant is also required.	3-5, 7-9
Anredera cordifolia	Madeira Vine	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread	1. Spray infestations during spring/early summer 2015/16; Physical removal of small infestations must ensure that all vegetative material is collected and disposed of appropriately. 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re-use of topsoil and mulch to be limited to affected areas only; 4. Any new infestations or isolated plants detected during monitoring inspections should be manually removed or sprayed with appropriate herbicide treatment.	3-5, 7-11

Scientific name	Common name	Control class	Legal requirement	Management measures	Relevant section
Asparagus aethiopicus	Ground Asparagus	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction. The plant must not be sold, propagated or knowingly distributed	1. Physical removal via mechanical means of infestations must ensure that all vegetative material is disposed of appropriately. 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re-use of topsoil and mulch to be limited to affected areas only; 4. Any new infestations or isolated plants detected during monitoring inspections should be sprayed with appropriate herbicide treatment during winter.	3-5, 7, 10, 11
Asparagus asparagoides	Bridal Creeper	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction. The plant must not be sold, propagated or knowingly distributed	1. Spray infestations during spring 2015/16. Physical removal of small infestations must ensure that all vegetative material is collected and disposed of appropriately. 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re-use of topsoil and mulch to be limited to affected areas only; 4. Any new infestations or isolated plants detected during monitoring inspections should be sprayed with appropriate herbicide treatment during spring.	6
Asparagus plumosus	Climbing Asparagus Fern	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction. The plant must not be sold, propagated or knowingly distributed	1. Spray infestations during spring 2015/16; Physical removal of small infestations must ensure that all vegetative material is collected and disposed of appropriately. 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re-use of topsoil and mulch to be limited to affected areas only; 4. Any new infestations or isolated plants detected during monitoring inspections should be sprayed with appropriate herbicide treatment during spring.	10, 11

Scientific name	Common name	Control class	Legal requirement	Management measures	Relevant section
Baccharis halimifolia	Groundsel Bush	3	The plant must be fully and continuously suppressed and destroyed.	1. Slash or spray actively growing plants before April 2016; 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re- use of topsoil and mulch to be limited to affected areas only; 4. Grow a combination of winter and summer grasses to maintain dense cover & inhibit growth; 5. Conduct spring inspection of open (disturbed) areas and apply suitable herbicide treatment on any new infestations or isolated plants.	3-5, 7-9
Bryophyllum delagoense	Mother-of-millions	3 (CVLGA) and 4 (RVLGA & BLGA)	The plant must be fully and continuously suppressed and destroyed. The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed	1. Physical removal via mechanical means of infestations must ensure that all vegetative material is collected and disposed of appropriately. Chemical application should spray infestations during early late autumn/ early spring. Herbicides with effective wetting agent are needed to penetrate waxy outer covering of plants. 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re-use of topsoil and mulch to be limited to affected areas only; 4. Any new infestations or isolated plants detected during monitoring inspections should be sprayed with appropriate herbicide treatment.	3-5, 7-9
Chrysanthemoides monilifera subsp. monilifera	Boneseed	1	The plant must be eradicated from the land and that land must be kept free of the plant	1. Notify relevant weed control authorities of sites containing Boneseed; 2. Removal through mechanical methods, ensure all stumps and root material are removed. If controlled through chemical methods spray infestations during spring 2015/16. Both methods should be undertaken during flowering period between late winter or spring before plants set seed.	6

Scientific name	Common name	Control class	Legal requirement	Management measures	Relevant section
				3. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 4. Re-use of topsoil and mulch to be limited to affected areas only; 5. Any new infestations or isolated plants detected during monitoring inspections should be sprayed with appropriate herbicide treatment. (See Boneseed Management Manual(Brougham *et al.* 2006) for herbicide treatments).	
Chrysanthemoides monilifera subsp. rotundata	Bitou Bush	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	1. Removal through mechanical methods, ensure all stumps and root material are removed. If controlled through chemical methods spray infestations during winter 2015/16. Both methods can be undertaken any time of year but should be prioritized during winter before plants set seed. 3. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 4. Re-use of topsoil and mulch to be limited to affected areas only; 5. Any new infestations or isolated plants detected during monitoring inspections should be sprayed with appropriate herbicide treatment. (See Bitou Bush Management Manual(Winkler *et al.* 2008) for herbicide treatments).	8, 9
Cinnamomum camphora	Camphor Laurel	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	1. Adopt a combination of mechanical and chemical control. Chemical control is to be implemented through use of Glyphosate 360g/L at a ratio of 1:1.5 using cut stump / stem injection / basal bark or foliar spray application techniques. 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re-use of topsoil and mulch to be limited to affected areas only;	3-5, 7-11

Scientific name	Common name	Control class	Legal requirement	Management measures	Relevant section
				4. Any new infestations or isolated plants detected during monitoring inspections should be manually removed or sprayed with herbicide treatment during.	
Erythrina crista-galli	Cockspur Coral Tree	3 (CVLGA) and 4 (RVLGA & BLGA)	The plant must be fully and continuously suppressed and destroyed. The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	1. Adopt a combination of mechanical and chemical control. Chemical control is to be implemented through use of Glyphosate 360g/L at a ratio of 1:1.5 using cut stump / drill / axe cut or inject spray application techniques; 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re-use of topsoil and mulch to be limited to affected areas only; 4. Any new infestations or isolated plants detected during monitoring inspections should be manually removed or sprayed with herbicide treatment during late summer/autumn.	8, 9
Lantana camara	Lantana	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	1. Initial weed control is recommended through use of mechanical removal using earth moving equipment. Mechanical control is not recommended in steep areas or water courses where care will need to be taken and alternate manual or chemical controls may be implemented. 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re-use of topsoil and mulch to be limited to affected areas only; 4. Any new infestations or isolated plants detected during monitoring inspections should be manually removed or sprayed with herbicide treatment during late summer/autumn.	All
Ligustrum lucidum	Large-leaf Privet	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	1. Initial weed control is recommended through use of mechanical removal using earth moving equipment. Mechanical control is not recommended in steep areas or water courses where care will need to be taken and	10,11

Scientific name	Common name	Control class	Legal requirement	Management measures	Relevant section
				alternate manual or chemical controls may be implemented. 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re-use of topsoil and mulch to be limited to affected areas only; 4. Any new infestations or isolated plants detected during monitoring inspections should be manually removed or sprayed with herbicide treatment during late summer/autumn.	
Ligustrum sinense	Small-leaf Privet	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	1. Initial weed control is recommended through use of mechanical removal using earth moving equipment. Mechanical control is not recommended in steep areas or water courses where care will need to be taken and alternate manual or chemical controls may be implemented. 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re-use of topsoil and mulch to be limited to affected areas only; 4. Any new infestations or isolated plants detected during monitoring inspections should be manually removed or sprayed with herbicide treatment during late summer/autumn.	8-11
Opuntia sp	Prickly Pear	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	1. Generally controlled through biological agents. Herbicide application maybe implemented using a mixture of Glyphosate and Metasulfuron methyl. 2. Re-use of topsoil and mulch to be limited to affected areas only;	3-5, 8, 9

Scientific name	Common name	Control class	Legal requirement	Management measures	Relevant section
				3. Any new infestations or isolated plants detected during monitoring inspections should be manually removed or sprayed with herbicide treatment during.	
Rubus fruticosus agg	Blackberry	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	1. Adopt a combination of mechanical and chemical control. Spray infestations when plants are actively growing during early summer 2015 to mid-autumn 2016; 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re-use of topsoil and mulch to be limited to affected areas only; 4. Any new infestations or isolated plants detected during monitoring inspections should be manually removed or sprayed with herbicide treatment during late summer/autumn.	4, 5
Senecio madagascariensis	Fireweed	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	1. Slash or spray actively growing plants before April 2016; 2. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re-use of topsoil and mulch to be limited to affected areas only; 4. Grow a combination of winter and summer grasses to maintain dense cover and inhibit growth; 5. Conduct autumn inspection of open areas and apply suitable herbicide treatment on any new infestations or isolated plants.	3-5, 7-11
Xanthium occidentale	Noogoora Burr	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	1. Spray infestations when plants are young and actively growing during early summer 2015/16; 2. Slash as a follow-up to herbicide application; 3. Thoroughly clean machinery of soil and plant material prior to exiting affected areas; 3. Re-use of topsoil and mulch to be limited to affected areas only;	3-6

Scientific name	Common name	Control class	Legal requirement	Management measures	Relevant section
				4. Grow a combination of winter and summer grasses to maintain dense cover and inhibit growth; 5. Conduct autumn inspection of open areas and apply suitable herbicide treatment on any new infestations or isolated plants.	

2.3 Control of pathogens

2.3.1 Overall management measures

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

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

Performance indicators

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

2.3.2 Chytrid Fungus disinfectant protocol

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

- Footwear will be thoroughly cleaned and disinfected at the commencement of fieldwork and between each sampling site. This will be achieved by initially scraping boots clear of mud and standing the soles in a disinfecting solution. The remainder of the boot is to be rinsed or sprayed with a disinfecting solution that contains benzalkonium chloride as the active ingredient. Disinfecting solutions are to be prevented from entering any water bodies. Works must adhere to the Safety Materials Data Sheet
- Where practical and as an alternative to cleaning, footwear will be changed and bagged between sites
- Equipment such as nets, balances, callipers, bags, scalpels, headlamps, torches, wetsuits and waders etc. that are used at one site will be cleaned and disinfected before reuse at another site
- Disposable items will be used where possible. Non-disposable equipment will only be used 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 will 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 present 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 be undertaken to prevent the transfer of pathogens from/to vehicle floor and control pedals
- Frogs will 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
- When handling frogs, the risk of pathogen transfer will be minimised by following handling protocols 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 will be used especially where several people are working together with one person processing frogs and others doing the collecting. Bags will not be reused.
- A 'one bag-one sample' approach to tadpole sampling will be used. Bags will not be reused.

- All used disinfecting solutions, glove and other disposable items will be stored in a sharps or other waste container and disposed or sterilised appropriately at the completion of fieldwork. Disinfecting solutions must not come into contact with frogs or be permitted to contaminate any water bodies
- The disinfecting agents for hands and equipment will be effective against bacteria as well as both the vegetative and spore stages of fungi.

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

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

2.3.3 Myrtle Rust management measures

All occurrences of Myrtle Rust will be reported to the PC 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 will 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
- Environment Manager to report all occurrences of Myrtle Rust to the NSW DPI within 7 days of positive identification.

2.3.4 Phytophthora cinnamomi management measures

Where necessary, the introduction and spread of *Phytophthora cinnamomi* will be managed using a combination of the following measures, where applicable and necessary:
- Testing of soil in known phytophthora and seeking advice from Royal Botanical Gardens & EPA Biodiversity unit.
- Training of staff on the risk of, and controls to be implemented for, working in or adjacent to *Phytophthora cinnamomi* infested areas.
- Establishment of No-Go Zones where works within infested areas can be avoided.
- Maintenance of natural barriers between construction activities and infected areas, where possible.

- Scheduling activities in non-infested areas before moving to infested areas.
- Scheduling activities for periods with the highest likelihood of dry soil conditions to minimise the spread of the pathogen, where possible.
- Ensuring vehicles, material and footwear are clean upon entry into, and exit from, infested areas.
- Minimisation of the amount of water discharged into infested areas.
- Restricted movement of soil from infested areas and implementation of local stockpiling and demarcation of infested soils within infested areas.
- Implementation of hygiene protocols where working across infested and non-infested areas cannot be avoided.

2.3.5 Panama Disease management measures

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

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

2. Where potentially contaminated soils may be present:

    - Signage to be installed advising special hygiene measures apply in the zone.
    - Limit access to contaminated area with fencing.
    - No earth works will occur after extended rainfall that could make the earth saturated.
    - No earth work will occur during heavy rainfall where water could potentially cause overland flow.
    - Vehicles should be kept clean of mud, dirt and plant matter, including tyres, wheels and the undersides of vehicles.
    - Vehicles should not, where possible, be driven through mud or potentially infected areas.
    - Vehicles should not, where possible, be parked off plantations and not be driven across plantation access routes, such as driveways.
    - If a vehicle or machinery is taken onto a plantation, **all** mud and dirt is to be removed, (including from floor mats, the underside of vehicles, tyres and wheels) and the vehicle is to be washed with Truckwash® (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 cannot contaminate plantation soils.

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

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

5. Limiting movement of potentially contaminated plantation topsoil

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

6. Limiting importation of potentially contaminated soil and plant matter

- Any vehicles or equipment brought onto to the Project from construction sites north of Evans Head (NSW Northern Zone banana plantations) need to be checked and cleared of any potentially Panama disease contaminated soil and/or potentially Bunchy Top Virus contaminated plant matter.

- If signs of soil and/or plant matter are present, vehicles or equipment should be cleaned in accordance with the procedure in Step 2 above.

2.4 Topsoil

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

2.5 Aquatic Weeds

2.5.1 Overview

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

The following management approach for aquatic weeds is taken from the NSW DPI (Primefact 30, NSW DPI, November 2008 (Gorham 2008). To select the most appropriate management option, it is essential that the plant is correctly identified. The project ecologist should undertake an assessment of any aquatic weeds. A listed of identified aquatic weeds can be seen in Table 2-2. Two aquatic weed species (Water Hyacinth (*Eichhornia crassipes)* and Salvinia (*Salvinia molesta)*) were not identified in the project area; however, they have been identified in close proximity to the project area and due to their capability to disperse there is potential for the occurrence of these weeds species within the project area.

2.5.2 Overall management measures

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

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

Timing
Weeds will be controlled during the clearing and grubbing program.

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

2.5.3 Mechanical removal of weeds

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

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

Performance indicators
If required, all noxious weeds removed mechanically are done so in accordance with the *Noxious Weeds Act 1993.*

2.5.4 Environmental control

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

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

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

Performance indicators
If required, all noxious weeds controlled using environmental controls are done in accordance with the *Noxious Weeds Act 1993.*

2.5.5 Chemical control

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

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

Timing

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

Performance indicators

- Herbicide application administered by authorised personnel only, with ChemCert Accreditation AQF 3 (in accordance with Workcover requirements).
- Noxious weeds treated in accordance with the herbicide specific to each species, as listed in the Noxious and Environmental Weed Control Handbook(NSW Department of Primary Industries 2014).

2.5.6 Stockpiling and disposal

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

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

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

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

2.5.7 Specific management measures

Specific management measures identified for those noxious aquatic weeds identified during the pre-construction survey are identified in Table 2-2. Timing and performance indicators will be implemented as per Section 2.5 of this plan.

Table 2-2: Noxious aquatic weeds identified within project area or in close proximity to project area.

Scientific name	Common name	Control class	Legal requirement	Management measures	Relevant section
Alternanthera philoxeroides	Alligator Weed	2	The plant must be eradicated from the land and that land must be kept free of the plant	1. Immediately notify relevant weed control authorities of sites containing Alligator Weed; 2. The Alligator Weed Control Manual provides a comprehensive overview of control methods and should be referenced too. Depending on the scale of infestation different control strategies maybe implemented. 3. Any machinery working in an infested area should be thoroughly cleaned before it is moved to a new site. Cleaning should include removal of all mud and vegetation, followed by complete and thorough inspection of the machine. 4. Any new infestations or isolated plants detected during monitoring inspections need to be notified to relevant weed control authorities and should be controlled by following Alligator Weed Control Manual (NSW Department of Primary Industries 2007).	10, 11
Eichhornia crassipes[1]	Water Hyacinth	4	The growth of the plant must be managed in a manner that continuously inhibits its reproduction.	1. Notify relevant weed control authorities of any new recordings of this species; 2. If infestations of this species are recorded an integrated management control program is to be developed and implemented that will involve mechanical and chemical control techniques;	
Salvinia molesta [2]	Salvinia	3	The plant must be fully and continuously suppressed and destroyed.	1. Notify relevant weed control authorities of any new recordings of this species; 2. If infestations of this species are recorded an integrated management control program is to be developed and implemented that will involve mechanical and chemical control techniques (See Salvinia control manual (Department of Primary Industries 2006)).	

Note:

1) Water Hyacinth has been recorded within the Clarence River Estuary within Sections 6-8 as part of surveys conducted for the EIS. This species was not identified during pre-clearing surveys conducted as part of the Threatened Flora Management Plan.
2) Salvinia was recorded from Section 3-5 and 9-11 as part of surveys conducted for the EIS. This species was not identified during pre-clearing surveys conducted as part of the Threatened Flora Management Plan.

3 Inspection and monitoring

3.1 Weed monitoring

Weed monitoring will be conducted in all disturbed areas, landscaped areas, rehabilitation sites and mulch and topsoil stockpiles. The frequency and duration of weed monitoring will be specific to the site and adjoining areas and have the flexibility to respond to changes in the environment. As a minimum, weed inspections will be undertaken on a six monthly basis (i.e. autumn and spring) during the project construction phase (or in response to seasonal and climatic conditions). Post-construction/operational weed monitoring and inspections will be conducted as part of routine maintenance and monitoring associated with the approved Urban Design and Landscape Management Plan.

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

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

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

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

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

3.2 Pathogen monitoring

Monitoring for Frog Chytrid Fungus will be conducted as part of the threatened frog population monitoring programs and undertaken by the project ecologist and the project environment team. Monitoring of all other pathogens will be devised once the presence and extent of the pathogens has been determined during the construction phase of the project.

3.3 Other inspections and monitoring

All plant, vehicles, equipment must be checked as required by the Projects Weed & Pest Declaration Checklist (Attachment 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 subcontractor plant supervisor when machinery is onsite.

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

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

References

Australian Museum Consulting 2014, *Vegetation Surveys of Sections 10 & 11 of the Woolgoolga to Ballina Pacific Highway Upgrade*, Consultancy report to NSW Roads and Maritime Services.

Biosis, PL 2014, *Vegetation Survey Report. Woolgoolga to Ballina Pacific Highway Upgrade. Section 7 – Devils Pulpit Upgrade to Trustums Hill.*, Report for Roads and Maritime Services.

Brougham, K, Cherry, H & Downy, P 2006, *Boneseed Management Manual: current management and control options for boneseed (Chrysanthemoides monilifera ssp. monilifera) in Australia.*, Department of Environment and Conservation, Sydney.

Commonwealth of Australia 2014, *Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi*, Department of the Environment,

Department of Environment and Climate Change (NSW) 2008, *Hygiene protocol for the control of disease in frogs. Information Circular Number 6.*, Sydney South,

Department of Natural Resources Mines and Energy 2004, *Prickly Acacia: National Case Studies Manual - Approaches to the management of prickly acacia (Acacia nilotica subsp. indica) in Australia*, Department of Natural Resources Mines and Energy,, Cloncurry QLD.

Department of Primary Industries 2006, *Salvinia control manaul: Management and control options for salvinia (Salvinia molesta) in Australia*, Department of Primary Industries, Orange.

GeoLINK 2015a, *Vegetation Survey Report: Woolgoolga to Ballina Highway Upgrade (Section 3)*, Prepared for NSW Roads and Maritime Services.

GeoLINK 2015b, *Vegetation Survey Report: Woolgoolga to Ballina Pacific Highway Upgrade (Section 4 and 5)*, Prepared for NSW Roads and Maritime Services.

Gorham, P 2008, *Aquatic weed management in waterways and dams - Primefact 30*, Department of Primary industries,, Richmond (NSW).

Melaleuca Group 2014, *Vegetation Surveys Sections 8 and 9 of the Woolgoolga to Ballina Pacific Highway Upgrade*, Report prepared by Melaleuca Group for Roads and Maritime Services.

Newley, P 2010, *Panama disease in bananas - Primefact 1029*, Industry and Investment (NSW), Coffs Harbour.

NSW Department of Primary Industries 2014, *Noxious and Environmental Weed Control Handbook - A guide to weed control in non-crop, aquatic and bushland situations (6th Edition)*, NSW Department of Primary Industries, Grafton

Office of Environment and Heritage 2011, *Management plan for myrtle rust on the national parks estate*, Office of Environment and Heritage NSW, Sydney,

Richard, N 2004, *Introductory Weed Management Manual*, Natural Heritage Trust, Department for Environment & Heritage, Canberra.

Roads and Traffic Authority 2011, *Biodiversity Guidelines - Protecting and managing biodiversity on RTA projects*, RTA - Environment Branch, Sydney.

Winkler, M, Cherry, H & Downey, PO 2008, *Bitou Bush Management Manual: current management and control options for bitou bush (Chrysanthemoides monilifer ssp. rotundata) in Australia*, Department of Environment and Climate Change, Sydney.

Attachment A - Weed and pest declaration checklist

Weed & Pest Declaration Checklist

Contractor/Supplier: **Date :**

Plant/Vehicle/Equipment Type: **Received From (location):**

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1. **Has the plant/equipment/vehicle been moved through an area infested with noxious pests or weeds, or been used to clear forest containing noxious weeds? for example:** ☐ Yes ☐ No

   - Pest animals (cane toads)
   - Pest insects (fire ants, yellow crazy ants, electric ants)
   - Pest aquatic weeds (Alligator weed, salvina, water hyancinth)
   - Pest grasses (Giant rats tail, American Rats tail, Giant Parramatta)
   - Pest weeds (camphor laurel, lantana, groundsel bush, coral tree)

2. **If the answer to Question 1 is ''yes'', has the plant/vehicle/equipment been quarantined/washed/cleaned/certified clean/other to prevent prohibited use onsite?** ☐ Yes ☐ No

3. **Has the vehicle/plant/equipment been cleaned prior to coming onto site?**

   "Clean means that no soil and/or organic matter that may contain weed reproductive material in or on in areas that are accessible during cleaning and maintenance work. ☐ Yes ☐ No

4. **Have the following areas been checked for signs of seeds, mud, organic matter, grass or animals?**

   a) between dual wheels/rims, muffler surrounds, wheel guards and mud guards; ☐ Yes ☐ No

   b) spare tyres, toolbox, tracks and track frames; ☐ Yes ☐ No

   c) turret pivot areas and axle beams; ☐ Yes ☐ No

   d) engine bays where grease and oil stains may accumulate soil and plant material in the residue; ☐ Yes ☐ No

   e) radiators; ☐ Yes ☐ No

   f) the underside of the machinery (guards and belly plates should be removed for inspection); ☐ Yes ☐ No

   g) hollows, crevices and exposed welded plates; ☐ Yes ☐ No

h) the interior of the cabin.

☐ Yes
☐ No

i) bullbars and light recesses

☐ Yes
☐ No

Refer to Government Websites for supporting information:

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

https://www.daff.qld.gov.au/__data/assets/pdf_file/0016/64006/IPA-Inspection-Procedures.pdf

Comments/Observations:

To be signed when onsite by Supplier & Joint Venture Representative

INSPECTION SIGN OFF

Inspection undertaken by: ……..…. (PC Authorised Rep) Date:

Name & Signature Required

Inspection undertaken by:……..…. (Contractor Rep) Date:

Name & Signature Required

PROVIDE SIGNED COPY OF COMPLETED FORM & SUPPORTING DOCUMENTS TO ENVIRONMENT MANAGER

Appendix Q
Mitigation Framework

Appendix R
Flora Translocation Strategy

Appendix S
Threatened Bat Management Plan

Appendix T
Threatened Mammal Management Plan