APPENDIX B2

Construction Flora and Fauna Management Sub-plan

Foxground and Berry bypass

May 2017

Document control

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Plan approved by:

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Contractor Project Director	Contractor EM	RMS representative

Revision history

Revision	Date	Description	Approval
G	3/05/17	Updated with minor changes regarding Grey Headed Flying Fox camp and project personnel. Additions made to Sections 3.2, 6.2, Table 3.3, Table6.1, inclusion of CFFMM4A in Table 5.1 and amendment of Appendix E	
F	26/10/15	Construction phase revision Updated with minor editorial changes (tracked) to Sections 5, 6, Appendices D, E and F.	
E	01/09/14	Fifth draft in response to DP&E comments. Updated Glossary / Abbreviations to include Director General and 'Secretary'. Amended CFFMM23, CFFMM27 and Section 6.2. Added Contacts cross-reference to Appendix C.	
D	25/07/14	Fourth draft incorporating construction-related provisions of the Ecological Monitoring Program as required. For submission to DP&E.	
C	17/07/14	Third draft for review by RMS and ER. All comments addressed.	
B	24/06/14	Second draft for review and comment by OEH (Biodiversity), and DPI (Fishing and Aquaculture).	
A	23/05/14	First draft for RMS and ER review.	

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1	RMS – Ryan Whiddon	Rev G
2	Project ER – Toby Hobbs	Rev G
3	Fulton Hogan – Michael Phillips Ryder	Rev G

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Glossary / Abbreviations

CEMP	Construction Environmental Management Plan
CFFMP	Construction Flora and Fauna Management Sub-plan
CoA	Condition of Approval
CCS	Community Communication Strategy
CSWQMP	Construction Soil and Water Quality Management Sub-plan
Director General	Director General of the NSW Department of Planning and Infrastructure (or delegate). Now the Secretary of the Department of Planning and Environment.
DP&E	Department of Planning and Environment
DPI	Department of Primary Industries (Fishing and Aquaculture)
EA	Environmental Assessment
EEC	Endangered Ecological Community
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
EWMS	Environmental Work Method Statement
Feasible and Reasonable	Defined by the Project Approval: "*Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community views and nature and extent of potential improvements.* *Where requested by the Director General, the Proponent must provide evidence as to how feasible and reasonable measures were considered and taken into account*."
FM Act	*Fisheries Management Act 1994*
GGBF	Green and Golden Bell Frog
NOW	NSW Office of Water
NPW Act	*National Parks and Wildlife Act 1974*
NW Act	*Noxious Weeds Act 1993*
OEH	Office of Environment and Heritage
PESCP	Progressive Erosion and Sediment Control Plans
Project, the	The Princes Highway Upgrade - Foxground and Berry Bypass Project, defined as "*The construction and operation of approximately 11.6 kilometres of two lane divided carriageways (with the exception of the cutting through Toolijooa Ridge which comprises two lanes plus a climbing lane in each direction), with provisions for the possible future widening to three lanes within the road corridor (if required in the future).*"
Project Ecologist	Defined by RMS Specification D&C G40 Clearing and Grubbing: "*Ecologists are people whose qualifications and experience in botany, environmental science, landscaping or bush regeneration and experience in identifying weeds and other plant species are accepted by the RMS Representative*."
RCE	Riparian, channel and environmental inventory
RMS	Roads and Maritime Services
Secretary	Secretary of the Department of Planning and Environment
SoC	Revised Statement of Commitments included in the Submissions Report

TSC Act	*Threatened Species and Conservation Act 1995*
UDLP	Urban Design and Landscape Plan

1 Introduction

1.1 Purpose

This Construction Flora and Fauna Management Sub-plan (CFFMP) describes how Fulton Hogan will minimise and manage potential impacts on ecology during construction of the Foxground and Berry Bypass project (the Project).

This CFFMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), the RMS Statement of Commitments (SoC), the mitigation measures listed in the *Foxground and Berry bypass Environmental Assessment* (EA) (AECOM, 2012) and applicable legislation.

1.2 Background

The *Princes Highway upgrade – Foxground and Berry bypass Environmental Assessment* (AECOM, 2012) assessed the impacts of construction and operation of the Project on flora and fauna.

As part of the EA development, a detailed flora and fauna assessment was prepared to address the Director-General's Requirements issued by the then Department of Planning. The flora and fauna assessment was included in the EA as:

- Volume 2 Appendix F Technical paper: terrestrial flora and fauna; and
- Volume 2 Appendix G Technical paper: aquatic ecology and water quality management.

1.3 Structure of CFFMP

This CFFMP is part of Fulton Hogan's environmental management framework for the Project and is supported by other documents such as work procedures and environmental work method statements. The review and document control processes for this CFFMP are described in Chapter 10 of the CEMP.

1.4 Consultation for the preparation of the CFFMP

In accordance with CoA B36(b), this CFFMP has been developed in consultation with OEH and DPI (Fishing and Aquaculture). A summary of consultation undertaken during the preparation of this CFFMP is provided in Appendix A2 of the CEMP.

2 Legal and other requirements

2.1 Legislation

Legislation relevant to flora and fauna management includes:

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *National Parks and Wildlife Act 1974* (NPW Act)
- *Threatened Species Conservation Act 1995* (TSC Act)
- *Fisheries Management Act 1994* (FM Act)
- *Noxious Weeds Act 1993* (NW Act)
- *Pesticides Act 1999*
- *Animal Research Act 1985*
- *Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act)
- *State Environmental Planning Policy 14 Coastal Wetlands* (SEPP 14), and
- *State Environmental Planning Policy 44 Koala Habitat Protection* (SEPP 44).

Relevant provisions of the above legislation are explained in the register of legal and other requirements included in Appendix A1 of the CEMP.

2.2 Guidelines and standards

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

- RMS Specification D&C *G36 – Environmental Protection (Management System)*
- RMS Specification D&C *G40 – Clearing and Grubbing*
- RMS Specification D&C *R178 – Vegetation*
- RMS Specification D&C *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 Department of Primary Industries, *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings,* Fairfull and Witheridge, 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,* and
- Relevant recovery plans, priority action statements and best practice guidelines.

2.3 Minister's Conditions of Approval

The CoA relevant to this CFFMP are listed Table 2-1 below. A cross reference is also included to indicate where the condition is addressed in this CFFMP or other Project / environmental management documents.

Table 2-1 Conditions of Approval relevant to the CFFMP

CoA No.	Condition Requirements	Where addressed
CoA B3	The Proponent shall design (and implement) the fauna crossings identified in Table 5.1 of Appendix F of the document listed under condition A1(b), at the locations and in accordance with the minimum design principles identified in Table 5.1, unless otherwise agreed by the Director General.	*Fauna Crossings Report* (CoA B5) To be provided separately to this CFFMP, prior to the commencement of construction of the relevant crossing.
CoA B4	Investigations into the design of fauna crossings identified in Table 5.1 of Volume 2 Appendix F of the document listed under condition A1(b) during detailed design shall be undertaken with the input of a suitably qualified and experienced ecologist and in consultation with OEH and DPI (Fishing and Aquaculture).	*Fauna Crossings Report* (CoA B5) To be provided separately to this CFFMP, prior to the commencement of construction of the relevant crossing
CoA B5	The Proponent shall prepare a report on the final design of fauna and/or waterway crossings identified in Table 5.1 of Appendix F of the document listed under condition A1(b), where the location of the crossing has changed and/or the crossing does not meet the minimum design principles identified in Table 5.1. The report shall be submitted to the Director General prior to the commencement of construction of the relevant crossing, and shall demonstrate how the new location and/ or design would result in acceptable biodiversity outcomes. The report shall clearly identify how the fauna and/or waterway crossing will work in conjunction with complementary fauna exclusion fencing measures to be implemented for the project. The report shall be accompanied by evidence of consultation with OEH and DPI (Fishing and Aquaculture) in relation to the suitability of any changes to the location and/or crossing design.	*Fauna Crossings Report* (CoA B5) To be provided separately to this CFFMP, prior to the commencement of construction of the relevant crossing.
CoA B6	The Proponent shall, in consultation with OEH and DPI (Fishing and Aquaculture), ensure that all waterway crossings are designed and constructed consistent with the principles of the *Guidelines for Controlled Activities Watercourse Crossings* (Department of Water and Energy, February 2008), *Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW Fisheries, February 2004) and *Policy and Guidelines for Design and Construction of Bridges, Roads, Causeways, Culverts and Similar Structures* (NSW Fisheries 1999). Where multiple cell culverts are proposed for creek crossings, at least one cell shall be provided for fish passage, with an invert or bed level that mimics creek flows.	Chapter 5 Mitigation Measures ID CFFMM12 Detailed design. It is also noted that *Policy and Guidelines for Design and Construction of Bridges, Roads, Causeways, Culverts and Similar Structures* (NSW Fisheries 1999) has been superseded by: *Policy and Guidelines for Fish Habitat Conservation and Management* (Update 2013) and

CoA No.	Condition Requirements	Where addressed
		NSW Department of Primary Industries, *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge, 2003).
CoA B9	The Proponent shall develop an **Ecological Monitoring Program** to monitor the effectiveness of the biodiversity mitigation measures implemented as part of the project. The program shall be developed by a suitably qualified and experienced ecologist in consultation with the OEH and DPI (Fishing and Aquaculture) and shall include but not necessarily be limited to: (a) an adaptive monitoring program to assess the effectiveness of the mitigation measures identified in conditions B3 and B36(b) and allow amendment to the measures if necessary. The monitoring program shall nominate performance parameters and criteria against which effectiveness will be measured and include operational road kill surveys to assess the effectiveness of fauna crossings and exclusion fencing implemented as part of the project; (b) mechanisms for developing additional monitoring protocols to assess the effectiveness of any additional mitigation measures implemented to address additional impacts in the case of design amendments or unexpected threatened species finds during construction (where these additional impacts are generally consistent with the biodiversity impacts identified for the project in the documents listed under condition A1); (c) monitoring shall be undertaken during construction (for construction-related impacts) and from opening of the project to traffic (for operation/ ongoing impacts) until such time as the effectiveness of mitigation measures can be demonstrated to have been achieved over a minimum of three successive monitoring periods after opening of the project to traffic, unless otherwise agreed by the Director General. The monitoring period may be reduced with the agreement of the Director General in consultation with the OEH and DPI (Fishing and Aquaculture), depending on the outcomes of the monitoring; (d) provision for the assessment of the data to identify changes to habitat usage and whether this can be directly attributed to the project; (e) details of contingency measures that would be implemented in the event of changes to habitat usage patterns directly attributable to the construction or operation of the project; and (f) provision for annual reporting of monitoring results to the Director General and the OEH and DPI (Fishing and Aquaculture), or as otherwise agreed by those agencies. The Program shall be submitted to the Director General for approval no later than 6 weeks prior to the commencement of construction that would result in the disturbance of native vegetation (unless otherwise agreed by the Director General).	*Ecological Monitoring Program* (by RMS) Provided separately to this CFFMP. All monitoring required during construction for construction–related impacts, from the *Ecological Monitoring Program*, has been incorporated into this CFFMP as required. For example, refer to Chapter 5 mitigation measure ID CFFMM9, CFFMM13, CFFMM14 and CFFMM15; and Section 6.3.
CoA B36	As part of the Construction Environment Management Plan for the project required under condition B35, the Proponent shall prepare and implement the following sub plan(s):	This CFFMP

CoA No.	Condition Requirements	Where addressed
	(b) a **Construction Flora and Fauna Management Sub-plan** to detail how construction impacts on ecology will be minimised and managed. The sub-plan shall be developed in consultation with the OEH and DPI (Fishing and Aquaculture) and shall include, but not necessarily be limited to:	Section 1.1 Section 1.4
	(i) details of pre-construction surveys undertaken by a suitably qualified and experienced ecologist to verify the construction boundaries/ footprint of the project based on detailed design and to confirm the vegetation to be cleared as part of the project (including tree hollows, threatened flora and fauna species and riparian vegetation);	Chapter 3 Chapter 5 mitigation measure ID CFFMM2 Appendix A – Clearing and Grubbing EWMS addresses pre-construction surveys, pre-clearing survey and internal permit requirements
	(ii) updated sensitive area/ vegetation maps based on (i) above and previous survey work;	Chapter 3 addresses previous survey work Chapter 5 mitigation measure ID CFFMM6 CEMP Appendix A6 – Sensitive Area Plans
	(iii) details of general work practices and mitigation measures to be implemented during construction to minimise impacts on native fauna and native vegetation (particularly threatened species and EECs) not proposed to be cleared as part of the project, including, but not necessarily limited to:	Chapter 5 Section 3.1.2 Appendix C – Unexpected Threatened Species/ EEC Find Procedure
	• fencing of sensitive areas,	Chapter 5 mitigation measure ID CFFMM1 Section 6.3 – inspection of exclusion fencing Appendix A - Clearing and Grubbing EWMS
	• a protocol for the removal and relocation of fauna during clearing,	Chapter 5 mitigation measure ID CFFMM15 Appendix D - Fauna Handling and Rescue Procedure
	• engagement of a suitably qualified and experienced ecologist to identify locations where they would be present to oversee clearing activities and facilitate fauna rescues and re-location,	Chapter 5 mitigation measure ID CFFMM2 Section 6.1.1 Appendix A - Clearing and Grubbing EWMS Appendix D - Fauna Handling and Rescue Procedure Appendix E – Fauna Rescue Event Record Glossary/ Abbreviations for definition of Project Ecologist
	• clearing timing with consideration to breeding periods,	Chapter 5 mitigation measure ID CFFMM2 Appendix A - Clearing and Grubbing EWMS

CoA No.	Condition Requirements	Where addressed
	• measures for maintaining existing habitat features (such as bush rock and tree branches etc.),	Chapter 5 mitigation measure ID CFFMM1 and CFFMM2 Appendix A - Clearing and Grubbing EWMS - Pre-clearing surveys
	• seed harvesting and appropriate topsoil management,	Chapter 5 mitigation measure ID CFFMM2, CFFMM11, CFFMM22 Appendix A - Clearing and Grubbing EWMS CSWQMP Appendix F Stockpile Management Protocol
	• construction worker education,	Section 6.2
	• weed management (including controls to prevent the introduction or spread of *Phytophthora cinnamomi*),	Chapter 5 mitigation measure ID CFFMM2 and CFFMM19-CFFMM23. Appendix A - Clearing and Grubbing EWMS Appendix F – Weed Management Plan Appendix I – *Phytophthora cinnamomi* Procedure
	• erosion and sediment control and	Chapter 5 Appendix A - Clearing and Grubbing EWMS - pre-clearing survey and internal permit requirements. CSWQMP
	• progressive re-vegetation;	Chapter 5 mitigation measure ID CFFMM23 and CFFMM27. Appendix A - Clearing and Grubbing EWMS
	(iv) specific procedures to deal with EEC/ threatened species anticipated to be encountered within the project corridor including re-location, translocation and/or management and protection measures;	Section 3.1.2 - no threatened flora species were recorded in the study area during pre-construction field surveys. Therefore, no specific procedures (e.g. re-location, translocation and/or management and protection measures) to deal with identified threatened flora species are required at this stage Management of threatened fauna will be undertaken through a number of measures including:

CoA No.	Condition Requirements	Where addressed
		• Appendix A - Clearing and Grubbing EWMS - Pre-clearing and pre-construction surveys by the Project Ecologist. • Appendix A - Clearing and Grubbing EWMS - A two-staged clearing approach. • Appendix D Fauna Handling and Rescue Procedure.
	(v) a procedure for dealing with unexpected EEC/threatened species identified during construction including cessation of work and notification of the OEH, determination of appropriate mitigation measures in consultation with the OEH (including relevant re-location measures) and update of ecological monitoring and/ or biodiversity offset requirements consistent with conditions B7 and B8; and	Chapter 5 mitigation measure ID CFFMM6 Appendix C - Unexpected Threatened Species/ EEC Find Procedure
	(vi) mechanism for the monitoring, review and amendment of this sub-plan;	Chapter 7
C1	The Proponent shall employ feasible and reasonable measures to minimise the clearing of native vegetation during the construction of the project.	Section 3.1.2 Chapter 5 mitigation measure ID CFFMM2 Appendix A - Clearing and Grubbing EWMS - includes pre-construction, pre-clearing survey and internal permit requirements.

2.4 Statement of commitments

Relevant SoC are listed in Table 2-2 below. This includes reference to required outcomes and the timing of when the commitment applies. A cross reference is also included to indicate where the condition is addressed in this CFFMP or other project / environmental management documents.

Table 2-2 Statement of commitments relevant to this CFFMP

Outcome	Ref #	Commitment	Timing	Document Reference
Manage impacts on flora and fauna.	BD1	Areas of vegetation identified to be retained will be managed as environmentally sensitive areas.	Pre-construction	Chapter 5 mitigation measure ID CFFMM1
	BD2	Pre-clearing fauna surveys, clearing procedures, including staged clearing where there are hollow trees, and methods to control noxious and environmental weeds and pests will be developed and implemented prior to clearing activities, in consultation with a suitably qualified and experienced ecologist.	Pre-construction and construction	Chapter 5 mitigation measure ID CFFMM2 Appendix A - Clearing and Grubbing EWMS (includes pre-clearing survey and internal permit requirements). Appendix F – Weed Management Plan Glossary/ Abbreviations for definition of Project Ecologist
	BD3	Natural and artificial habitat features, such as bat roost and nest boxes, will be installed to replace hollow-bearing trees that are removed.	Pre-construction and construction	Chapter 5 mitigation measure ID CFFMM2, CFFMM8-CFFMM10, CFFMM13, CFFMM14. Appendix A - Clearing and Grubbing EWMS
	BD4	A fauna monitoring program will be developed in consultation with OEH. This program will allow the assessment of the effectiveness of fauna mitigation measures including nest boxes, bat roost boxes, fauna underpasses, rope bridges and fauna fencing.	Preconstruction, construction and operation	*Ecological Monitoring Program* (by RMS) Provided separately to this CFFMP. All monitoring required during construction for construction–related impacts, from the *Ecological Monitoring Program*, has been incorporated into this CFFMP as required. For example, refer to Chapter 5 mitigation measure ID CFFMM9, CFFMM13, CFFMM14 and CFFMM15; and Section 6.3.
	BD5	Soil that has been stripped, stockpiled and/or reinstated as part of the construction works will be appropriately managed to maintain available seed bank.	Pre-construction and construction	Chapter 5 mitigation measure ID CFFMM2 and CFFMM22. Appendix A - Clearing and Grubbing EWMS CSWQMP Appendix F Stockpile Management Protocol

Outcome	Ref #	Commitment	Timing	Document Reference
Mitigate impacts on wildlife corridor and connectivity.	BD6	Fauna mitigation structures, such as fauna underpasses, fauna overpasses and fauna fencing will be provided where reasonable and feasible. These structures will be designed to assist the safe passage of fauna underneath or over the highway.	Pre-construction, construction and operation	*Fauna Crossings Report* (CoA B5) To be provided separately to this CFFMP, prior to the commencement of construction of the relevant crossing.
	BD7	Vegetation will be retained, where practicable, under bridges, at temporary creek crossing sites, adjacent to ancillary sites and in the vicinity of rope bridges.	Pre-construction, construction and operation	Chapter 5 mitigation measure ID CFFMM1 and CFFMM2 Appendix A - Clearing and Grubbing EWMS (includes pre-clearing survey and internal permit requirements)
Minimise impacts on fish and aquatic habitat.	BD8	Permanent and temporary waterway crossings will be designed and constructed in accordance with the fish classification of each waterway.	Pre-construction and construction	Chapter 5 mitigation measure ID CFFMM12

3 Existing environment

This Chapter summarises existing flora and fauna within and adjacent to the study area including species, communities and habitats based on the information contained in Section 7.3, Appendix F and Appendix G of the EA. Vegetation communities are shown on the Sensitive Area Plans included in Appendix A6 of the CEMP.

The study area for the EA ecological assessment was defined by the extent of possible direct and indirect impacts on flora and fauna that may occur as a result of the Project. Direct impacts were assumed to be limited to the highway footprint and the location and land take for ancillary facilities such as construction compounds, site offices and stockpile areas, as well as land downstream of the proposed Town Creek diversion point. Areas that may be indirectly affected by the Project include adjoining flora and fauna habitats within 50 metres of either side of the subject site. Together these areas make up the study area for the Project, for the purposes of the flora and fauna assessment.

The study area mainly comprises the existing road reserve, privately owned rural agricultural, rural residential and suburban (Berry) properties. The project deviates from the existing Princes Highway corridor across Toolijooa Ridge and to the north of Berry. Although most of the area outside the road reserve has been cleared for agricultural use, there are scattered patches of native vegetation and isolated remnant trees.

Conservation reserves in the area include the Cambewarra Range Nature Reserve, the Seven Mile Beach National Park, the Barren Grounds Nature Reserve and the Saddleback Mountain Reserve. None of these reserves would be directly impacted by the project.

The northern section of the Project lies within the Crooked River catchment, however the Project does not intersect any significant or ephemeral waterways in this catchment. As the Project cuts through Toolijooa Ridge it crosses into the adjacent Broughton Creek catchment (part of the Shoalhaven River catchment) on three occasions.

3.1 Terrestrial flora

Most of the study area is covered by cleared land, generally consisting of grazed paddocks with little existing native vegetation, which is considered to have limited to no capacity for regeneration to a native plant community. A total of 513 vascular flora species were recorded within the study and adjoining areas. About 78% of these species were locally indigenous species and 22% were exotic or environmental weed species.

Terrestrial ecological assessments were conducted during February 2007, November 2008, May 2009, June 2011 and November 2011 as part of background assessments for the Environmental Assessment, prior to project approval.

3.1.1 Vegetation Communities

Eight vegetation communities were mapped within the study area including Illawarra gully wet forest, Currambene-Batemans lowlands forest, Riverbank forest, warm temperate layered forest, closed grassland, closed grassland/sedgeland, disturbed riparian open woodland and constructed wetland.

Endangered ecological communities

One Endangered Ecological Community (EEC) was recorded in the study area: Riverbank forest (source: Appendix F of the EA p ii). This vegetation community is consistent with the Endangered Ecological Community (EEC) *River-flat eucalypt forest on coastal floodplains of*

the NSW North Coast, Sydney Basin and South East Corner bioregions listed under the *Threatened Species Conservation Act 1995* (TSC Act).

During the surveys, Riverbank forest was identified along the riparian corridors of freshwater creeks, including Broughton Creek and Bundewallah Creek. The location of the EEC Riverbank forest community in relation to the Project is shown on Figure 3-1 and included on the Sensitive Area Plans included at Appendix A6 of the CEMP.

The Riverbank forest community within the study area is highly disturbed and in poor condition as its species composition and structure have been altered and weed species are often dominant in the understorey. An assessment of significance was carried out for this EEC and it was determined that despite the direct impacts to about 2.9 hectares and indirect impacts to about 7.1 hectares of this ecological community the project is unlikely to have a significant impact upon this EEC.

A *Biodiversity Offset Strategy* (CoA B7) will be prepared separately by RMS to compensate for the unavoidable loss and residual impact on River-flat eucalypt forest EEC from the project.

No EECs listed under the EPBC Act were recorded in or adjoining the study area.

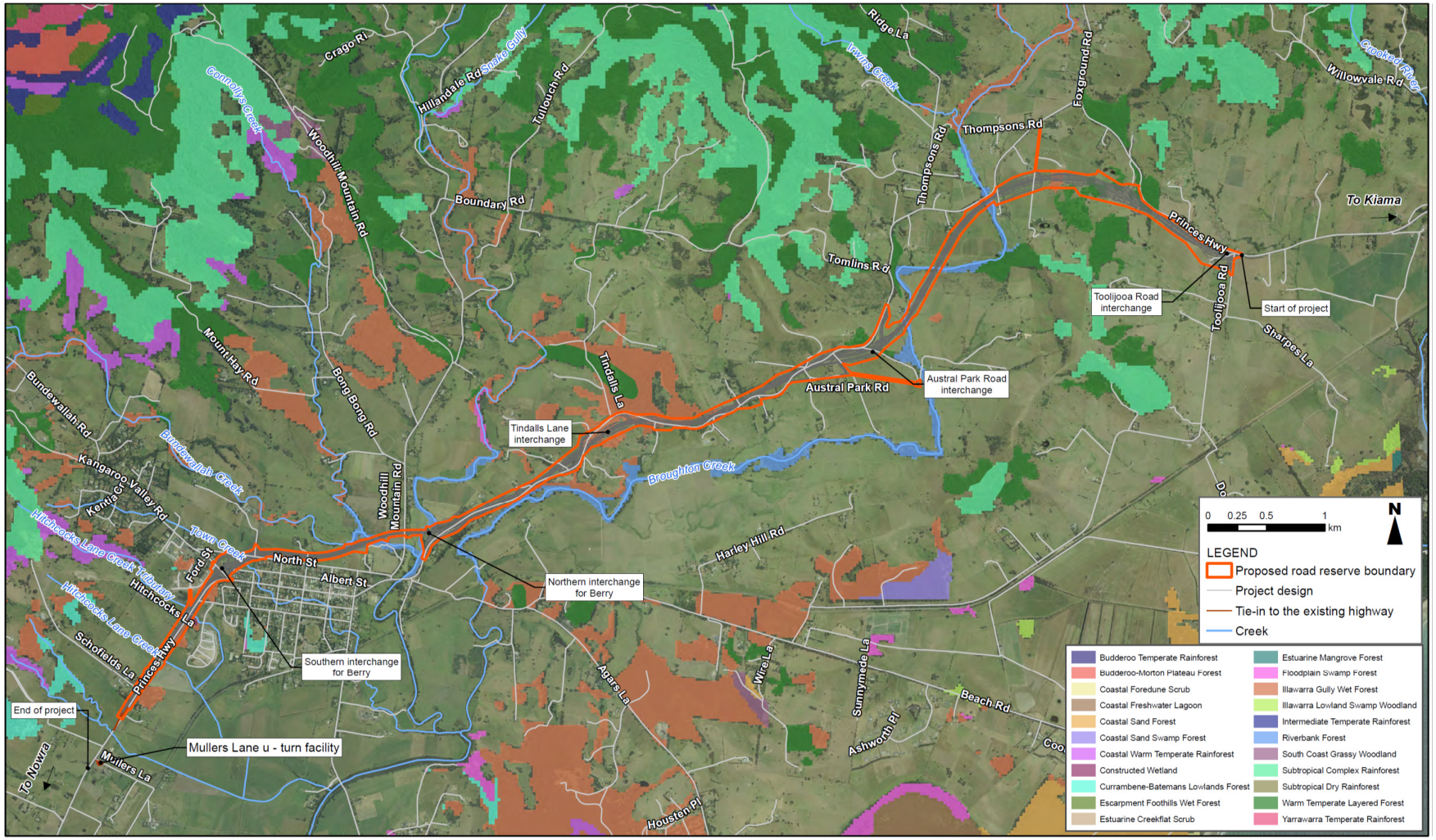

Figure 3-1 Vegetation communities within the study area

Note: Closed grassland, closed grassland / sedgeland and riparian open forest are not shown on this figure.

3.1.2 Threatened or otherwise significant flora species

No threatened flora species, as listed under the TSC Act or EPBC Act, were recorded in the study area during pre-construction field surveys for the EA. Therefore, there are no specific procedures (e.g. re-location, translocation and/or management and protection measures) to deal with threatened flora species.

In the event that Futon Hogan's Project Ecologist identifies threatened flora species during pre-construction surveys, specific procedures (e.g. re-location, translocation and/or management and protection measures) to deal with these species will be developed at that stage. Refer to *Clearing and Grubbing EWMS* in Appendix A.

Nevertheless, it is beneficial to identify the potential threatened flora species that may exist on the Project. Based on the proximity of previous records and the presence of identified habitat preferences, the terrestrial flora and fauna technical paper (Appendix F of the EA) identified that potential habitat may exist within the study area for the following four threatened flora species:

- White-flowered Wax Plant (*Cynanchum elegans);*
- Illawarra Socketwood (*Daphnandra* Sp. 'Illawarra');
- Delicate Cress (*Irenepharsus trypherus);*
- Hill Zieria *(Zieria granulata).*

In addition, OEH identified five flora species to be assessed as subject species for the Project, including two of those already cited above (*Daphnandra* Sp. 'Illawarra' and *Zieria granulata*) and the following additional three species:

- Illawarra Greenhood (*Pterostylis gibbosa);*
- Leafless Tongue Orchid *(cryptostylis hunteriana);*
- Bauer's Midge Orchid *(genoplesium baueri).*

These seven threatened flora species are listed in Appendix B along with a picture to assist with identification in the field. In the event that they, or any other threatened flora species, are unexpectedly encountered on the project, refer to the Unexpected Threatened Species/ EEC Find Procedure in Appendix C.

Assessments of significance carried out for these seven threatened flora species determined that the project is unlikely to have a significant impact upon any of these species (source: Appendix F of the EA p ii).

3.1.3 Exotic Species

Eight exotic species that are listed as noxious weeds in the Shoalhaven local government area (LGA) were recorded in the study area, three of which are also listed as noxious in the Kiama LGA. Table 3-1 provides a list of the recorded species and the noxious weed class to which they belong. This information is based on the flora results provided in Appendix A within Appendix F of the EA.

Table 3-1 Noxious weeds recorded in the study area

Weeds Species	Common Name	Weed Class
Ageratina riparia	Mistflower	4
*Lantana camara**	Lantana	4

Ligustrum lucidum	Large-leaved privet	4
Ligustrum sinense	Small-leaved privet	4
*Rubus fruiticosus**	Blackberry complex	4
Senecio madagascariensis	Fireweed	4
Ageratina adenophora	Crofton weed	4
*Salix species**	Willow	5

* Listed as noxious in Kiama LGA

Alligator weed is a Class 2 noxious weed in the Shoalhaven and Kiama LGAs, and was not observed at any site within the study area and no records were found for its occurrence. Nevertheless, if identified on site it must be eradicated. For further information refer to the Weed Management Plan in Appendix F.

3.2 Terrestrial fauna

3.2.1 Threatened fauna

Nine threatened fauna species (i.e. birds and bats) and six migratory species (i.e. birds) were recorded during the field surveys for the Project, as listed in Table 3-2. As identified in Section 4.1.2 of Appendix F of the EA, the Project is not likely to significantly impact these species because they are highly mobile and would not be averse to crossing cleared areas. In the event that they, or any other threatened fauna species, are unexpectedly encountered on the project, refer to the Unexpected Threatened Species/ EEC Find Procedure in Appendix C.

Since the EA, in late 2016/early 2017 a camp of Grey-Headed Flying Foxes (GHFF) has established at approximate chainage 15900 to the south of Berry Bridge, adjacent the existing Princes Highway and RMS owned property. The GHFF is a Commonwealth listed Threatened Species and is also protected under the NPWS Act. Exclusion fencing and signage is in place between the camp and the project site to ensure that no work occurs within the immediate vicinity.

The camp and the presence of the GHFF require ongoing observation and consultation with RMS and OEH based on any observed behavioural changes and consideration of potential impacts caused by construction.

Table 3-2 Threatened fauna & migratory species recorded in study area

Common name	Scientific name	EPBC Act	TSC Act	Occurrence Likelihood
Threatened Fauna Species (recorded in EA field survey)				
Birds				
Gang-gang Cockatoo	*Callocephalon fimbriatum*	-	Vulnerable	High
Powerful Owl	*Ninox strenua*	-	Vulnerable	High
Mammals				
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	-	Vulnerable	High
Eastern Freetail Bat	*Mormopterus norfolkensis*	-	Vulnerable	High
Grey-headed Flying Fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable	High

Common name	Scientific name	EPBC Act	TSC Act	Occurrence Likelihood
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	-	Vulnerable	High
Eastern False Pipistrelle	*Falsistrellus Tasmaniensis*	-	Vulnerable	High
Southern Myotis	*Myotis macropus*	-	Vulnerable	High
Greater Broad-nosed Bat	*Scoteanax rueppellii*	-	Vulnerable	High
Migratory Species (recorded in EA field survey)				
Birds				
White-bellied Sea-eagle	*Haliaeetus leucogaster*	M	-	High
Fork-tailed Swift	*Apus pacificus*	M	-	High
Cattle Egret	*Ardea ibis*	M	-	High
Black-faced Monarch	*Monarcha melanopsis*	M	-	High
Rufous Fantail	*Rhipidura rufifrons*	M	-	High
Australian Reed-warbler	*Acrocephalus stentoreus*	M	-	High

M – listed as migratory species under the EPBC Act.

3.2.2 Wildlife corridors

The Project crosses the Seven Mile Beach National Park – Barren Grounds Nature Reserve wildlife corridor. Remnant native vegetation at Toolijooa Ridge, Broughton Creek, Broughton Mill Creek and Bundewallah Creek are discontinuous parts of this corridor and are important to wildlife in the area.

Creeks provide dispersal habitat for aquatic fauna and vegetation. Other creeks (such as Town Creek) and some road reserves within the study area also provide limited value as local wildlife corridors for some species. These smaller corridors are important in linking the larger corridors.

A broader wildlife corridor, identified by the Southern Rivers CMA, represents a long term restoration goal for a revegetated corridor extending east from the escarpment to the coast. This corridor includes the section of the Project between the proposed embankment at Broughton Creek Bridge 1 and just east of the Tindalls Lane interchange.

Wildlife corridors located within the study area are shown Figure 3-2 and included on the Sensitive Area Plans provided in Appendix A6.

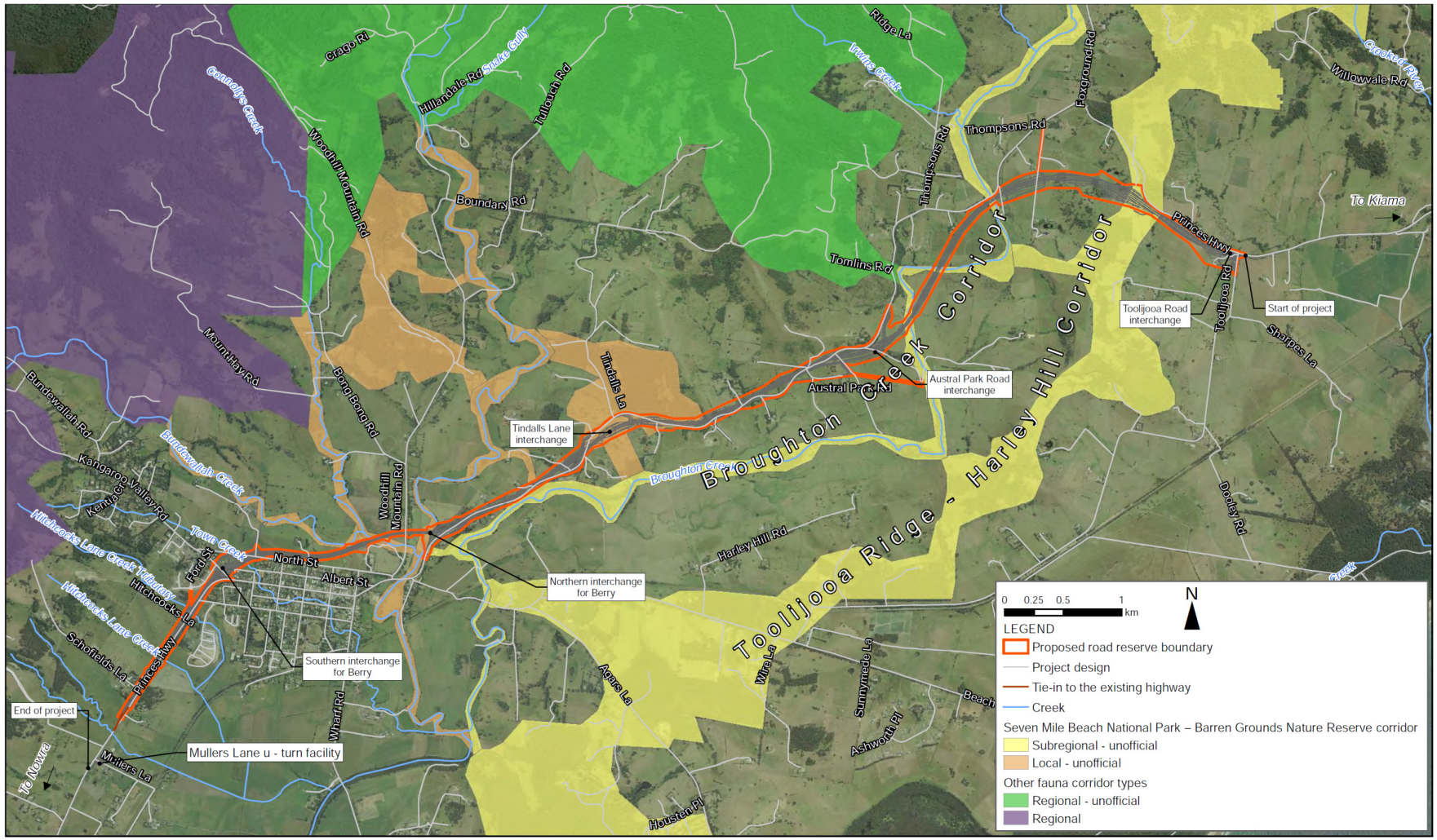

Figure 3-2 Wildlife corridors within the study area

3.3 Terrestrial flora and fauna habitat

The description of terrestrial flora and fauna habitat within the study area provided in the EA or discovered during construction is summarised in Table 3-3 below.

Table 3-3 Terrestrial Flora and Fauna habitat

Area	Terrestrial Habitat features
Toolijooa Ridge and Harley Hill	• Native vegetation generally confined to discontinuous patches of remnant and regrowth vegetation. • Vegetation communities along Toolijooa Ridge included subtropical complex rainforest which grades into warm temperate layered forest further down slope and along edges. Isolated stands of Illawarra gully wet forest were also present. • The dominant vegetation community at Harley Hill was the Illawarra gully wet forest. • Ongoing disturbances such as grazing and a high degree of weed invasion continue to threaten the integrity of flora and fauna habitats. • Native vegetation generally considered to be in poor condition along edges where large infestations of the noxious weed Lantana were present. • Some large hollow-bearing trees were present and provided potential nesting and roosting resources for birds, arboreal mammals and microchiropteran bats.
Broughton Creek	• Native vegetation alongside the creek largely restricted to a thin riparian corridor with patches of remnant and regrowth vegetation. • Vegetation alongside Broughton Creek was riverbank forest in poor condition. • Obvious disturbances at each of these sites included heavy grazing and erosion. • At least six large hollow-bearing River Oaks and six large hollow-bearing Blackbutts (Eucalyptus pilularis) were located in the vicinity of Broughton Creek.
Princes Highway at Tindalls Lane	• Adjacent to Tindalls Lane and on the north and south sides of the existing Princes Highway was an area of remnant native vegetation that covered about 60 hectares. • Historic disturbances such as logging have altered the structure of these communities and environmental weeds were scattered throughout these areas. • The remnant native vegetation in these areas was Illawarra gully wet forest in a moderate to good condition. • The fauna habitats at this site were varied. Hollow-bearing trees were scarce, but those present (large eucalypts) may provide nesting and roosting habitat for various birds, bats and arboreal mammals. Small scale habitat features such as logs, dense undergrowth and leaf litter were also present.
Broughton Mill and Bundewallah Creeks	• Native vegetation largely restricted to a highly disturbed riparian corridor. • Vegetation was represented by riverbank forest in a highly disturbed, poor condition. • There was also a tall native canopy of River Oak and an understorey completely dominated by a high density of environmental weeds. Natural structural layers were not intact and in most areas the mid storey and ground layers were completely dominated by environmental weed species. • Regardless of the degraded nature of much of the area, many sites contained mature casuarinas with small hollows. • A Grey-Headed Flying Fox camp has established on the banks of Broughton Mill Creek and Bundewallah Creek within various trees that appear to provide potential nesting and roosting resources.
Bundewallah Creek (proposed receiving point for Town Creek diversion)	• Native vegetation within this riparian corridor was consistent with riverbank forest. • Where the proposed diversion would connect to Bundewallah Creek, the riverbank forest included a sparse canopy of River Oak between 15 and 25 metres in height and woody weeds which formed a dense understorey in patches. Elsewhere the understorey was absent or had scattered woody weeds. Groundcover was

Area	Terrestrial Habitat features
	dominated by exotic grasses and herbs with occasional patches of native groundcovers. • Fringing vegetation consisted largely of weedy grasses which would likely provide habitat for common frogs and ducks. Deposited concrete slabs provided basking and shelter habitat for common reptiles. Fauna habitats range from poor to moderate in condition.
Town Creek	• Small ephemeral watercourse that passes directly through Berry. • The dominant vegetation type in the northern reaches of the creek, in the area north of North Street, was closed grassland. • Fauna habitat was limited within the closed grassland. However, the land was prone to flooding and small, shallow wetlands were present at the time of survey. Common waterbirds, migratory waterbirds and common frogs may utilise this resource. Fauna habitat was subject to trampling by cattle which were seen drinking from the wetlands during the survey. • Town Creek south of North Street consisted of closed grassland, closed sedgeland and disturbed riparian open woodland – dominated by exotic species and patches of native vegetation. • Disturbed riparian open woodland occurred along Town Creek through the Berry township, characterised by areas of revegetation and regrowth of native vegetation, planted exotic trees, invasive woody weeds and areas of managed open space. • South of Berry, a wetland is located in the area immediately to the west of where Town Creek joins Broughton Mill Creek characterised by patches of native rushes (Typha, Typha orientialis) and sparse cover of other emergent macrophytes. The banks were dominated by pasture grasses with exotic trees and shrubs occurring around the banks. • Fauna habitats along Town Creek south of North Street were disturbed, however they provide foraging and breeding resources for a range of fauna. Town Creek itself and the wetland provide habitat for threatened and migratory birds. • The wetland may offer potential habitat for the threatened Green and Golden Bell Frog. • Fauna habitats along Town Creek ranged from poor to moderate in condition.
Broughton Mill Creek (confluence with Town Creek)	• Where Town Creek joins Broughton Mill Creek south-east of Berry, the vegetation consisted of riparian open woodland containing stands of exotic shrubs and trees. • Groundcover was dominated by introduced pasture species. • Fauna habitats were disturbed and subject to trampling by cattle. No sedges were present but patches of the reed would provide potential habitat for common frogs and birds.
Hitchcocks Lane	• Two separate stands of vegetation occurred on the south side of the existing Princes Highway, one opposite Hitchcocks Lane and the second within a small reserve at the western end of Victoria Street. • Vegetation opposite Hitchcocks Lane was Illawarra gully wet forest with conditions considered to be moderate. • A small drainage line crosses under the existing highway and flows into a constructed wetland. The drainage line and wetland provide habitat for common frogs and birds. • Vegetation at the western end of Victoria Street included isolated remnant native trees with a mown grassy understorey considered to be highly modified and in poor condition.
Schofields Lane	• A native stand of Illawarra gully wet forest occurred south-west of Berry township and directly opposite Schofields Lane. • Considered to be in moderate condition. • Potential for microbat breeding and roosting habitat in logs and scattered with hollows.

3.4 Aquatic habitat

The majority of the Project is contained within the Broughton Creek catchment. Broughton Creek is the dominant watercourse within this catchment and originates in the Cambewarra Range. South of the Princes Highway alignment the creek flows in a south-westerly direction towards Berry. To the north and north-west of Berry are the smaller Broughton Mill Creek and Bundewallah Creek catchments. A smaller section of the project is located in the Crooked River catchment.

This section of the Project does not cross any significant waterways. Freshwater habitat within the study area ranges from relatively healthy to significantly degraded. Riparian vegetation is generally absent on the smaller waterways, banks are unconsolidated, eroded and channels often colonised by pasture grasses and/or annual weeds. The larger waterways, particularly Broughton Creek, Broughton Mill Creek and Bundewallah Creek retain large sections of relatively complete riparian vegetation, support frequent alternation of riffles and pools sequences and considerable instream habitat (eg macrophytes, submerged woody debris, rocks and deep holes). Water quality in the catchment is typical of aquatic ecosystems that have been disturbed by agricultural practices. Downstream of the study area, in the low-lying floodplain, the tributaries of Broughton Creek have been highly modified by flood mitigation works.

AusRivAS (Australian River Assessment System) assessments found the aquatic macroinvertebrate assemblages within the Broughton Creek were generally moderately impaired, reflecting the effects of diffuse agricultural pollution and/or local habitat degradation, although the assemblages from pool edge habitat at Broughton Mill Creek and Bundewallah Creek were equivalent to reference condition. Macroinvertebrate assemblages were often dominated by pollution-tolerant taxa and usually had a greater proportion of pollution-tolerant taxa than at equivalent reference sites.

Table 3-4 below summarises the existing quality of aquatic habitats as assessed in the EA using the following measures:

- Riparian, channel and environmental inventory (RCE) classification – to provide a measure of habitat disturbance
- Fish habitat – measured as Class 1 to Class 4 waterways, and
- Riparian habitat – measured as category 1 to category 3 waterways.

Figure 3-3 shows the riparian habitat classification graphically.

Table 3-4 Aquatic Habitat Assessment (EA)

Area	Habitat features
Broughton Creek	• Broughton Creek upstream of Berry was mostly surrounded by cleared agricultural land. • Large upstream sections with intact native riparian vegetation. • Large sections of the creek also alternated between riffle and pool habitats and in-stream fish habitat, such as snags, rocks and deep holes. • Closer to Berry, riparian vegetation became sparse and there was greater livestock access to the creek. • Previous surveys have found that Broughton Creek provides major fish habitat (Class 1 waterway). The ephemeral tributaries of upper Broughton Creek have been considered unlikely to provide fish habitat (Class 4 waterways), as they only flow during larger rain events, have poorly defined channels with few standing pools and are often colonised by pasture grasses. • Broughton Creek was moderately disturbed (i.e. a moderate RCE score) at the location of each of the three proposed highway bridges that would cross the creek.

Area	Habitat features
	• The results of the AusRivAS assessment showed that Broughton Creek was moderately impacted due to pollution and/or damage to the local habitat. However, Broughton Creek was considered to provide major fish habitat and it is a Category 1 waterway meaning that it provides biodiversity linkages along the riparian corridor. • The Coolangatta Road bridge crossing of Broughton Creek marks the downstream extent of freshwater habitat. It meandered through the Broughton floodplain which has been cleared for agricultural use and the riparian vegetation was thin and sparse. There have been historical flood mitigation works in this area and a number of tributaries of Broughton Creek have been straightened and contain tidal gates. The estuarine section of Broughton Creek has been previously classed as major fish habitat (Class 1 waterway).
Broughton Mill Creek and Bundewallah Creek	• Habitats within the catchments were relatively degraded. Riparian vegetation was sparse or dominated by River Oak and mixed exotic species. • Assessments completed during a prolonged dry period in Bundewallah Creek and Connollys Creek found minimal fish habitat (Class 3 waterway). The sections of Broughton Mill Creek just above and below the point where it joins Bundewallah Creek provided moderate fish habitat (Class 2 waterway). This watercourse had a sequence of pools and riffles, with some large snags and deeper holes. • At the location of the proposed crossing of Broughton Mill Creek, the waterway provided moderate fish habitat and had a moderate RCE score. It is a Category 2 waterway. The results of the AusRivAS assessment showed that Broughton Mill Creek was relatively healthy but showed some signs of pollution and/or local habitat damage. • At the location of the proposed crossing of Bundewallah Creek, the waterway provided moderate fish habitat and had a moderate RCE score. It was also a Category 2 waterway and the results of the AusRivAS assessment showed that Bundewallah Creek was relatively healthy but had some signs of pollution and/or local habitat damage.
Town Creek	• At the location of the proposed diversion of Town Creek, the waterway was ephemeral, had a low RCE score and was unlikely to provide fish habitat. • The catchment was urbanised with riparian habitat that was highly degraded and the creek is classed as a Category 3 waterway. • Reaches of the creek to the north and south of the urbanised reaches had poorly defined channels, with few standing pools and were often colonised by pasture grasses.

The fisheries habitat classification for each of the waterways referred to above is provided in Table 3-5 and shown graphically in Figure 3-3. The locations of the waterway sites are shown in Figure 3-4.

Table 3-5 Fisheries habitat classifications

Waterway	Classification #	Description
Unnamed site 14	Class 4 – unlikely fish habitat	Class 4 – Named or unnamed watercourse with intermittent flow during rain events only, little or no defined drainage channel, little or no free standing water or pools after rain event (e.g. dry gullies or shallow floodplain depression with no permanent wetland aquatic flora present).
Unnamed site 15	Class 4 – unlikely fish habitat	
Unnamed site 19	Class 4 – unlikely fish habitat	
Unnamed site 20	Class 4 – unlikely fish habitat	
Unnamed site 21	Class 4 – unlikely fish habitat	
Unnamed site 23	Class 4 – unlikely fish habitat	
Unnamed site 24	Class 4 – unlikely fish habitat	
Unnamed site 26	Class 4 – unlikely fish habitat	
Unnamed site 28	Class 4 – unlikely fish habitat	

Waterway	Classification #	Description
Unnamed site 29	Class 4 – unlikely fish habitat	
Unnamed site 18	Class 4 – unlikely fish habitat / Class 3 – minimal fish habitat	Class 4 – see above Class 3 – Named or unnamed waterway with intermittent flow and potential refuge, breeding or feeding areas for some aquatic fauna (e.g. fish, yabbies). 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.
Unnamed site 22	Class 4 – unlikely fish habitat / Class 3 – minimal fish habitat	
Broughton Mill Creek site 25	Class 2 – moderate fish habitat	Class 2 – Named permanently or intermittent stream, creek or waterway with clearly defined bed and banks and 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.
Bundewallah Creek site 27	Class 2 – moderate fish habitat	
Broughton Creek site 13	Class 1 – major fish habitat	Class 1 – Major permanently or intermittently flowing waterway (e.g. river or major creek), habitat of a threatened fish species.
Broughton Creek site 16	Class 1 – major fish habitat	
Broughton Creek site 17	Class 1 – major fish habitat	

Classification in accordance with NSW Department of Primary Industries, *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings,* Fairfull and Witheridge, 2003.

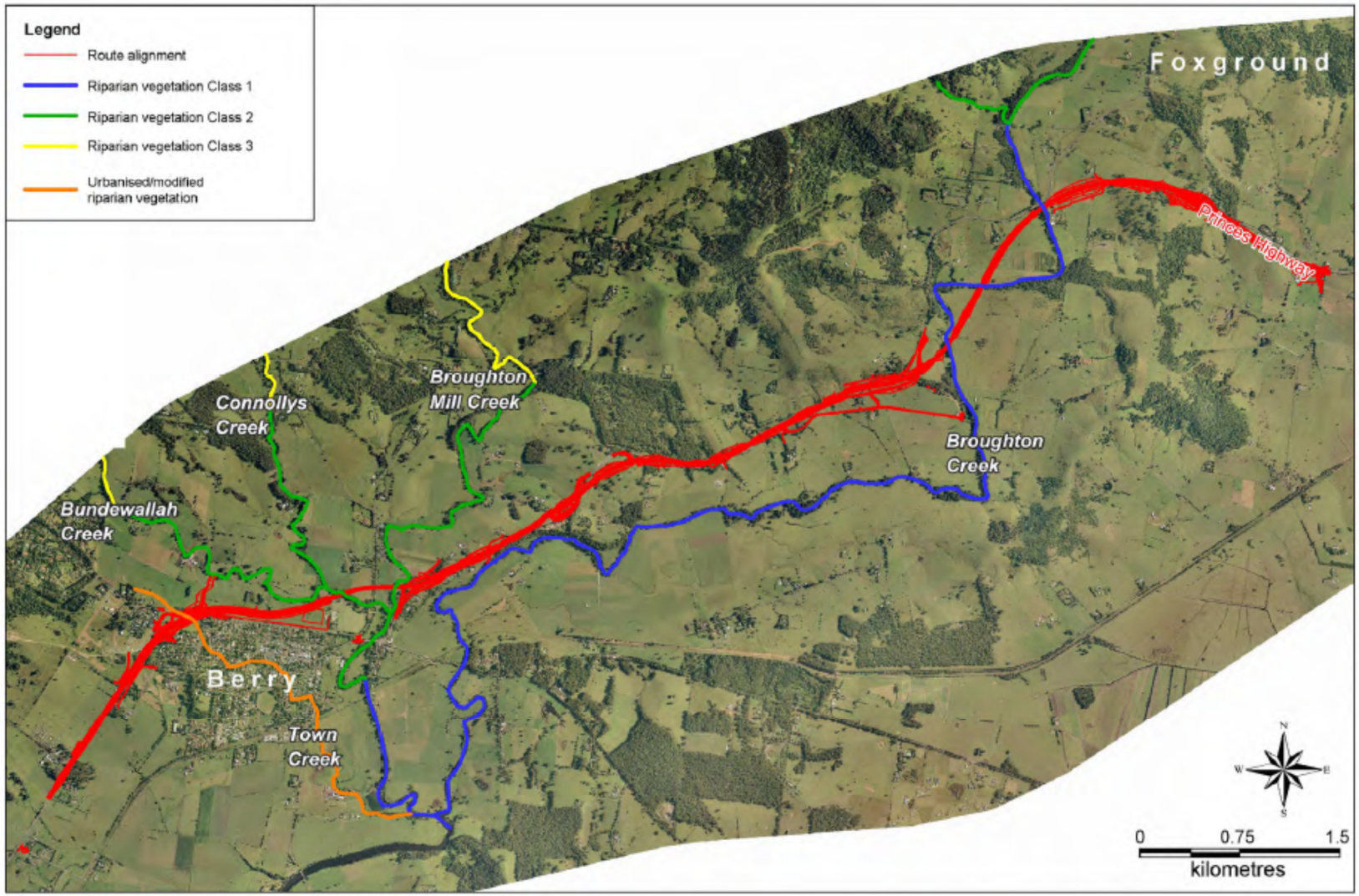

Figure 3-3 Waterway riparian habitat classification

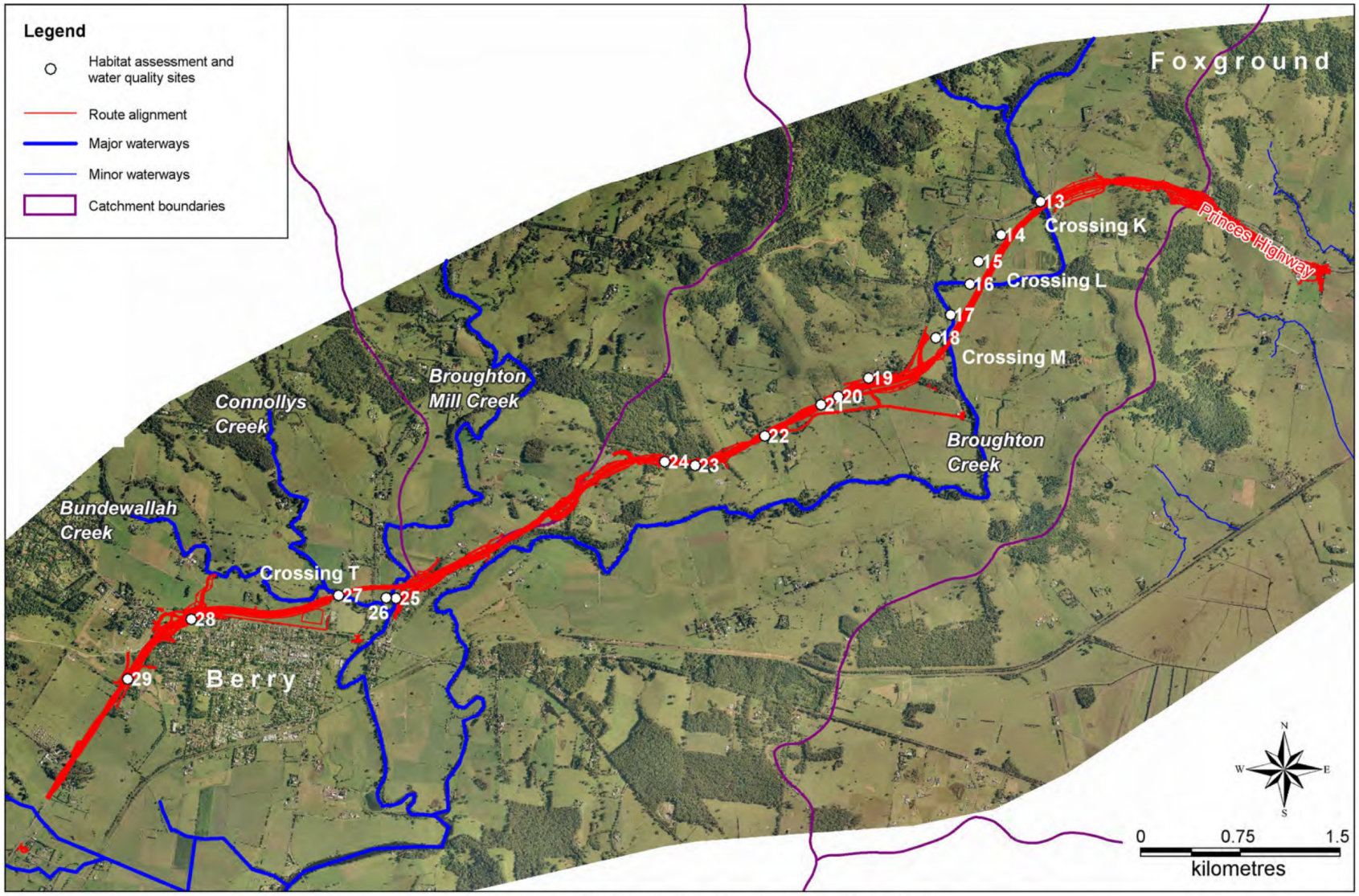

Figure 3-4 Major waterways and sites for fisheries habitat assessment

3.5 *Phytophthora cinnamomi*

Phytophthora cinnamomi is a microscopic soil-borne plant pathogen that can invade and destroy the root systems of susceptible native and introduced plant species. The resultant disease is Phytophthora root rot. Dieback caused by root-rot fungus (*Phytophthora cinnamomi)* is listed as a key threatening process under the *Environment Protection and Biodiversity Conservation Act 1999*.

Phytophthora cinnamomi is spread through movement of spores which may swim to new hosts or be dispersed over large distances in flowing water, such as storm runoff. Some spread within a site may be by mycelial growth from infected roots to roots of healthy plants. Propagules of *Phytophthora cinnamomi* may also be dispersed by:

- vehicles (e.g. cars and earth moving equipment)
- animals (e.g. feral pigs - Shearer & Tippett 1989)
- walkers, and
- the movement of soil.

In all these cases, movement of *Phytophthora cinnamomi* involves infected soil and/or root material (Source: NSW Government Environment & Heritage website http://www.environment.nsw.gov.au/determinations/PhytophthoraKTPListing.htm)

There is little available information about the distribution of *Phytophthora cinnamomi* within the Kiama and Shoalhaven LGAs, and no information about Phytophthora cinnamomi in Section 7.3 of the EA. Currently, there is no evidence of *Phytophthora cinnamomi* in the Project area.

Nevertheless, measures to prevent and reduce the risk of spreading *Phytophthora cinnamomi* in response to CoA B36(b)(iii) are detailed in the *Phytophthora cinnamomi* Procedure in Appendix I of this CFFMP.

4 Environmental aspects and impacts

The key construction activities and the associated potential impacts to flora and fauna were identified through a risk management approach. The consequence and likelihood of each activity's impact on the environment was assessed to prioritise its significance. The results of this risk assessment are included in Appendix A3 of the CEMP.

5 Environmental mitigation measures

Specific mitigation measures to address impacts on flora and fauna are outlined in Table 5-1.

Table 5-1 Flora and fauna mitigation measures

ID	Mitigation Measure	Timing		Responsibility
		PC[1]	C[2]	
GENERAL				
CFFMM1	Manage flora and fauna sites identified to be retained and protected as environmentally sensitive areas. In this regard, erect exclusion fencing and signage to ensure that environmentally sensitive areas are protected in accordance with the RMS *Biodiversity guidelines: Guide 2 – Exclusion Zones* (RTA, 2011) and map these sites on Sensitive Area Plans.	✓	✓	Project / Site Engineers Foreman Environmental Officer Environmental Manager
CFFMM2	Clear vegetation in accordance with the *Clearing and Grubbing EWMS* in Appendix A. This includes the completion of pre-construction surveys (by the Project Ecologist) to verify the construction boundaries/ footprint of the project based on detailed design and to confirm the vegetation to be cleared as part of the project (including tree hollows, threatened flora and fauna species and riparian vegetation). It also includes the issue of a Pre-clearing Permit prior to clearing.	✓	✓	Foreman Environmental Manager Environmental Officer
FRAGMENTATION AND LOSS OF TERRRESTRIAL FAUNA CONNECTIVITY				
CFFMM3	Install fauna underpasses, overpasses (rope crossings), fauna 'furniture and fauna fencing in accordance with the Drawings and *Fauna Crossings Report* (CoA B5) to minimise potential impacts to fauna related to loss of connectivity.		✓	Foreman Environmental Officer
LOSS OF UNEXPECTED EEC/ THREATENED SPECIES				
CFFMM4	In the event that an EEC/ threatened species is identified during pre-construction, pre-clearing survey or construction, incorporate any specific procedures to deal with that species (e.g. re-location, translocation and/or management and protection measures) into this CFFMP as required.	✓	✓	Environmental Manager
CFFMM4A	**GHFF Management Procedures:**			
	• Install No-Go delineation	✓		Environmental Officer
	• Update Sensitive Area Plans, Induction slides and educate workforce via toolbox or EWMS for works within 50m of the camp.	✓	✓	Environmental Manager Environmental Officer
	• Monitoring of the location, extent and the size of the camp will be conducted on a fortnightly basis.		✓	
	• If possible, delay construction works until May.			
	• Conduct observed "simulated construction" trials of limited duration to ascertain any potential impacts prior to proceeding with works within 50m of the camp.	✓		Environmental Officer
	• Consult OEH, RMS & Project Ecologist in regard to any behavioural changes observed during trials.	✓		Environmental Manager

ID	Mitigation Measure	Timing		Responsibility
		PC[1]	C[2]	
	• On the basis of knowledge gained from the trials, undertake works during the day and perform observations of the camp checking for signs of disturbance (e.g. increased noise, agitation, lifting) relative to pre-works behaviour. • If significant disturbance is observed, cease works; consult with OEH, RMS & Project Ecologist and assess potential for alternative construction methodologies. • Consult OEH and RMS in regard to any change to this procedure.		✓ ✓ ✓	Foreman Environmental Officer Foreman Environmental Manager Environmental Manager
CFFMM5	Where an EEC or threatened species is unexpectedly identified during construction, follow the *Unexpected Threatened Species/ EECs Procedure* in Appendix C.	✓	✓	Foreman Environmental Officer
CFFMM6	Where EEC/ threatened species are identified during pre-construction, pre-clearing surveys or unexpectedly during construction, update Sensitive Area Plans with this new information. Also provide required information to RMS to enable update of ecological monitoring and/or biodiversity offset requirements consistent with CoA B7 and B9.	✓	✓	Environmental Manager
LOSS OF ANTICIPATED EEC/ THREATENED SPECIES				
CFFMM7	Provide RMS with the relevant inputs for the *Biodiversity Offset Strategy* (CoA B7) to compensate for the unavoidable loss and residual impact on River-flat eucalypt forest EEC from the Project.	✓		Environmental Manager
LOSS OF NATIVE VEGETATION/ FAUNA HABITAT				
CFFMM8	Install bat roosting and nest boxes in accordance with the RMS *Biodiversity Guidelines: Guide 8 – Nest Boxes.*		✓	Foreman Environmental Officer
CFFMM9	Implement and comply with the requirements of the *Green and Golden Bell Frog Management Report, Nest Box Management Report* and *Bat Management Report* (developed by RMS) as required, subject to the requirements of the *Biodiversity Offset Strategy* (CoA B7).	✓	✓	Environmental Manager
CFFMM10	Install 70% of nest boxes prior to construction and 30% after clearing is complete.	✓	✓	Foreman Environmental Officer
CFFMM11	Complete landscaping in accordance with the UDLP to ensure that local native species are used to stabilise the soil and existing fauna corridors are enhanced (e.g. along Broughton Creek).		✓	Foreman Environmental Manager Environmental Officer
LOSS OF FISH PASSAGE				
CFFMM12	Install temporary bridge structures over all Class 1 and 2 waterways in accordance with the relevant EWMS, prepared in consultation with EPA, DPI (Fishing and Aquaculture) and NOW.		✓	Foreman

ID	Mitigation Measure	Timing		Responsibility
		PC[1]	C[2]	
				Environmental Officer
TERRESTRIAL FAUNA MORTALITY/ INJURY				
CFFMM13	Complete at least one visual inspection of all nest boxes during construction in accordance with the *Ecological Monitoring Program* (by RMS).		✓	Environmental Manager
CFFMM14	Incorporate all monitoring required to comply with the *Green and Golden Bell Frog Management Report, Nest Box Management Report* and *Bat Management Report* (to be developed by RMS), subject to the requirements of the Biodiversity Offset Strategy (CoA B7), into this CFFMP as required.	✓		Environmental Manager
CFFMM15	Where fauna is encountered that requires handling or rescue, follow the *Fauna Handling and Rescue Procedure* in Appendix D		✓	Foreman Environmental Officer
CFFMM16	Remove vegetation overhanging fauna fences. Overhanging vegetation may allow fauna to enter the road reserve.		✓	Foreman
LOSS OF AQUATIC HABITAT				
CFFMM17	Retain stumps in riparian zones and aquatic habitats where practicable to reduce the potential for bank erosion. Even dead stumps and root systems may act to reduce erosion during construction and operation periods.		✓	Foreman Environmental Officer
CFFMM18	Subject to consultation with NOW and DPI (Fishing and Aquaculture), utilise trees removed as a consequence of the project for fish habitat and bank stability within the creeks of the project area.		✓	Foreman Environmental Manager
INVASION OF WEEDS				
CFFMM19	Train staff in the identification and disposal of Alligator Weed.	✓	✓	Environmental Manager
CFFMM20	If Alligator Weed is identified during pre-clearing inspection, regularly inspect and clean heavy machinery before leaving the site to ensure that the species is not spread to new areas.		✓	Foreman
CFFMM21	Report positive identifications of Alligator Weed within the construction footprint to the Environmental Manager. The Environmental Manager will notify Kiama Municipal Council/ Shoalhaven City Council (as applicable).		✓	Foreman Environmental Officer Environmental Manager
CFFMM22	Stockpile in accordance with the *Stockpile Management Protocol* (refer CSWQMP) to ensure that stockpiling is restricted to areas already cleared of vegetation.		✓	Foreman Environmental Officer

ID	Mitigation Measure	Timing		Responsibility
		PC[1]	C[2]	
CFFMM23	Progressively revegetate batters and other disturbed areas with cover crop species to stabilise the soil and provide vegetation cover as a method to control weeds. Use Rye Corn during the months of April to August or Japanese Millet during the months of September to March. Also refer to the UDLP where necessary.		✓	Superintendent Foreman Environmental Officer
REDUCED WATER QUALITY AND LOSS OF FISH				
CFFMM24	For temporary water crossings over all Class 1 and 2 waterways install temporary bridges or other structures approved by DPI (Fishing and Aquaculture) and NOW instead of box culverts to reduce the potential for scouring.		✓	Foreman Environmental Officer
CFFMM25	Follow the relevant EWMS and PESCP for the construction of all temporary bridges to minimise the potential of erosion and sedimentation impacts.		✓	Foreman Environmental Officer
CFFMM26	Locate all refuelling areas at least 50 metres away from waterways. Smaller plant items such as pumps or generators should be refuelled within drip trays or bunds.	✓	✓	Foreman Environmental Manager
CFFMM27	Progressively revegetate batters and other disturbed areas with cover crop species to stabilise the soil and provide vegetation cover as a method to minimise sedimentation of waterways and impacts on fish. Use Rye Corn during the months of April to August or Japanese Millet during the months of September to March. Also refer to the UDLP where necessary.		✓	Superintendent Foreman Environmental Officer
SPREAD OF *Phytophthora cinnamomi*				
CFFMM28	Where there is potential to disturb soils that contain *Phytophthora cinnamomí* (as identified during pre-clearing survey) or to unintentionally import such soil or plant matter from outside the Project area (as identified by OEH), follow the *Phytophthora cinnamomi Procedure* in Appendix I.		✓	Foreman. Environmental Officer

1. PC means pre-construction
2. C means construction

6 Compliance management

6.1 Roles and responsibilities

Fulton Hogan's Project Team organisational structure and overall roles and responsibilities are outlined in Section 4.1 of the CEMP. The roles and responsibilities of the Project Ecologist are detailed below.

6.1.1 Project Ecologist

The environmental responsibilities of the Project Ecologist are to:

- Develop and review procedures for the relocation of fauna habitats; and clearing and grubbing activities
- Review the design of temporary waterway crossings
- Provide advice on threatened species with regards to the design and final locations of fauna crossings
- Undertake pre-construction and pre-clearing surveys
- Undertake joint inspections with Fulton Hogan and RMS
- Complete pre-clearing reports
- Identify suitable fauna release locations (including GPS location) within or near the Project site
- Rescue and relocate fauna identified during pre-clearing surveys
- Conduct a post-clearing abundance and density count of hollow-bearing trees removed to determine the final number and type of hollows removed by the project
- Provide technical advice on design specifications
- Undertake monitoring of native flora and fauna habitats (including installed nest boxes), and
- Be present during clearing activities.

Specific responsibilities for the implementation of mitigation measures are detailed in Chapter 5 of this CFFMP.

6.2 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:

- the requirements of this CFFMP
- relevant legislation
- specific species likely to be affected by the construction works and how these species can be recognised
- Unexpected Threatened Species/ EEC Find Procedure
- Locations of known Threatened species (including GHFF) and relevant access or work restrictions
- fauna rescue requirements
- weed control measures
- general flora and fauna management measures
- ecological monitoring requirements, and

- specific responsibilities for the protection of flora and fauna.

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

6.3 Monitoring and inspections

Regular monitoring and inspections will be undertaken during construction in accordance with Table 6-1. Additional requirements and responsibilities in relation to inspections and monitoring are documented in Sections 8.1 and 8.2 of the CEMP.

Table 6-1 Monitoring and inspection

Monitoring details	Record	Responsibility	Frequency
Inspection of exclusion fencing; exclusion signage; adherence to exclusion zones; and weeds (including Alligator weed) when works are being undertaken in the vicinity.	Environmental Inspection Checklist	Environmental Officer	Weekly
Pre-clearing/ pre-construction survey (Also refer to *Ecological Monitoring Program*)	Pre-clearing Permit Project Ecologist's pre-clearing/ pre-construction survey report	Foreman Environmental Officer	Prior to clearing
Threatened species/ EEC	Unexpected Threatened Species/ EEC Find Procedure	Foreman Environmental Manager	As discovered
Observation of Grey-Headed Flying-Fox camp (Broughton Mill and Bundewallah Creeks)	Conduct attended trial to observe any behavioural impacts caused by proposed construction works. Environmental Inspection Checklist - Monitoring of the location, extent, and the size of the camp Report any significant disturbance of the camp including any irregular behaviour	Environmental Manager Environmental Officer Foreman Environmental Officer	Prior to works within 50m Fortnightly Daily during works within 50m of the camp As discovered
Fauna handling and rescue	Fauna Rescue Event Record	Foreman Environmental Officer	As discovered
Visual inspection of all nest boxes (Refer to *Ecological Monitoring Program*)	Monitoring Results Report	Environmental Officer	At least once

Fulton Hogan will comply with the monitoring requirements of the following reports (developed by RMS), subject to the requirements of the Biodiversity Offset Strategy (CoA B7):

- Green and Golden Bell Frog Management Report (if GGBF observed)
- Nest Box Management Plan (2014)
- Microbat Management Plan (2015) (if bats are identified)

All construction phase monitoring required by the approved Biodiversity Offset Strategy, will be conducted by the project Ecologist as directed by the Fulton Hogan Environmental Manager.

6.4 Non-conformances

Non-conformances will be dealt with and documented in accordance with Section 8.5 of the CEMP.

6.5 Complaints

Complaints will be recorded and addressed in accordance with Section 6.3 of the CEMP and the Community Communication Strategy (CCS).

6.6 Audits

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this CFFMP, CoA and other relevant approvals, licenses and guidelines. Audit requirements are detailed in Section 8.4 of the CEMP.

7 Review and improvement of CFFMP

The CFFMP will be reviewed annually to ensure compliance with legislative requirements and its suitability and effectiveness for the project.

The review may be in the form of:

- a formal management review
- a second party audit, and/or
- an inclusion as a separate item at a site meeting.

The Environmental Manager can review and update the CFFMP more regularly where:

- significant changes in construction activities occur
- where targets are not being achieved, or
- in response to audits and nonconformity reports.

Minor changes to the CFFMP will be approved by the Environmental Representative in accordance with section 1.7 of the CEMP.

Appendix A
Clearing and Grubbing Environmental Work Method Statement

Clearing and Grubbing Environmental Work Method Statement

1. Purpose

The purpose of this environmental work method statement (EWMS) is to describe the clearing and grubbing processes to be implemented throughout the construction phase to minimise the threat to remnant vegetation, farmland and waterways within the local area.

This EWMS must be read in conjunction with the Flora and Fauna Management Sub-plan and Weed Management Plan in Appendix F.

This is a general procedure for the Project, which must be updated and made site-specific for each area or section of works.

2. Scope

This EWMS covers the following activities:

- Identification and protection of trees to be retained, hollow bearing trees, threatened flora and / or fauna
- Identification of weeds to be removed
- Clearing and grubbing
- Topsoil stripping & stockpiling
- Production and stockpiling of mulch
- Re-use and disposal of materials, and
- Regular post-clearing inspections and trimming of trees along exclusion fence.

3. Authorities and Responsibilities

Senior Project Engineers, Project Engineers, Foremen

The Senior Project Engineers, Project Engineers, and Foreman are responsible for:

- implementing the requirements of this EWMS; and
- supervising clearing, grubbing, mulching and stockpiling activities to ensure compliance with the requirements of this EWMS.

Environmental Manager

The Environmental Manager is responsible for:

- preparing and revising area or section-specific clearing and grubbing EWMSs; and
- ensuring that FH employees and subcontractors are trained.

Environmental Officer

The Environmental Officer is responsible for:

- preparing Progressive Erosion and Sediment Control Plans (PESCPs) for each stage and /or area of works and ensuring all necessary erosion and sediment controls are installed prior to commencement of clearing and grubbing works;
- issuing a Clearing and Grubbing Permit prior to commencement of works; and
- inspecting site works daily to ensure adequate environmental controls have been implemented and maintained.

Refer to Section 4.1 of the CEMP for further information on resources, roles, responsibilities and authority.

4. Sequence of operation

Activity	Key Environmental Risks	Standard Environmental Controls	Responsibility	Sign off when complete
Stage 1. Prior to clearing and grubbing				
Timing of works	Injury or mortality of young fauna species due to loss of breeding habitat (e.g. tree hollows) Disruption of fauna breeding cycle	• When programming the works, consider breeding periods of fauna that may be impacted. If possible, avoid clearing during times when these species are breeding.	Construction Manager and Environmental Manager	
Determine presence of *Phytophthora cinnamomí* on the Project or in the locality	Introduction/spread of *Phytophthora cinnamomí* (root-rot fungus) causing threat to native plant species	• The EM/EO must contact OEH prior to the commencement of works to determine if there are any confirmed *Phytophthora cinnamomí* sites on the Project or in the locality, and if so where the soil-borne plant pathogen is located. • If present, follow the *Phytophthora cinnamomí* Procedure.	Environmental Manager	
Mark out construction boundaries/ clearing limits	Vegetation clearing occurs outside the construction boundaries/ clearing limits Loss of native vegetation	• Ensure the Project Ecologist undertakes pre-construction surveys to verify the construction boundaries/ footprint of the project based on detailed design and to confirm the vegetation to be cleared as part of the project (including tree hollows, threatened flora and fauna species and riparian vegetation). • Prior to clearing commencing, develop Sensitive Area Plans that show area/section specific clearing limits and include in this EWMS (G40 Cl 2.4.1) • Delineate all areas beyond these limits as 'no-go' or exclusion zones to minimise impacts to vegetation adjacent to the project. • If additional vegetation is to be removed, refer the proposed variation of scope to the RMS Senior Environmental Officer (SEO) to determine if	Environmental Officer and Project Ecologist/ Foreman	

Activity	Key Environmental Risks	Standard Environmental Controls	Responsibility	Sign off when complete
		additional impact assessment is required. No additional vegetation will be cleared until approval is granted. • Clearly delineate clearing limits on site using highly visible barrier, parawebbing or other similarly robust and durable material as appropriate. The location of the delineation will be checked and verified as correct by a surveyor independent of the parties that installed the delineation at least five (5) working days prior to the commencement of clearing. • Before clearing and grubbing commences, the Environmental Officer, Project Ecologist and RMS will inspect the clearing limits and temporary exclusion fencing to identify opportunities to preserve habitat trees that fall within or are likely to be affected by the clearing limits. During this inspection any trees outside the limits of clearing but inside the road reserve, which are unsound and likely to fall upon the roadway or onto private property, will be identified. These trees will be cleared or pruned in accordance with AS 4373 (G40 Cl 2.4.1)		

Pre-clearing survey	Damage to threatened flora and fauna not identified during the survey	• A pre-clearing survey will be undertaken by the Project Ecologist to:
		  • Identify the species and location of any weeds present in the area to be cleared and grubbed
		  • Identify the presence or evidence of the presence (including fresh scats, scratches and remains of prey) of fauna, including threatened species.
		  • Identify and fence off the location of threatened flora species, EECs, bushrock, trees adjacent to fauna underpasses, creeks and waterways that have been marked or otherwise identified for preservation, including for cultural heritage reasons
			Environmental Officer and Project Ecologist	

Activity	Key Environmental Risks	Standard Environmental Controls	Responsibility	Sign off when complete
		• Identify any trees outside the limits of clearing which are unsound and likely to fall upon the roadway or onto private property • Provide a final check for any EEC/ threatened species that may have moved into the area since undertaking previous surveys. Where an EEC/ threatened species is identified, the Project Ecologist will determine any additional mitigation measures and/or specific procedures (e.g. relocation/ translocation) required. • Confirm that any additional mitigation measures and/or relocation/ translocation to deal with EEC/ threatened species identified during pre-clearing survey have been carried out. • Identify suitable fauna release locations within or near the Project site. Identify GPS location and habitat type of each relocation point. • Identify any *Phytophthora cinnamomi*-induced dieback and thus the presence of *Phytophthora cinnamomí* on the Project. If present, follow the *Phytophthora cinnamomí* Procedure. • Clearly mark and record all habitat trees (e.g. hollow bearing trees, potential hollow bearing trees and all other fauna containing habitat trees, including trees with nests, dreys and termitaria likely to be occupied by fauna) within the clearing zone at least 7 days prior to the commencement of clearing and ensure no previously identified or new threatened species are present. • For all habitat trees record the following tree characteristics: • GPS location, species, height, diameter, number of hollows and overall health of each hollow bearing tree.		

Activity	Key Environmental Risks	Standard Environmental Controls	Responsibility	Sign off when complete
		• For each hollow identified the position in tree (e.g. trunk, dead branch, spout) and entrance diameter of hollow. • Other information e.g. signs of occupancy • During and on completion of the clearing operations the total number and type of hollows removed will be recorded. • Provide advice on the potential reuse of felled habitat trees and woody debris, in accordance with *Guide 5: Re-use of woody debris and bushrock* of the RMS *Biodiversity Guidelines* (RTA 2011)		
Notify community	Community complaints	• Advise all residents with the potential to be disturbed by the construction activities and obtain relevant property access permits **5 business days before the proposed activity**. Refer to Section 7.2 of the CCS.	Communications Manager	

Erosion and sediment control planning	Adverse impact on water quality due to sedimentation, loss of or damage to aquatic habitat	• Prepare section/area specific PESCPs and submit with the relevant Hold Point to Project Verifier (PV) (G38 Cl 3.1).
		• Prepare PESCPs consistent with:
		  • Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition (Landcom, 2004);
		  • *Managing Urban Stormwater: Soils and Construction*, *Vol*ume *2A* Installation of services (Department of Environment and Climate Change, 2008); and
		  • *Managing Urban Stormwater: Soils and Construction,* Volume 2D Main road construction (Department of Environment and Climate Change, 2008). (MCoA C20; G38 Cl 3.1.2).
			Environmental Officer	

Monitoring program	Adverse impact on water quality due to sedimentation,	• Refer to the *Water Quality Monitoring Program* and soil and water quality mitigation measures provided in the CSWQMP.	Environmental Officer	

Activity	Key Environmental Risks	Standard Environmental Controls	Responsibility	Sign off when complete
	loss of or damage to aquatic habitat			
Training	Pollution of waterways due to untrained staff or subcontractors undertaking the works	• Train all construction personnel, including subcontractors, involved in works in waterways in this EWMS. In addition, hold toolbox talks and pre-start meetings prior to commencement of the works covering the following topics: • The importance of using the nominated access routes. • The importance of observing 'no-go' zones. • Threatened aquatic flora and fauna species, where applicable. • Dewatering protocols.	Environmental Officer and Foreman	
Permit to Work in Waterways	Proceeding with the works without approvals	• Issue Works in Waterways Permit once all the requirements of Stage 1 of this EWMS are met.	Environmental Manager or delegate	
Stage 2. Construction Works – clear, grub, topsoil stripping, mulching, stockpiling activities				
Accessing the site	Damage to riparian flora	• Determine and clearly mark access to the works. • Use only the marked routes to access the area of works. • Ensure the access will be possible for the duration of the works and the works can be fully completed and not postponed in a partially completed state.	Foreman	
Clearing/ grubbing	Damage to riparian flora or vegetation to be retained Fauna injury/ mortality	• Identify and protect areas of vegetation to be retained showing them as exclusion zones or 'no-go' areas, in accordance with *Guide 2: Exclusion zones* of the RMS *Biodiversity Guidelines* (RTA 2011)	Foreman/ Environmental Officer	

Activity	Key Environmental Risks	Standard Environmental Controls	Responsibility	Sign off when complete
	Introduction/spread of *Phytophthora cinnamomí* (root-rot fungus) causing threat to native plant species	• If identified as present as part of the pre-clearing survey, follow the *Phytophthora cinnamomí* Procedure. • Complete the Pre-clearing Permit. • Implement a two-staged approach to clearing. • Remove non-habitat trees at least 48 hours before habitat trees are removed, unless otherwise agreed with OEH and DPI (Fishing and Aquaculture). • Leave felled trees for a short period of time, as determined by the Project Ecologist, on the ground to give any fauna trapped in the trees an opportunity to escape. • Project Ecologist to assess habitat trees and implement Fauna Handling and Rescue Procedure as required • Conduct a post-clearing abundance and density count of hollow-bearing trees removed to determine the final number and type of hollows removed by the project. • Minimise removal of native riparian vegetation, where practicable. • Consider lopping first where large woody debris is encountered; then consider relocation of the woody debris. Adopt removal only as a last resort. • Reuse felled habitat trees and woody debris in consultation with the Project Ecologist and in accordance with *Guide 5: Re-use of woody debris and bushrock* of the RMS *Biodiversity Guidelines* (RTA 2011). • If Alligator Weed is identified during the pre-clearing inspection, regularly inspect and clean heavy machinery before leaving the site to ensure that species is not spread to new areas. Click ***here*** for more information on Alligator Weed. In addition, report positive identifications of Alligator		

Activity	Key Environmental Risks	Standard Environmental Controls	Responsibility	Sign off when complete
		Weed within the construction area to Kiama Municipal Council/ Shoalhaven City Council (as applicable).		
Installation of erosion and sediment controls	Adverse impact on water quality due to sedimentation, loss of or damage to aquatic habitat	• Ensure the installation of all erosion and sediment controls in accordance with the approved PESCP prior to commencement of any works in waterways.	Foreman	

Using machinery	Disturbance to the community resulting in noise complaints	• Undertake construction activities during standard working hours:
		  • 7:00am to 6:00 pm Monday to Fridays, inclusive; and
		  • 8:00am to 1:00pm Saturdays; and
		• at no time on Sundays or public holidays.
			Foreman	

Temporary waterway crossings	Adverse impact on water quality due to sedimentation, loss of or damage to aquatic habitat
	
	Obstruction of fish passage
	
	Flooding
	
	Fuel/chemical spill
		Design
		• Ensure that temporary waterway crossings are designed to ensure safe access and minimal risk to an adverse impact on water quality.
		• Ensure that all temporary water crossings are designed by a suitably qualified engineer, in consultation with DPI (Fishing and Aquaculture).
		• All designs should consider:
		  • Hydrology of the catchment and potential to cause flooding;
		  • The ability to not be eroded or washed away by flows;
		  • Stability under the expected vehicle loads, and
		  • Fish and other fauna movements.
		Construction
		• Prior to starting construction, install downstream sediment traps where there is potential for sediment to be disturbed during construction.
			Project Engineer/ Environmental Manager	

Activity	Key Environmental Risks	Standard Environmental Controls	Responsibility	Sign off when complete

		• Ensure that spill kits are readily available.
		• Carry out refuelling of plant and equipment, chemical storage and decanting at least 50m away from aquatic habitats (SWTC Appendix 4 Cl 4.9(k).
		• Install downstream sediment traps during low-water flow conditions.
		• Monitor the area for entrainment of sediment during installation and removal of sediment traps.
		• Protect the crossing against erosion to prevent excessive sedimentation or washout of the crossing.
		• Position the crossing perpendicular to the flow and at the narrowest part of the waterway.
		• Locate stockpiles at least 50m from a waterway where, in SWTC Appendix 4 Clause 4.32, a 'waterway' is defined as:
		  • Any Class 1 or Class 2 fish habitat (as described in the NSW Fisheries guidelines); and
		  • Waters that are used for the purposes of human consumption.
		• Avoid damage to the waterway bed and banks.
		• Divert drainage from access routes away from the waterway crossing.
		• Ensure that drainage over the surface of the waterway crossing has adequate controls to ensure that sediment run-off to the stream is minimised.
		• If a cofferdam is used, maintain minimum downstream flows to sustain the aquatic ecology and ensure cofferdam installation and the pumping process does not stir up sediment.		

Activity	Key Environmental Risks	Standard Environmental Controls	Responsibility	Sign off when complete
Rehabilitation of the waterway	Adverse impact on water quality due to sedimentation, loss of or damage to aquatic habitat	• Following the removal of temporary waterway crossings, rehabilitate stream bed and banks in accordance with the Urban Design and Landscape Plan.	Foreman/ Environmental Officer	

Pre-clearing Permit

General Instructions

1. This permit is valid only for the scope of works specified below
2. This copy is to be retained by the relevant persons authorised to supervise work crews and/or contractors
3. Management must retain a copy
4. Standard work method statements must apply where relevant
5. Additional environmental controls must be implemented as listed in Part D of this permit
6. Managers and supervisors are responsible for advising their crew members of the additional environmental controls applicable to the works as listed in Part D of this permit

PART A. DESCRIPTION OF WORKS	To be completed by Permit Recipient
Date: / /	Project:
Location: Chainage:	
Company/Organisation conducting the work:	
Name of Permit Recipient:	
Date Clearing is to Commence: / /	
Brief Description of Work:	
Machinery to be used:	
Sensitive Area Plans for work area attached:	

PART B. PLANNING CHECKLIST	**Yes**	**No**	**N/A**	**Comments** include any details discussed with other parties
Has the general Clearing and Grubbing EWMS been revised for these works?	☐	☐	☐	
Has pre-clearing inspection of the area been undertaken by the Environmental Officer in conjunction with Project Ecologist and RMS?	☐	☐	☐	
Has the Hold Point (2.4.3 of G40) been submitted to and released by PV?	☐	☐	☐	
Have all necessary approvals and permits for the works been obtained from the following organisations (where applicable)? ❒ Kiama Municipal Council ❒ Shoalhaven City Council ❒ EPA ❒ Other (specify)	☐	☐	☐	
Have all necessary erosion and sediment controls been installed as per Progressive ESCP?	☐	☐	☐	

PART B. PLANNING CHECKLIST	Yes	No	N/A	Comments include any details discussed with other parties
Have community notifications (letterbox drop, etc) been completed?	☐	☐	☐	
Will access to private properties be maintained during the works *(If no, refer to section 7.2 of the Community Communication Strategy)*?	☐	☐	☐	
Have arrangements been made for Project Ecologist to observe the works?	☐	☐	☐	
Has Project Ecologist marked all habitat trees and recorded habitat tree characteristics (e.g. GPS location, species, height, diameter, number of hollows, overall health of each hollow-bearing tree)?	☐	☐	☐	

PART C. ADDITIONAL ENVIRONMENTAL CONTROLS

(as per Project Ecologist's recommendations or other environmental assessments)

List relevant environmental safeguards here. *Include all additional environmental controls and communicate these at the toolbox meeting, to the crew members, subcontractors and any other relevant parties, prior to the commencement of the works. Ensure crews and subcontractors know the locations of the exclusion zones as shown on the Sensitive Area Plans.*

Activity	Environmental Controls	Reference *(i.e. Ecologist's report, consultation with RMS, community or other)*

PART D. APPROVAL

I understand and accept all conditions stated in this permit and any associated permits. I will ensure that all conditions are strictly adhered to by myself and colleagues.

Name of Permit Holder……..Signature: ..... Date: .....Time:…….

Approval is granted for the work listed above by the Environmental Officer. All conditions of this permit and any associated permits have been fully explained to the permit holder.

Name of approver: .....Signature: ..... Date: ..... Time: .....

Appendix B
Potential threatened flora species identification guide

Potential threatened flora species identification guide

Species	TSC Act conservation status	EPBC Act conservation status	Picture	Source/ Reference
White-flowered Wax Plant (Cynanchum elegans)	Endangered	Endangered	 Flowers and foliage	http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10196)
Illawarra Socketwood (*Daphnandra Sp. 'Illawarra'*)	Endangered	Endangered	 Flower	http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10201)

Species	TSC Act conservation status	EPBC Act conservation status	Picture	Source/ Reference
Delicate Cress (*Irenepharsus trypherus*)	Endangered	Endangered	 Flower and foliage	http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10437)
Hill Zieria (Zieria granulata)	Endangered	Endangered	 Flowers and foliage	http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10856)

Species	TSC Act conservation status	EPBC Act conservation status	Picture	Source/ Reference
Illawarra Greenhood (*Pterostylis gibbosa*)	Endangered	Endangered	 Flower	http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10701)
Leafless Tongue Orchid (*cryptostylis hunteriana*)	Vulnerable	Vulnerable	 Leafless Tongue Orchid	http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10187

Species	TSC Act conservation status	EPBC Act conservation status	Picture	Source/ Reference
Bauer's Midge Orchid (*genoplesium baueri*)	Endangered	Endangered	 Bauer's Midge Orchid	http://www.retiredaussies.com/ColinsHome%20Page/OrchidsNSW/Genoplesium/Genoplesium%20baueri/Genoplesium%20baueri%20Brittle%20Midge%20Orchid.htm)

Appendix C
Unexpected Threatened Species/ EEC Find Procedure

Unexpected Threatened Species/ EEC Find Procedure

1. Purpose

This procedure details the actions to be taken when a threatened flora or fauna species / EEC is unexpectedly encountered during excavation / construction activities.

2. Scope

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

Where threatened fauna is unexpectedly encountered that requires handling or rescue refer to the Fauna Handling and Rescue Procedure (Appendix D of this CFFMP).

3. Induction / Training

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

4. Procedure

The Environmental Manager (EM) is responsible for implementing this procedure.

1. Threatened species/ EEC unexpectedly encountered during excavation/ construction activities
If a threatened species / EEC is unexpectedly encountered during excavation / construction activities: • STOP ALL WORK in the vicinity of the find. • Immediately notify the Environmental Manager (EM) or Environmental Officer (EO) who will notify the Project Ecologist, ER, RMS Representative. The RMS Representative will then contact the relevant agencies as required. For contact details, refer to the Contacts list on page ii of the CEMP.
2. Assessment of Impact
An assessment is to be undertaken by the EM and the Project Ecologist to identify the plant or animal to species level and the likely impact to the threatened species / EEC and appropriate management options, such as re-location measures, developed in consultation with RMS.
3. Approvals
Obtain any relevant licences, permits or approvals required if the threatened species / EEC is likely to be significantly impacted.
4. Recommencement of Works
Construction works may recommence once the Environmental Manager has: • obtained approvals as required, and • confirmed that all corrective actions and additional mitigation measures have been implemented. The Environmental Manager must also: • Ensure that the threatened species / EEC is included in subsequent Sensitive Area Plans, Project Inductions and Toolbox Talks.

- Provide information to RMS to enable update of ecological monitoring and/ or biodiversity offset requirements consistent with CoA B7 and B8

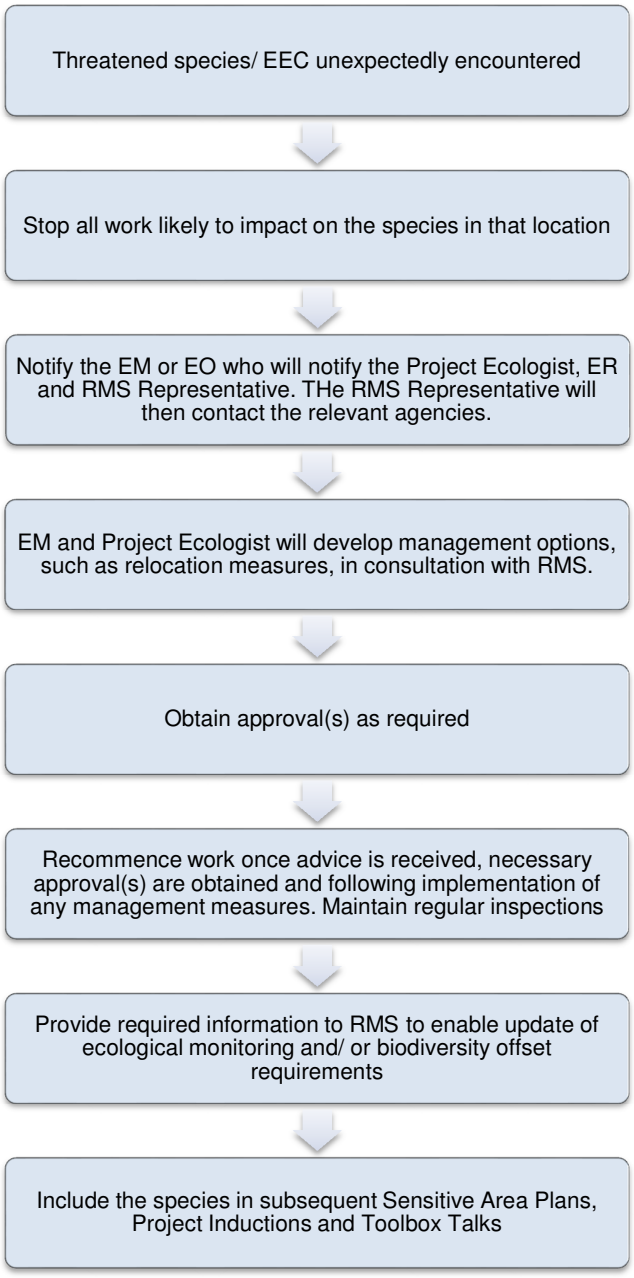

Figure 7-1 Unexpected Threatened Species/ EEC Find Procedure Flow Chart

Appendix D
Fauna Handling and Rescue Procedure

Fauna Handling and Rescue Procedure

1. Purpose

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

2. Scope

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

Where a threatened fauna species is unexpectedly encountered during construction activities refer to the Unexpected Threatened Species/ EEC Find Procedure (Appendix C of this CFFMP).

3. Induction and training

All site personnel and subcontractors will be made aware of the actions to be taken in the event that fauna is discovered on the project. This training will occur on site during the Project induction and as required in toolbox talks.

4. Procedure

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

1. Stop all work in the vicinity of the fauna and immediately notify the Foreman who is then to notify the Environmental Manager or Environmental Officer. The EM is then to notify the Project Ecologist.
2. Preferably allow fauna to leave an area without intervention if it is not injured or in shock and if safe to do so (i.e.no machinery in the immediate vicinity).
3. Call the appropriate rescue agency immediately and follow any advice provided by the agency. Once the rescue agency arrives at the site, they are responsible for the animal. Any decisions regarding the care of the animal will be made by the rescue agency. The licensed fauna ecologist, rescue services and local veterinary surgeries contact details are as follow:

Agency / business	Contact Number
Project Ecologist	*NGH Environmental – Raphael Morgan 0437 361 898*
Wildlife Rescue South Coast	0418 427 214
RSPCA Shoalhaven shelter 114 Flatrock Road Mundamia NSW 2541	02 4429 3410
RSPCA Lost, stray and found animals	02 9770 7555
Veterinary Services	*Berry Veterinary Clinic* :(02) 4464 1899

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.

4. Where necessary, to minimise stress to native fauna and/or remove the risk of further injury before appropriate rescue agency arrives onsite, the Environmental Officer shall:

(a) Cover larger animals with a towel or blanket and place in a cardboard box and/or hessian bag;
(b) Place smaller animals in a cotton bag, tied at the top;
(c) Keep the animal quiet, warm, ventilated and in a dark location away from noisy construction activities; and
(d) Aquatic fauna to be placed in plastic aquaria or plastic bag with sufficient amount of water. Frogs would be transported without water or debris in recognition of the risk of transporting disease and the minimal transport time.

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 Rescue South Coast representative(s)

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

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

i. Thoroughly cleaning/disinfecting footwear and equipment when moving from one site to another;
ii. Where necessary in high risk areas, spraying/flushing vehicle tyres with a disinfecting solution;
iii. Cleaning/disinfecting hands between collecting samples/frogs (preference would be given to using bags, rather than bare hands to handle frogs); and
iv. Limiting one frog or tadpole to a bag. Bags should not be reused.

5. If the animal cannot be handled (i.e. venomous reptiles):

   (a) Exclude all personnel from the vicinity with fencing and/or signage; and
   (b) The exact location of the animals is to be recorded and provided to the Project Ecologist or appropriate rescue agency (i.e. Wildlife Rescue South Coast).

6. If the fauna species is identified as a threatened species that is not a species identified in the CFFMP, the Environmental Officer or Environmental Manager must:

   (a) Immediately cease all work likely to affect the threatened species.
   (b) If the fauna is injured call Wildlife Rescue South Coast 0418 427 214.
   (c) Implement the Unexpected Threatened Species/ EEC Find Procedure (Appendix C of this CFFMP).

7. If the fauna is to be released, the Project Ecologist must identify suitable fauna release locations within or near the Project site. NOTE: uninjured animals are to be released into adjacent suitable habitat.

8. Environmental Manager to record find in RMS Environmental Incident Report where required following consultation with the RMS Representative. All relevant characteristics of the fauna find should be recorded to the extent practicable (i.e. visual signs of behaviour; habitat; health signs; sex, time date, weather etc.).

9. Following consultation with all relevant stakeholders, the Environmental Manager shall implement any corrective actions and additional safeguards.

10. Following confirmation by the Environmental Manager that all appropriate safeguards have been implemented, construction works shall recommence.

11. All fauna handling/ rescue events will be recorded on the Fauna Rescue Event Record (Appendix E of this CFFMP).

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Appendix E
Fauna Rescue Event Record

Fauna Rescue Event Record

Item	Detail
Date fauna located	
Time fauna located	
Location (ie chainage, habitat (in tree hollow, under stockpile, in open grass, near culvert etc)	
Fauna type (e.g. possum, bird, snake etc)	
Species (if known)	
Is the fauna injured? (yes or no)	
If the fauna is injured complete this section	
What time was the fauna specialist called?	
What time did the fauna specialist arrive?	
Fauna specialist name and contact Note: No person is to handle a bat unless they are trained and have the relevant health vaccinations.	
What was the outcome of calling the fauna specialist?	
If the fauna is not injured complete this section	
NOTE: uninjured animals are to be released into adjacent suitable habitat. Where was the fauna relocated?	
Name and qualification of fauna handler	
Any other comments:	

Note: Fauna specialist - Fauna spotter/ catcher, fauna carer/ snake catcher or similar (e.g. vet surgery).

Completed by:

Date: / /

Related sub-plan: Construction Flora and Fauna Management Sub-plan

File in Fauna records

Appendix F
Weed Management Plan

Weed Management Plan

1. Purpose

The purpose of this Weed Management Plan (WMP) is to detail how Fulton Hogan will manage and control weeds throughout pre-construction, construction and for a period of the maintenance phase of the Project to minimise the threat to remnant vegetation, native flora and fauna habitats and waterways within the local area.

This WMP has been prepared by Brett Morrisey, Consultant Botanist of Biosis Wollongong Office. Brett is a qualified and experienced ecological consultant with formal qualifications and experience in bush regeneration as required by RMS *Specification D&C G40 Clearing and Grubbing.*

This WMP does not provide the detail for weed management for restoration and rehabilitation areas as this will be provided as part of the Vegetation Management Plan within the UDLP.

2. Scope

Weed management will be implemented to control weed infestation on the Project and to limit the introduction and/or spread of weed species during construction activities.

Noxious and environmental weeds in the existing road corridor, construction areas and Ancillary Facility areas will be controlled in accordance with RMS *Biodiversity Guidelines: Guide 6 - Weed management* and *Guide 10 - Aquatic habitats and riparian zones* (RTA, 2011). Weed control, generally, will have a strong focus on:

- restricting the area of native vegetation disturbed during construction works by application of RMS *Biodiversity Guidelines: Guide 2 Exclusion zones* (RTA 2011)
- restricting stockpiling to areas already cleared of vegetation
- controlling drainage that may contain weed propagules
- weed hygiene protocols including inspecting and cleaning light and heavy plant and equipment; inspecting materials brought to site, especially topsoil, turf and mulch to ensure that these are weed-free;
- removing weeds prior to clearing (where practicable), in order to reduce the potential for any future weed infestation
- revegetating disturbed sites with locally indigenous plant species to stabilise the soil and provide native vegetation cover as a method of ongoing weed control.

This WMP must be read in conjunction with the Project specific Clearing and Grubbing Environmental Work Method Statement.

3. Induction and training

All site personnel and subcontractors will be inducted in the existence of noxious weeds on the Project, and management procedures for weeds. This training will occur on site during the Project induction and as required in toolbox talks.

Where work is scheduled in an area that contains weeds, personnel will be advised of this in toolbox talks. The controls that are required to be implemented to minimise weed spread (i.e. weed hygiene protocols) will be implemented prior to clearing and grubbing or ground disturbance.

All site personnel will be made aware of the limits of clearing and the importance of threatened species and populations and any vegetation of significant value.

4. Weeds overview

Weeds are often classed in broad groups depending on their characteristics and impacts. The main groups of weeds are: noxious weeds, Weeds of National Significance (WONS), National Environmental Alert List weeds, environmental weeds and agricultural weeds. The focus of this procedure is on the first four weed groups. These are discussed below, followed by the weed control procedure.

5. **Noxious weeds**

Noxious weeds are plants declared under section 7 of the *Noxious Weeds Act 1993* to be a noxious weed. The full list of noxious weed species in the Kiama Municipal Council and Shoalhaven City Council areas, and their classification are available from the NSW Department of Primary Industries' Biosecurity website http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/noxweed.

The *Noxious Weeds Act 1993* sets out the regulatory framework for controlling noxious weeds in NSW. Table 7-1 details the five noxious weed control classes that may be applied by a weed control order.

As provided for under the *Noxious Weeds Act 1993* the Illawarra District Noxious Weeds Authority (IDNWA) is the Local Government body empowered to control noxious weeds in the Kiama local government area (LGA) and including the Wollongong and Shellharbour LGA's. The IDNWA is a local control authority and is responsible for controlling noxious weeds on all council owned lands including certain roadsides and vacant Crown land. It is also responsible for the inspection of private property for noxious weed infestations and the giving of directions and advice to landholders or occupiers so that adequate control is maintained. Shoalhaven City Council is the local control authority for Shoalhaven LGA.

Table 7-1 Classes of noxious weeds

Control Class	Characteristics	Example Control Requirements
Class 1: State Prohibited Weeds	Plants that pose a potentially serious threat to primary production or the environment and are not present in the State or are present only to a limited extent.	The plant must be eradicated from the land and the land must be kept free of the plant. The weeds are also "notifiable" and a range of restrictions on their sale and movement exist.
Class 2: Regionally Prohibited Weeds	Plants that pose a potentially serious threat to primary production or the environment of a region to which the order applies and are not present in the region or are present only to a limited extent.	The plant must be eradicated from the land and the land must be kept free of the plant. The weeds are also "notifiable" and a range of restrictions on their sale and movement exist.
Class 3: Regionally Controlled Weeds	Plants that pose a serious threat to primary production or the environment of an area to which the order applies, are not widely distributed in the area and are likely to spread in the area or to another area.	The plant must be fully and continuously suppressed and destroyed.
Class 4: Locally Controlled Weeds	Plants that pose a threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area.	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.
Class 5: Restricted Plants	Plants that are likely, by their sale or the sale of their seeds or movement within the State or an area of the State, to spread in the State or outside the State.	There are no requirements to control existing plants of Class 5 weeds. However, the weeds are "notifiable" and a range of restrictions on their sale and movement exists.

Source: adapted from www.dpi.nsw.gov.au

Eight exotic species that are listed as noxious weeds in the Shoalhaven LGA were recorded in the study area, three of which are also listed as noxious in the Kiama LGA. Table 7-2 provides a list of the noxious weeds recorded in the study area, the weed class to which they belong, a picture, and the DPI website where additional up-to-date information can be found on control and management methods. Further reference can be made to *Noxious and environmental weed control handbook: A guide to weed control in non-crop, aquatic and bushland situations, 5th Edition.* (DPI 2011) for the following and any additional noxious weed species.

Table 7-2 Noxious weeds recorded in the study area

Weed Species	Weed Class[2]	Picture	Website for control and management details
Mistflower (*Ageratina riparia)*	4	 Habitat prior to flowing (source: http://keyserver.lucidcentral.org)  Habit in flower (source: http://keyserver.lucidcentral.org)	http://www.dpi.nsw.gov.au/
Lantana (*Lantana camara)* [1]	4	 Flower clusters in leaf forks (source: http://keyserver.lucidcentral.org)	http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles/lantana

Weed Species	Weed Class[2]	Picture	Website for control and management details
Large-leaved privet (*Ligustrum lucidum)*	4		http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles/privet
Small-leaved privet (*Ligustrum sinense)*	4		http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles/privet
Blackberry complex (*Rubus fruiticosus*[1]	4	 Blackberry leaf and fruit (source: http://www.daff.qld.gov.au/plants/weeds-pest-animals-ants/weeds/a-z-listing-of-weeds/photo-guide-to-weeds/blackberry)	http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles/blackberry

Weed Species	Weed Class[2]	Picture	Website for control and management details
Fireweed (*Senecio madagascariensis)*	4		http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles/fireweed
Crofton weed (*Ageratina adenophora)*	4		http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles/crofton-weed
Willow (*salix species (*Includes all Salix species except S. babylonica, S. x reichardtii, S. x calodendron))[1]	5		http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles/willow

[1] Listed as noxious in Kiama LGA
[2] See Table 7-1 for example control requirements.

It is noted that there appears to be discrepancies between the summary information provided in the main body of the EA, and that provided within the terrestrial flora and fauna technical paper (Appendix F of the EA). For example, Table 7-48 of the EA provides that African

boxthorn (*Lycium ferocissimum*) was recorded in the study area, but this is not reflected in the flora results provided in Appendix A of Appendix F of the EA. In addition, Crofton weed (*Ageratina adenophora*) and Willow (*salix species*) are not identified in Table 7-48 of the EA, yet both of these species were recorded in the study area as part of the flora results provided in Appendix A of Appendix F of the EA.

For the purpose of this Weed Management Plan, the accuracy of the information provided in the terrestrial flora and fauna technical paper has been relied upon. Further to this the implementation of this WMP will involve a site inspection by the Environmental Manager/EO who will undertake a 'joint inspection' with the Project Ecologist and RMS Representative to inspect the area for weeds. The FH Environmental team will also coordinate site inspections by the respective council weed management authorities to assist in the identification of noxious weeds and to gain recommendations on approved forms of control. Additionally, the project team will be supported by a specialist weed management subcontractor, who will perform weed management tasks seasonally or as required. In the instance of any new, infestations of noxious weeds or WONS, the areas will be mapped with by the Project Ecologist or specialist subcontractor including noting the specie(s) degree of infestation and capturing an image for monitoring purposes.

Alligator weed

Alligator weed (*Alternanthera philoxeroides*) was not observed at any site within the study area and no records were found for its occurrence. Notwithstanding, this species is known to be present within the Illawarra region. Alligator weed is a Class 2 noxious weed in the Shoalhaven and Kiama LGAs, and is a WON. It poses a significant environmental and economic threat and is highly invasive. As such, the Project must be kept free of alligator weed and it must be eradicated when identified. Periodic inspections will be undertaken around the project waterways in conjunction with the relevant weed authorities to confirm the absence of Alligator Weed.

All environmental staff will be trained in the identification of alligator weed. Positive identifications of alligator weed within the construction area must be reported to Kiama Municipal Council and Shoalhaven City Council. Refer to Figure 7-2 Alligator weed (Source: http://www.dpi.nsw.gov.au) for pictures of Alligator weed and to the DPI website http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles/alligator for additional up-to-date information on control and management measures.

Figure 7-2 Alligator weed (Source: http://www.dpi.nsw.gov.au)

6. Weeds of National Significance (WONS)

Weeds of National Significance (WONS) are nationally agreed priority plant species for control and management. Species are selected based on their high rankings for invasiveness, potential to spread, and impact on socioeconomic and environmental assets. Thirty two WONS have been identified by Australian governments, including those listed in Table 7-3. A list of 20 WONS was endorsed in 1999 and a further 12 were added on 20 April 2012. (Source: Australian Government Weeds in Australia website, http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html).

Table 7-3 WONS

WON	WON
Alligator weed (*Alternanthera philoxeroides*)	Mesquite (*Prosopis species)*
Athel pine (*Tamarix aphylla)*	Mimosa (*Mimosa pigra)*
Bitou bush (*Chrysanthemoides monilifera* subspecies *rotundata)* / boneseed (*Chrysanthemoides monilifera ssp. monilifera)*	Parkinsonia (*Parkinsonia aculeate)*
Blackberry (*Rubus fruticosus agg.species)*	Parthenium weed (*Parthenium hysterophorus)*
Bridal creeper (*Asparagus asparagoides)*	Pond apple (*Annona glabra)*
Cabomba (*Cabomba caroliniana)*	Prickly acacia (*Acacia nilotica*)
Chilean needle grass (*Nassella neesiana)*	Rubber vine (*Crytostegia grandiflora*)
Gorse (*Fabaceae* family)	Salvinia (*Salvinia molesta*)
Hymenachne (*Hymenachne amplexicaulis)*	Serrated tussock (*Nassella trichotoma)*
Lantana (*Lantana camara)*	Willow (*salix spp.)*
African boxthorn (*Lycium ferocissimum)*	Gamba grass (*Andropogon gayanus)*
Asparagus weeds (*Asparagus aethiopicus)*	Madeira vine (*Anredera cordifolia*
Bellyache bush (*Jatropha gossypiifolia)*	Prickly pear *(Opuntia* species except *O. ficus-indica)*
Brooms (*Fabaceae* family)	Sagittaria (*Sagittaria platyphylla*, previously *S. graminea*)
Cat's claw creeper (*Dolichandra unguis-cati* (previously *Macfadyena unguis-cati*))	Silverleaf nightshade (*Solanum elaeagnifolium)*
Fireweed (*Senecio madagascariensis)*	Water hyacinth (*Eichhornia crassipers)*

Of these 32 WONS, 4 were recorded in the study area, including:

- Blackberry complex (*Rubus fruticosus*);
- Lantana (*Lantana camara*);
- Fireweed (*Senecio madagascariensis*); and
- Willow (*salix spp.)*

All four of these WONS are also noxious weeds and therefore, additional information can be found in Table 7-2.

It is noted that Section 7.3.2 of the EA identifies Blackberry complex and Lantana as the only WONS recorded in the study area. However, Fireweed was added to the WONS list on 20 April 2012 and this appears to have been overlooked between this date and November 2012 when the EA was published. It should be noted that the Illawarra District Noxious Weed Authority considers Fireweed to be naturalised and is not classified "noxious". Willow was not identified in the main body of the EA as being recorded in the study area, yet it is recorded in the study area as part of the flora results provided in Appendix A of Appendix F of the EA.

For additional information on WONS refer to the NSW Department of Primary Industries' Biosecurity website: http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/definition.

7. National Environmental Alert List weeds

Twenty eight non-native weeds that have established naturalised populations in the wild have been placed on the National Environmental Alert List (the Alert List). Refer to Table 7-4. The Alert List complements the WONS list, which includes weeds already causing significant agricultural, forestry and environmental damage.

Species were identified for the Alert List based on three criteria:

- posing a high or serious potential threat to the environment
- having limited distribution within Australia at present, and
- being amenable to successful eradication or containment programs.

Table 7-4 National Environmental Alert List

National Environmental Alert List	National Environmental Alert List
Barleria or porcupine flower (*Barleria prionitis*)	Lagarosiphon (*Lagarosiphon major*)
Blue hound's tongue (*Cynoglossum creticum*)	Laurel clock vine (*Thunbergia laurifolia*)
Cane needle grass (*Nassella hyalina*)	Leaf cactus (*Pereskia aculeata*)
Chinese rain tree (*Koelreuteria elegans ssp. formosana*)	Lobed needle grass (*Nassella charruana*)
Chinese violet (*Asystasia gangetica ssp. micrantha*)	Orange hawkweed (*Hieracium aurantiacum*)
Cutch tree (*Acacia catechu*)	Praxelis (*Praxelis clematidea*)
Sedge, Cyperus (Cyperus *teneristolon*)	Rosewood or tipuana tree (*Tipuana tipu*)
False yellowhead (*Dittrichia viscosa*)	Senegal tea plant (*Gymnocoronis spilanthoides*)
Garden geranium (*Pelargonium alchemilloides*)	Siam weed or chromolaena (*Chromolaena odorata*)
Heather (*Calluna vulgaris*)	Subterranean Cape sedge (*Trianoptiles solitaria*)
Holly leaved senecio (*Senecio glastifolius*)	Uruguayan rice grass (*Piptochaetium montevidense*)
Horsetails (*Equisetum species*)	White Spanish broom (*Cytisus multiflorus*)
Karroo thorn (*Acacia karroo*)	White weeping broom (*Retama raetam*)
Kochia (*Bassia scoparia*)	Yellow soldier (*Lachenalia reflexa*)

No National Environmental Alert List weeds were recorded in the study area.

8. Environmental weeds

Environmental weeds are plants that invade native ecosystems and adversely affect the survival of indigenous flora and fauna (Source: http://www.daff.qld.gov.au).

Environmental weeds can be foreign plants accidentally or intentionally introduced into Australia, or they can be native plants that have become weedy due to inappropriate management, or because they are outside of their normal range (Source: http://www.daff.qld.gov.au).

Environmental weeds may have significant economic and social impacts, as well as environmental impacts, including:

- reduction of biodiversity
- cost of control
- loss of ecotourism opportunities
- impacts on recreational activities
- impacts on landscape
- degradation of water quality
- increased risk of fire.

Many environmental weeds were present throughout the study area, some including those listed in Table 7-5.

Table 7-5 Other environmental weeds

Environmental weeds	Environmental weeds
Cobbler's Pegs (*Bidens pilosa)*	Madeira Winter Cherry (*Solanum pseudocapsicum)*
Spear Thistle (*Cirsium vulgare)*	Creeping Christian (*Tradescantia fluminensis*)
Panic Veldtgrass (*Ehrharta erecta)*	Camphor Laurel (*Cinnamomum camphora)*
Kikuya Grass (*Pennisetum clandestinum)*	Wild Tobacco Bush (*Solanum mauritianum)*
Paddy's Lucerne (*Sida rhombifolia)*	Moth vine *(Araujia hortorum)*
Curled Dock (*Rumex crispus)*	Cape Ivy (Delairea odorata)

9. Weed control procedure

To control weed infestations pre and during construction the Environmental Manager or Environmental Officer will ensure that the following procedure is implemented:

1. Stakeholder consultation

As required from the RMS *Specification D&C G40 – Clearing and Grubbing* (RMS, 2013) the Environmental Manager/EO will undertake consultation with the relevant local Weeds Authority Officer on the presence of any noxious weed in areas to be cleared and to ascertain if any special precautions are required. This will include consultation with:

- the IDNWA Chief Weeds Officer or Noxious Weed Inspector/Operator for Kiama LGA, and
- the Shoalhaven City Council Noxious Weeds or a natural Area Officer.

The Environmental Manager/EO will request from the above stakeholders a statement regarding the presence or otherwise of noxious weeds

2. Exclusion Zones

Prior to any clearing and grubbing the Environmental Manager/EO will undertake a 'joint inspection' with the Project Ecologist and RMS Representative to establish clearing exclusion zones focusing on areas of threatened ecological communities (TEC's) and items of Aboriginal and non- Aboriginal cultural heritage significance as identified on the most current set of project Sensitive Area Plans prior to clearing and grubbing. This can be carried out concurrently with the joint inspection for weeds.

3. Weed inspection

The Environmental Manager/EO will undertake a 'joint inspection' with the Project Ecologist and RMS Representative to inspect the area for weeds:

- prior to clearing and grubbing;
- prior to drainage works or change in drainage that may facilitate the distribution of weed seeds or high level of nutrients;
- when a potential weed infestation has been identified; and
- before spring (around August) to identify weeds before they go to flower and seed.

Infestations of noxious weeds and WONS will be mapped with GPS by the Project Ecologist during the joint site inspection including noting the specie(s) degree of infestation and capturing an image for monitoring purposes.

4. Weed treatment methodology

The Project Ecologist will identify areas of weed infestation; advise the appropriate weed control methods, and timing for each area of works.

As a guide, control and management methods for noxious weeds are available at the websites identified in Table 7-2.

5. Pesticide Application Record

The Environmental Manger/EO will follow the Pesticide Use Procedure (Appendix G of the CFFMP) and ensure that a Pesticide Application Record (Appendix H of the CFFMP) is completed and public notifications made in accordance with relevant legislation and the RMS Specification D&C G36, where pesticides are to be used in areas that could be accessed by members of the public.

Only pesticides registered for use near water may be used near any waterways.

6. Follow up inspection

The Environmental Manger/EO will ensure that a follow-up inspection is undertaken of identified weed infestation sites to ensure treatment was successful.

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5. Vehicle, plant and equipment movement plan

Site specific vehicle, plant and equipment movement plans will be prepared for each worksite that contains noxious weeds. The plans will be incorporated into Progressive Erosion and Sediment Control Plans and include identification of vehicles, plant, equipment, turning and parking areas.

To prevent the spread of weeds throughout the construction site and surrounding areas, the movement of weed-contaminated plant and equipment will be monitored by Foreman.

The Foreman will ensure that all plant and machinery entering the site is inspected and free of weeds applying standard weed hygiene protocols.

Plant and equipment will be checked and cleaned before leaving a worksite that contains noxious weeds.

Records of all construction plant screening checks will be recorded on the Mobile Plant Inspection Checklist and monitored by the Foreman.

7. Weed disposal

Any weeds physically removed (particularly those bearing seeds) will be disposed of appropriately in accordance with the *Noxious Weeds Act 1993*, with preference for conserving locals landfill volumes and minimising the need to transport waste off site. This will be achieved through earthworks planning to ensure weed contaminated topsoil is incorporated into the works at the base of noise mounds or similar non-structural fills to effectively achieve encapsulation to prevent further seed dispersal.

10. Ongoing management and monitoring

Monitoring of weed infestations will occur as part of the routine weekly inspections as well as seasonally targeted surveys with specialist subcontractor and the local weed management authorities to determine the effectiveness of management controls. The presence of any weeds and the necessary management actions will be noted on the Environmental Inspection Checklist (Appendix A8 of the CEMP) and the outcome of specialist recommendation will be documented via email confirmations and generation of maps detailing treatment details.

Appendix G
Pesticide Use Procedure

Pesticide Use Procedure

1. Purpose

This procedure details the use and recording of pesticides throughout the construction phase of the Project to ensure the safety of users and other people, and minimise risks to the broader environment.

2. Scope

Pesticides can be used to achieve pest and weed management and control, which will be conducted on all weeds identified on site with attention to areas of revegetation and those weeds declared noxious within the Kiama and Shoalhaven LGAs.

Weed management within the Project site will consist of initial removal of vegetative cover on the site (including any weeds not removed prior to clearing) and ongoing monitoring and maintenance to ensure effective control of any new weed infestations that occurs, with the use of pesticides where required.

This procedure must be read in conjunction with the Weed Management Plan in Appendix F of the CFFMP to ensure the weeds to be treated are identified.

3. Induction and training

All site personnel and subcontractors managing and using pesticides will be trained in the appropriate use of pesticides through this procedure. This training will occur on site as required in toolbox talks.

4. Pesticide use procedure

To ensure the appropriate use of pesticides during construction the Environmental Manager or the Environmental Officer (EO) will ensure that the following procedure is implemented:

1. Appropriate pesticide use
Use pesticides in accordance with the *Pesticides Act 1999*, other relevant legislation, label directions and any relevant industry codes of practice.
2. Environment/conditions
When working near waterways, only use pesticides registered for use near water. When working adjacent to or across the road from a sensitive area: • Use mechanical means of pest control (such as mowing or slashing) where feasible; or • Use hand-held means of pesticide application where mechanical means of pest control are not feasible. Avoid applying pesticides: • On hot days when plants are stressed; • After seed has set; • Within 24 hours of rain or when rain is imminent; • When winds will cause drift of pesticides into non-target areas; and • Adjacent to watercourses or in locations where pesticide residue might enter a watercourse (including the stormwater system).
3. Pesticide Application Record
The Environmental Manger/EO will ensure that a Pesticide Application Record (Appendix H of the CFFMP) is completed and public notifications made in accordance with relevant legislation

and the RMS Specification D&C G36, where pesticides are to be used in areas that could be accessed by members of the public.

There is an exemption from completing the Pesticides Application Record where both of the following are satisfied:

- The pesticide is only applied by hand or by using hand-held equipment; and
- If applied outdoors on any single occasion in quantities of no more than 5 litres/5 kilograms of concentrated product or 20 litres/20 kilograms of the ready-to-use product, or; if applied indoors in quantities of no more than 1 litre/1 kilogram of concentrated product or 5 litres/5 kilograms of the ready-to-use product.

Appendix H
Pesticide Application Record

Pesticide Application Record

Item	Detail
Owner (1)	
Applicator	
Applicators address	
Applicators phone number	
Sensitive area identification (2)	
Pest or situation treated	
Product used (3)	
Equipment used	
Amount of concentrated product used	
Total amount of product used (4)	
Area of application (m^2)	
Estimation of wind speed and direction (5)	
Start time of application	
Finish time of application	
Other weather conditions (6)	
Other comments as per product label requirements	

Notes:

(1) The *Pesticides Regulation 2009* places obligations on prescribed public authorities to notify the public of the proposed use of pesticides. RMS has a Pesticide Use notification plan, which says for road construction sites/vacant land owned by RMS a sign must be displayed on a vehicle concurrent with spraying activity including a prominent number for public to call for specific information in relation to the spraying activity.

(2) If there are sensitive areas, either on the Project or on land adjoining, these should be identified in advance, together with any precautions or special instructions. When using a subcontractor or assigning the work to an employee, this section should be filled in and given to the person performing the application BEFORE the job starts. A drawing with the sensitive areas marked must also be shown to them, and the job fully discussed.

(3) include full product name including letters or numbers that are part of the product name

(4) including water mixed with the concentrated product

(5) e.g. a light breeze from the north east

(6) e.g. rainfall, temperature and/ or humidity where the product label requires this information

Completed by:

Date: / /

Related sub-plan: Construction Flora and Fauna Management Sub-plan

File in *[insert chapter reference]* Flora records

Appendix I
Phytophthora cinnamomi Procedure

Phytophthora cinnamomi Procedure

1. Purpose

This procedure details controls practices to be implemented throughout the construction phase of the Project to minimise the threat to native plant species associated with the introduction/spread of *Phytophthora cinnamomí* (root-rot fungus).

2. Scope

This procedure is applicable to all activities conducted on the Project that have the potential to disturb soils containing *Phytophthora cinnamomí* (as identified during pre-clearing survey) or unintentionally importing such soil or plant matter from outside the Project area.

This procedure must be read in conjunction with the Clearing and Grubbing Environmental Work Method Statement.

3. Induction and training

Where required, site personnel and subcontractors will be inducted in the control measures to prevent the introduction or spread of *Phytophthora cinnamomí* during construction activities, in line with this procedure. Training will occur on site during the Project induction and as required in toolbox talks.

4. Procedure

To prevent the spread or introduction of *Phytophthora cinnamomí* during construction the Environmental Manager (EM) or Environmental Officer (EO) will ensure that the following procedure is implemented:

1. Identify and prevent *Phytophthora cinnamomi*

The EM/EO must contact OEH prior to the commencement of works to determine if there are any confirmed *Phytophthora cinnamomí* sites on the Project or in the locality, and if so where the soil-borne plant pathogen is located.

The Project Ecologist must identify any *Phytophthora cinnamomi*-induced dieback during the Pre-clearing survey and thus the presence of *Phytophthora cinnamomí* on the Project.

The EM and EO are responsible for overseeing works in the Project area that are infected with *Phytophthora cinnamomí*

2. Limit movement of soils potentially infected with *Phytophthora cinnamomi* via vehicles and machinery

Where potentially infected soils may be present:

- Install signage advising of special hygiene measures;
- Limit access to the infected area using fencing;
- Stop earthworks in the infected area after extended rainfall that could make the earth saturated and potentially cause overland flow;
- Where possible, do not drive through mud or potentially infected areas;
- If a vehicle or machinery is taken into an infected area, remove all mud and dirt (including that from floor mats, tyres, wheel rims and the undersides of vehicles) and wash the vehicle/machinery with Truckwash (or equivalent) and disinfect with Phytoclean (or equivalent) immediately prior to leaving the area or immediately prior to accessing the Project.
- Complete a Wash-down Checklist for vehicles and machinery entering or leaving areas infected with *Phytophthora cinnamomí* (Appendix J of the CFFMP).
- Do not use water from sediment basins, and potentially infected catchments, for vehicle wash-downs.
- Bund the area where a vehicle is to be washed using a 400mm high sandbag wall.

• Capture and dispose of all liquids used in the washing and disinfecting process to an appropriately licenced waste facility.
3. Limit movement of soils potentially infected with *Phytophthora cinnamomi* via personnel and equipment
• Clean and disinfect footwear by removing mud and dirt and then stepping into a tray of Phytoclean (or equivalent) immediately prior to leaving the area or immediately prior to accessing the Project. • Clean and disinfect equipment by removing mud and dirt and sponging with a solution of Phytoclean (or equivalent) immediately prior to leaving the area. • Capture and dispose of all liquids used in the washing and disinfecting process to an appropriately licenced waste facility.
4. Limit movement of soils potentially infected with *Phytophthora cinnamomi* via erosion and sediment controls
• Remove and dispose of any sandbags, straw bales or other erosion and sediment controls from infected areas to an appropriately licenced waste facility. Do not reuse erosion and sediment controls outside of the potentially infected area. • Do not use water from sediment basins for dust control or other road construction purposes, which has originated from areas potentially infected with *Phytophthora cinnamomi*. Instead, this water may be used for concrete production, subject to the prior approval of RMS. • Remove and dispose of sediment from sediment basins potentially infected with *Phytophthora cinnamomi* to an appropriately licenced waste facility.
5. Limit movement of topsoil potentially infected with *Phytophthora cinnamomi*
• Stockpile, contain and reuse topsoil stripped from potentially infected areas, within the same area of the Project.
6. Limit importation of soil and plant matter potentially infected with *Phytophthora cinnamomi*
• Check and clear any vehicles or equipment brought onto the Project from areas potentially infected with *Phytophthora cinnamomi* (as identified by OEH in Step 1 above). • If signs of soil and/or plant matter are present, clean the vehicle/equipment in accordance with the procedure in Step 2/3 above, as applicable.

11. Ongoing management and monitoring

Where *Phytophthora cinnamomí* is identified on the Project or in the locality, monitoring of the soil-borne plant pathogen will occur as part of the routine weekly inspections to determine the effectiveness of management controls. Necessary management actions will be noted on the Environmental Inspection Checklist (Appendix A8 of the CEMP).

Appendix J

Wash-Down Checklist for vehicles and machinery entering or leaving areas infected with *Phytophthora cinnamomi*

Wash-Down Checklist for vehicles and machinery entering or leaving areas infected with *Phytophthora cinnamomi*

Objective: All vehicles and machinery will be clean and visually free of soil and plant matter before entering or leaving any project area that is current or was former *Phytophthora cinnamomi* infected land.

Action: All vehicles and machinery from *Phytophthora cinnamomi* infected land will be cleaned of all loose soil and plant matter as necessary prior to leaving or entering the Project, washed down with Truckwash (or equivalent), and sterilised with Phytoclean disinfectant (or equivalent).

Machinery, equipment, plant	Components checked (includes all other parts of the machinery/equipment/plant not specifically mentioned)	Plant number	Cleaned By: Name	Company	Signature	Date
[Bulldozer]	*[Rippers, blade, track frame, belly plate, air filter, cabins, floor mat.]*					
[Excavator]	*[Truck frame, underside of slew ring, buckets]*					
[Piling rig]	*[Track, drill bits]*					
[Grader]	*[Rippers, mould board]*					
[Motor Scraper]	*[Overflow area on rear of scraper]*					
[Tractor]	*[Top of slasher, skids]*					
[Backhoe]	*[Buckets, backhoe attachment]*					
[Bobcat]	*[Buckets, belly plate, other attachments]*					
[Truck]	*[Soil build up in bins, chassis rails]*					

Related sub-plan: Construction Flora and Fauna Management Sub-plan **File in *[insert chapter reference]* Flora record**