

M1 Pacific Motorway Extension to Raymond Terrace – Stage 1 Black Hill to Tomago

Appendix D - Flora and Fauna Management Sub-Plan

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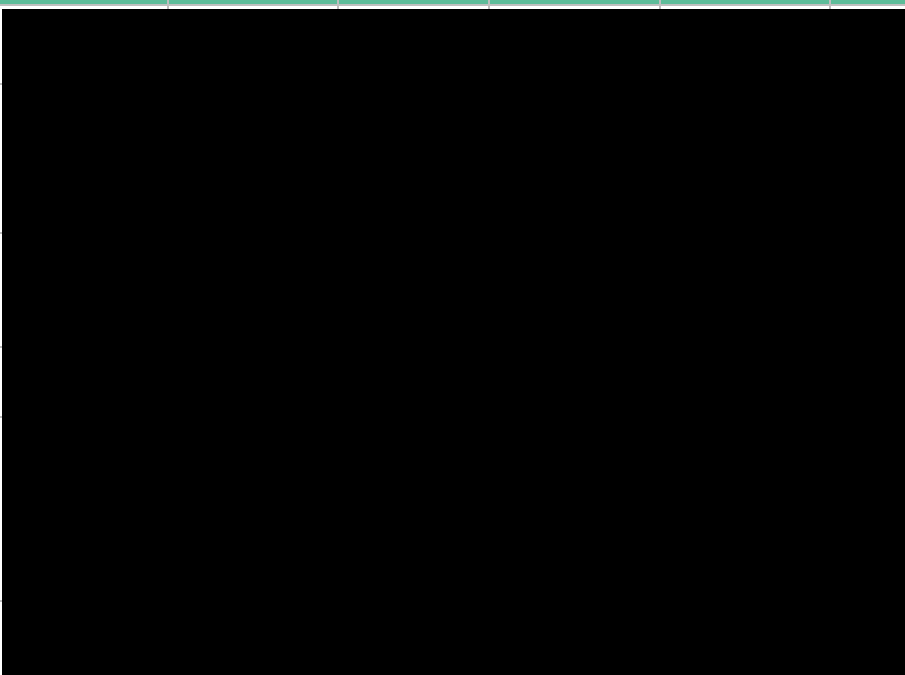
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Revisions and Distribution

Revisions

Draft issues of this document are identified as Revision A, B, C, etc. Upon initial issue (generally Contract Award) this will be changed to a sequential number commencing at Revision 0. Revision numbers will continue at Revision 1, 2, etc.

Rev	Date	Prepared By [Name]	[Signature]	Reviewed By [Name]	[Signature]	Approved By [Name]	[Signature]	Remarks
A	10/05/23							Transport and ER submission
B	30/06/23							Transport and ER re-submission
C	31/07/23							Transport and ER re-submission
D	18/08/23							For External Consultation
E	22/09/23							For ER Endorsement
F	29/09/23							ER endorsement resubmission and additional BCD comment
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02	20/06/24							6 monthly review – change to distribution list and Terms and Abbreviations
03	24/10/24							Transport & ER re-submission
04	30/01/25							CoA administration modification Review of FFMP Appendices – no changes to Appendix A – F.
05	02/05/25							For ER Endorsement
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Rev	Date	Prepared By [Name]	[Signature]	Reviewed By [Name]	[Signature]	Approved By [Name]	[Signature]	Remarks
								confirmation of satisfactory closure of comments on the FF Mon.Program. Re-submission includes minor updates to the FFMP since the June 2024 review and encompasses the June 2025 six-monthly review.

Distribution List

Client's Representative		
Project Director		
Construction Director		
Environment and Sustainability Manager		
Environmental Representative		
Independent Certifier		

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Terms and Abbreviations

Term/Abbreviation	Definition/Expanded text
ABLV	Australian Bat Lyssavirus
AG DCCEEW	Australian Government Department of Climate Change, Energy, the Environment and Water
AQMP	Air Quality Management Sub-Plan
BAM	Biodiversity Assessment Method
BAR	Biodiversity Assessment Report
BC Act	<i>Biodiversity Conservation Act 2016</i>
BCS	Biodiversity, Conservation and Science Group of the NSW Department of Climate Change, Energy, the Environment and Water
BH2T	Black Hill to Tomago, or the Project
CA (Consistency assessment)	Consistency assessment is a document that shows how any proposed changes, including works outside of the project area comply with both the NSW approval and this approval. This document provides detailed clearing areas showing plant community types, EPBC threatened ecological communities, EPBC threatened species/habitat, and any other protected matters.
CEMP	Construction Environmental Management Plan
CMP	Construction Monitoring Programs
CMR	Construction Monitoring Report
CoA	Conditions of Approval
CSSI	Critical State Significant Infrastructure
D&C	Design and Construct
DPHI	Former Department of Planning and Environment, now Department of Planning, Housing and Industry
DPIRD Fisheries	NSW Department of Primary Industries and Regional Development - Fisheries Division
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	Environment Protection Authority
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
EPL	Environment Protection Licence
ER	Environmental Representative
EWMS	Environmental Work Method Statement
FFCMP	Fauna and Flora Construction Monitoring Program
FFMP	Flora and Fauna Management Sub-Plan
FM Act	<i>Fisheries Management Act 1994</i>
GDE	Groundwater Dependent Ecosystems
HBT	Hollow-bearing trees
ISC	Infrastructure Sustainability Council
JHGA JV	John Holland Gamuda Australia Joint Venture
KFH	Key Fish Habitat
M12RT	M1 Pacific Motorway Extension to Raymond Terrace
NPWS	National Parks and Wildlife Services
PVC	Polyvinyl chloride
REMM	Revised Environmental Management Measures from M1 Pacific Motorway extension to Raymond Terrace Submissions Report Appendix K
RTA	Roads and Transport Authority
SEAR	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policies

Term/Abbreviation	Definition/Expanded text
SMART	Specific, Measurable, Achievable, Relevant and Time-bound
SQP	Suitably Qualified Person
SWTC	Scope of Works and Technical Criteria
TEC	Threatened Ecological Community
Transport	Transport for New South Wales, or TfNSW
TSC Act	<i>Threatened Species Conservation Act 1995</i>
VMS	Variable Message Signs
WoNS	Weeds of National Significance

Flora and Fauna Management Sub-Plan

Plan Profile

Management System	The Project will use John Holland's Environmental Management System (EMS) and core Project plans to support Project delivery. Additional functional plans have been developed for the Project.
Name	Flora and Fauna Management Sub-Plan (FFMP)
Authorisation	All personnel employed on the Project will perform their duties in accordance with the requirements of this Plan and in compliance with Project system procedures and any specific Project instructions. This Plan is authorised by the Project Director.
Review and update	This FFMP will be regularly reviewed, developed and updated: • For changes in design or construction sequence, staging, methodology or resourcing • To consider progress of the Project Company's Work • For changes in access to the Project Site and Temporary Areas • To consider changes directed by Transport's Representative under the D&C Deed.

1. Introduction

1.1. Context

This Flora and Fauna Management Sub-Plan (FFMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the M1 Pacific Motorway Extension to Raymond Terrace (M12RT) Black Hill to Tomago (BH2T, or the Project).

This FFMP has been prepared to address the requirements of the Conditions of Approval (CoA), the measures listed in the M12RT Environmental Impact Statement (EIS) as amended by the Submissions Report (known as the Revised Environmental Management Measures (REMMs)), the EPBC Act Conditions of Approval (EPBC-CoA), and all applicable guidelines and legislation.

1.2. Background

M12RT is a 15 kilometre extension of the existing M1 Pacific Motorway at Black Hill to the existing Pacific Highway at Raymond Terrace within the City of Newcastle and Port Stephens Council local government areas. The M12RT will be delivered as follows:

- Stage 1 - Construction - Southern Package (BH2T), delivered by the John Holland Gamuda Australia Joint Venture (JHGA JV)
- Stage 2 - Construction - Northern Package (Heatherbrae Bypass), delivered by Seymour Whyte.

The JHGA JV has been appointed by Transport for New South Wales (Transport) for the Design and Construct (D&C) contract for BH2T, which involves the design and construction of 10 kilometres of new dual carriageway motorway with two lanes in each direction, with interchanges at Black Hill, Tarro, and Tomago. For the full project description, see Section 3 of the CEMP.

The M12RT EIS (Chapter 9 - Biodiversity and Appendix I – Biodiversity Assessment Report), Submissions Report (Chapter 7.10 and Appendix K – REMMs), and the Assessment Report (Chapter 6.4) identified the potential impacts and risk to biodiversity during construction of the Project, typically associated with vegetation clearing, works in aquatic habitats and general construction works. They concluded that residual risks from construction activities can be mitigated to the extent that flora and fauna impacts can be managed.

1.3. Environment Management Systems Overview

The Environmental Management System (EMS) overview is described in Section 1.5 of the CEMP. The EMS also incorporates the Project-specific CEMP and sub-plans, strategies, procedures, and Environmental Work Method Statement (EWMS). The EMS provides for overarching environmental management actions for implementation by Project personnel and contractors and will apply for the duration of construction.

1.3.1. Relationship between this Plan and other Project documents

Other Project documents that interface with this Plan include:

- CEMP and Construction Monitoring Programs
- Construction Management Plan
- Safety Management Plan
- Sustainability Management Plan
- Environmental management documents (e.g. plans, protocols, strategies, reports, and programs).
- M12RT Unexpected Threatened Ecological Communities and Threatened Species Protocol (TfNSW, 2023)

The key CEMP Sub-Plan interfaces that ensure the Project CoA and REMMs are implemented are as follows:

- The Flora and Fauna Construction Monitoring Plan (FFCMP), which details the biodiversity monitoring program to be implemented prior to (baseline) and during construction.
- The Construction Soil and Surface Water Management Sub-Plan (SSWMP) and Groundwater Management Sub-Plan (GMP) (noting the presence of aquatic ecosystems and potential groundwater dependant ecosystems within the project footprint) which address controls to mitigate

the risks of the migration of existing contamination to ecological receptors as well as appropriate controls to mitigate risk of new contamination during construction through appropriate handling and storage of contamination and response to spills.

- The Surface Water and Groundwater Quality Construction Monitoring Program, which addresses construction phase water quality monitoring including a trigger action response plan for water quality and levels.
- The Sustainability Management Plan, which addresses biodiversity related sustainability requirements.

Section 1.6 of the CEMP provides a full list of plans, procedures and other documents that form the EMS.

The construction and design teams will also develop, maintain and be responsible for implementation of the documents listed in Table 1-1. These documents do not form part of the EMS, however, will inform potential impacts to soils and surface water during construction works and may provide evidence of compliance with the environmental control measures detailed in Section 6 of this Plan.

Table 1-1 Key Design and Construction Documents

Document	Details
Road Furniture Design	The Road Furniture design package includes detail on project fauna crossings. This includes locations, design details, target fauna and the standards and studies that that designs are based on.
Property Works and Site Fencing Design	The Property Works and Site Fencing Design includes details on project fauna fencing. This includes locations, design details, measures to allow vehicles to enter access points, target fauna and the standards and studies that the designs are based on.
Design Landscape Plan	The Design Landscape Plan includes details on revegetating landscaped areas of the Project. Revegetation has been designed to utilise native vegetation where possible, providing resources for local fauna such as birds and insects, while maintaining ground cover for stabilisation and enhancing the visual aspects of the project

1.4. Consultation for Preparation

In accordance with CoA A8, C5(c), and C12(d) this FFMP and the associated FFCMP (refer Appendix G) has been prepared as part of the CEMP in consultation with the following agencies and councils:

- Australian Government Department of Climate Change, Energy, the Environment and Water (AG DCCEEW)
- NSW Department of Primary Industries, Fisheries, now, NSW Department of Primary Industries and Regional Development, Fisheries Division (DPIRD Fisheries)
- Water Group of the Department of Planning and Environment, now Water Group of the NSW Department of Climate Change, Energy, the Environment and Water (Water Group)
- Biodiversity and Conservation Division of the Environment and Heritage Group of the Department of Planning and Environment, now Biodiversity, Conservation and Science Group of the NSW Department of Climate Change, Energy, the Environment and Water (BCS)
- City of Newcastle Council
- Port Stephens Council.

This FFMP and associated FFCMP was provided to the above listed agencies from 18 August 2023. All comments received were considered and the FFMP updated accordingly. Appendix A provides a summary of the consultation undertaken for the development of this Plan and the key issues identified by the relevant stakeholders. Table 1-2 provides a summary of consultation periods and outcomes.

Table 1-2 Consultation summary

Stakeholder	Total Review Period (Calendar days)	Outcome
AG DCCEEW	10	Minor comments, Plan updated and closed out with AG DCCEEW
DPIRD Fisheries	24	Minor comments, Plan updated and closed out with DPIRD Fisheries
Water Group	17	No comments on Plan

Stakeholder	Total Review Period (Calendar days)	Outcome
BCS	25	Minor comments, Plan updated and closed out with BCS
City of Newcastle	21	Minor comments, Plan updated and closed out with City of Newcastle
Port Stephens Council	14	No comments on Plan

Ongoing consultation with relevant stakeholders, including any unique local receivers may be undertaken for specific issues. Community feedback and complaints relating to flora and fauna impacts will be dealt with in accordance with the Communication Strategy and the Complaints Management System (see Section 7.3 of this Plan).

In accordance with CoA C4 and C15, this FFMP and the associated FFCMP was endorsed by the Environmental Representative (ER) on 3 October 2023 prior to submission to the Planning Secretary for approval no later than one month before the commencement of construction. In accordance with CoA C10 and C16, construction may not commence until the CEMP and relevant CEMP Sub-Plans and Monitoring Programs applying to construction activities to be undertaken have been approved by the Planning Secretary.

2. Purpose and Objectives

2.1. Purpose

The purpose of this Plan is to describe how the Project will manage and protect flora and fauna during construction of the Project.

2.2. Objectives

The key objectives of the FFMP is to ensure all approval and contractual requirements relevant to flora and fauna are described, scheduled, and assigned responsibility as outlined in:

- M12RT EIS (Chapter 9 and Appendix I), Submissions Report (Chapter 7.10 and Appendix K – REMMs), and the Assessment Report (Chapter 6.4) and CoAs
- EPBC-CoA granted to the Project
- TfNSW Specifications G36 and G40
- Scope of Works and Technical Criteria (SWTC) Appendices.

To achieve compliance with the conditions and objectives of the Project documents above, the Project will undertake the following:

- Ensure control measures (Section 6 of this Plan) are implemented to address the relevant CoA outlined in Section 3.2 and the safeguards detailed in the REMMs in Section 3.3.
- Ensure best management practice controls and procedures are documented, communicated, and implemented during construction activities to avoid or minimise soil and surface water impacts.

2.3. Environmental Performance Outcomes and Targets

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

- Ensure full compliance with the relevant legislative requirements, CoA and REMMs
- Implement reasonably practicable measures to minimise flora and fauna impacts during construction
- Ensure training is provided in the form of inductions to relevant Project personnel relating to flora and fauna issues before they begin work on site
- Ensure no disturbance to flora and fauna outside the approved construction footprint and associated access tracks and site compounds
- Ensure no increase in distribution of weeds or other invasive species currently existing and no new weeds or other invasive species are introduced within the Project areas
- Ensure no transfer of plant diseases or pathogens to or from the Project work areas
- Ensure effective rehabilitation/revegetation that meets its ecological and landscaping objectives
- Ensure all fauna species encountered during construction are handled humanely in accordance with industry standards
- Ensure no pollution or siltation of aquatic ecosystems, wetlands, endangered ecological communities or threatened species habitat
- Implement measures to minimise barriers to fauna movement and fish passage.

The performance outcomes listed in Table 2-1 have been established for the management of flora and fauna during Project construction. These align with those established in the Revised Secretary Environmental Assessment Requirements (SEARS) and EIS Chapter 9 (Biodiversity) and Chapter 27 (Project Synthesis).

Table 2-1: Environmental Performance Outcomes relevant to flora and fauna management

No.	Performance outcome	How it is achieved
1	Consider all feasible measures to avoid and minimise impacts on terrestrial and aquatic biodiversity	Implementation of measures in Section 6 will help to achieve this requirement Note: Design of fauna crossings is included within the Road Furniture Design Report and Drawing Package Note: Design of fauna exclusion fencing is included within the Property Works and Site Fencing Design Report and Drawing Package

No.	Performance outcome	How it is achieved
2	Offsets are equivalent to any remaining impacts from construction and operation of the Project	Implementation of measures in Section 6 will help to achieve this requirement A Final Construction Footprint Clearing Report is to be produced within 12 months of the commencement of Construction and submitted to the Planning Secretary, BCS and AG DCCEEW. A Credit Retirement Report will be produced and submitted to DPHI and AG DCCEEW
3	Assure the delivery of offsets and/or supplementary measures required for the Project	Implementation of measures in Section 6 will help to achieve this requirement. Receipts confirming payment to the Biodiversity Conservation Fund and the DPI Fish Conservation Trust Fund to be provided to DPHI where applicable.

2.4. SMART Principles

In accordance with the requirements of CoA C6(d) and CoA C13(j), this FFMP and the associated FFCMP have been developed with consideration of SMART principles. This is achieved as follows:

- **Specific:** The measures listed in Section 6 of this Plan are specific to flora and fauna management during construction. They include the development and implementation of plans and procedures tailored to address flora and fauna impacts, identification, and management of specific issues like unexpected finds of threatened species and threatened ecological communities, replacement habitat, crossings and connectivity and weed and pathogen control.
- **Measurable:** The document provides specific measures, requirements, and references that enable the evaluation and measurement of the effectiveness of each control measure. Monitoring programs and reporting requirements are outlined, allowing for the assessment of impacts to flora and fauna.
- **Achievable:** The control measures outlined in the document are practical and achievable within the construction context. They involve the implementation of plans, investigations, and management strategies that can be feasibly executed during the construction phase.
- **Relevant:** The measures are directly relevant to flora and fauna management during construction. They address potential impacts, such as those associated with vegetation clearing, fauna encounters and impacts to aquatic habitats and groundwater. These measures are designed to mitigate or prevent these impacts on flora and fauna.
- **Time-bound:** The document specifies when each measure should be implemented, such as prior to and during construction. It also assigns responsibilities to specific roles, indicating the timeline and accountability associated with each measure.

3. Environment Requirements

3.1. Relevant Legislation and Guidelines

Table 3-1 details the principal legislation, regulation, guidelines, specifications, and Australian Standards that are relevant to flora and fauna management.

Table 3-1: Principal legislation and regulation relevant to flora and fauna

Legislation	Commonwealth Legislation • <i>Environment Protection Biodiversity Conservation Act 1999</i> (EPBC Act) (Commonwealth) NSW Legislation • <i>Environmental Planning and Assessment Act 1979</i> (EP&A Act) • <i>Threatened Species Conservation Act 1995</i> (TSC Act) • <i>Biodiversity Conservation Act 2016</i> (BC Act) • <i>Biodiversity Conservation (Savings and Transitional) Regulation 2017</i> • Bilateral agreement made under Section 45 of the EPBC Act relating to environmental assessment between Commonwealth of Australia and the State of New South Wales • <i>Biosecurity Act 2015</i> • <i>Fisheries Management Act 1994</i> (FM Act) • <i>Pesticides Act 1999</i> • <i>Protection of the Environment Operations Act 1997</i> • <i>National Parks and Wildlife Act 1974</i> • <i>State Environmental Planning Policy (Resilience and Hazards) 2021</i>
Standards	• AS/NZS ISO 14001: Environmental Management • AS 4373 Pruning of Amenity Trees • AS 4970 – Protection of trees on development sites
Guidelines and Specifications	• New South Wales Weed Control Handbook (DPI 2018) • Hygiene protocol for the control of disease in frogs (DECC 2008) • Managing Urban Stormwater: Soils and Construction, Volume 1 (Landcom 2004) • Managing Urban Stormwater: Soils and Construction Volume 2 (DECC 2008) (the “Blue Book”). • TfNSW D&C Specification G36 – Environmental Protection • TfNSW D&C Specification G40 – Clearing and Grubbing • TfNSW Biodiversity Guidelines (RTA 2011) • Department of Primary Industries ‘Policy and Guidelines for Fish Habitat Conservation and Management (DPI 2013) • DPI Water Guidelines for Controlled Activities on Waterfront Land • EPA Resource Recovery Order 2014 – Raw Mulch; • EPA Resource Recovery Exemption 2014 – Raw Mulch • Fish Passage Requirements for Waterway Crossings (Fairfull and Witheridge 2003) • Fishnote – Policy and Guidelines for Fish Friendly Waterway Crossings – November 2003 • Guide to providing maps and boundary data for EPBC Act projects (Commonwealth of Australia 2021) • Guideline for Biodiversity Offsets (Roads and Maritime Services 2016e) • Guidelines for biological survey and mapped data (Commonwealth of Australia, 2018) • Guidelines for Fish Habitat Conservation and Management – Update 2013 (DPI 2013) • Guidelines for riparian corridors on waterfront land (DPI Water 2012) • Guidelines for vegetation management plans on waterfront land (DPI Water, 2012) • Guidelines for watercourse crossings on waterfront land (DPI Water, 2012) • Guidelines for instream works on waterfront land (DPI Water, S2012) • Guidelines for outlet structures on waterfront land (DPI Water, 2012) • NSW Department of Primary Industries, Why Do Fish Need to Cross the Road (DPI Fisheries, 2003) • Biodiversity Assessment Method (BAM) (DPE 2020) • Risk Assessment Guidelines for Groundwater Dependent Ecosystems (DPI 2012)

Relevant provisions of the above legislation are explained in the Register of Legal and Other Requirements included in Appendix A1 of the CEMP.

3.2. Conditions of Approval – SSI-7319

The NSW CoA relevant to this Plan are listed in Table 3-2. A cross reference is also included to indicate where the condition is addressed in this Plan or other Project management documents.

Table 3-2: NSW CoA relevant to this FFMP

NSW CoA No.	Condition requirements	Document reference
A2	The CSSI must be carried out in accordance with all procedures, commitments, preventative actions, performance outcomes and mitigation measures set out in the documents listed in Condition A1 unless otherwise specified in, or required under, this approval.	This Plan CEMP
A8	Where the terms of this approval require consultation to be undertaken, evidence of the consultation undertaken must be submitted to the Planning Secretary and ER (as relevant) with the corresponding documentation in accordance with the consultation procedures set out in the Communication Strategy required by Condition B1. The evidence must include: (a) Documentation of the engagement with the identified party in the condition of approval that has occurred before submitting the document for approval; (b) A log of the dates of engagement or attempted engagement with the identified party; (c) Documentation of the follow-up with the identified party where engagement has not occurred to confirm that they do not wish to engage or have not attempted to engage after repeated invitations; (d) Outline of the issues raised by the identified party and how they have been addressed; and (e) A description of the outstanding issues raised by the identified party and the reasons why they have not been addressed. Note: The Communication Strategy required by Condition B1 should be used in conjunction with Condition A8 to determine the level consultation and evidence required that is proportionate to the activity that will be undertaken.	Section 1.4 Appendix A Communications Strategy
A29	For the duration of the Work until the completion of construction, or as agreed with the Planning Secretary, the approved ER must: (a) receive and respond to communication from the Planning Secretary in relation to the environmental performance of the CSSI; (b) consider and inform the Planning Secretary on matters specified in the terms of this approval; (c) consider and recommend to the Proponent any improvements that may be made to work practices to avoid or minimise adverse impact to the environment and to the community; (d) review documents identified in Conditions A9, A17, C1, C5 and C12 and any other documents that are identified by the Planning Secretary, to ensure they are consistent with requirements in or under this approval and if so: I. make a written statement to this effect before submission of such documents to the Planning Secretary (if those documents are required to be approved by the Planning Secretary); or II. make a written statement to this effect before the implementation of such documents (if those documents are required to be submitted to the Planning Secretary / Department for information or are not required to be submitted to the Planning Secretary/Department); Note: The written statement must be made via the Major Projects Portal. (e) regularly monitor the implementation of the documents listed in Conditions A9, A17, C1, C5 and C12 to ensure implementation is being carried out in accordance with the document and the terms of this approval; (f) as may be requested by the Planning Secretary, help plan or attend audits of the development commissioned by the Department including scoping audits, programming audits, briefings and site visits, but not independent environmental audits required under Condition A34 of this approval;	This Plan Flora and Fauna Construction Monitoring Program (Appendix G)

NSW CoA No.	Condition requirements	Document reference
	(g) as may be requested by the Planning Secretary, assist in the resolution of community complaints; (h) review the appropriateness of any activities reliant on the definition of Low Impact Work; (i) consider or assess the impacts of minor ancillary facilities as required by Condition A20; (j) consider any minor amendments to be made to the Ancillary Facility Site Establishment Management Plan, CEMP, CEMP Sub-plans and Construction Monitoring Programs that do not increase impacts to nearby sensitive land use(s) or that comprise updating or are of an administrative nature, and are consistent with the terms of this approval and the Ancillary Facility Site Establishment Management Plan, CEMP, CEMP Sub-plans and Construction Monitoring Programs approved by the Planning Secretary and, if satisfied such amendment is necessary, approve the amendment. This does not include any modifications to the terms of this approval; and (k) prepare and submit to the Planning Secretary and other relevant regulatory agencies (where requested by those agencies), for information, an Environmental Representative Monthly Report providing the information set out in the Environmental Representative Protocol under the heading "Environmental Representative Monthly Reports." The Environmental Representative Monthly Report must be submitted within seven days following the end of each month for the duration of the ER's engagement for the CSSI, or as otherwise agreed by the Planning Secretary.	
B7	A Complaints Management System must be prepared and implemented before the commencement of any Work and maintained for the duration of Work and for a minimum for 12 months following completion of construction of the CSSI. Note: In the situation where there are different entities constructing and operating the CSSI, continuity of access to the Complaints Management System must be maintained.	Section 7.3 Communications Strategy Complaints Management System
B8	The following information must be available to facilitate community enquiries and manage complaints one month before the commencement of Work and for 12 months following the completion of construction: (a) A 24-hour telephone number for the registration of complaints and enquiries about the CSSI; (b) A postal address to which written complaints and enquires may be sent; (c) An email address to which electronic complaints and enquiries may be transmitted; and (d) A mediation system for complaints unable to be resolved. This information must be accessible to all in the community regardless of age, ethnicity, disability or literacy level and must be provided on the website required under Condition B12.	Section 7.3 Communications Strategy Complaints Management System
C3	CEMP(s) (and relevant CEMP Sub-plans) must be submitted to the Planning Secretary for approval.	Section 1.4
C4	Where a CEMP (and relevant CEMP Sub-plans) requires Planning Secretary's approval, the CEMP (and relevant CEMP Sub-plans) must be endorsed by the ER. The endorsed CEMP (and relevant sub-plans) must be submitted to the Planning Secretary for approval no later than one month before the commencement of construction, or where construction is staged, no later than one month before the commencement of each stage.	Section 1.4
C5	The following CEMP Sub-plans must be prepared in consultation with the relevant government agencies and councils identified for each CEMP Sub-plan. Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant CEMP Sub-plan, including copies of all correspondence from those agencies as required by Condition A8:	Section 1.4 Appendix A Consultation records to be provided to DPHI with CEMP and sub-plan submissions

NSW CoA No.	Condition requirements		Document reference						
	<table><tr><th colspan="2">Required CEMP Sub-plan</th><th>Relevant government agencies and councils to be consulted for each CEMP sub-plan</th></tr><tr><td>(c)</td><td>Flora and Fauna</td><td>AG DCCEEW, DPIRD Fisheries, Water Group, BCS, and relevant council(s)</td></tr></table> Notes: (4) The Flora and Fauna CEMP Sub-Plan must be consistent with goals and objectives, mitigation measures and monitoring requirements of the Commonwealth approved conservation advice and any Recovery Plans for all Matters of National Environmental Significance.		Required CEMP Sub-plan		Relevant government agencies and councils to be consulted for each CEMP sub-plan	(c)	Flora and Fauna	AG DCCEEW, DPIRD Fisheries, Water Group, BCS, and relevant council(s)	
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C6	The CEMP sub-plans must state how:								
	(a) the environmental performance outcomes identified in the documents listed in Condition A1 will be achieved;		Section 2.3						
	(b) the mitigation measures identified in the documents listed in Condition A1 will be implemented;		Section 6						
	(c) the relevant terms of this approval will be complied with; and		Section 2.4						
	(d) issues requiring management during construction (including any trigger levels and cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART principles.		Section 2.4 (SMART principles) and Section 5.2, Table 5-1 (Cumulative Impacts)						
C10	Construction must not commence until the relevant CEMP(s) and CEMP sub-plans applying to the construction activities to be undertaken have been approved by the Planning Secretary.		Section 1.4 Document Revisions table						
C11	The CEMP(s) and CEMP sub-plans as approved, including any minor amendments approved by the ER, must be implemented for the duration of construction.		Section 1.3, 1.4 and 8.2 of this Plan						
C12	The following Construction Monitoring Programs (CMPs) must be prepared in consultation with the relevant government agencies and council(s) identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP: <table><tr><th colspan="2">Required Construction Monitoring Programs</th><th>Relevant government agencies to be consulted for each CEMP Sub-plan</th></tr><tr><td>(d)</td><td>Flora and Fauna</td><td>BCS, AG DCCEEW and relevant council(s)</td></tr></table> Note: The Flora and Fauna Monitoring Program must be consistent with goals and objectives, mitigation measures and monitoring requirements of the Commonwealth approved conservation advice and any Recovery Plans for all Matters of Environmental Significance.		Required Construction Monitoring Programs		Relevant government agencies to be consulted for each CEMP Sub-plan	(d)	Flora and Fauna	BCS, AG DCCEEW and relevant council(s)	Section 7.4.1 Flora and Fauna Construction Monitoring Program (Appendix G) Consultation Responses (Appendix A)
Required Construction Monitoring Programs		Relevant government agencies to be consulted for each CEMP Sub-plan							
(d)	Flora and Fauna	BCS, AG DCCEEW and relevant council(s)							
C13	Each CMP must provide: (a) details of baseline data available; (b) details of baseline data to be obtained and when; (c) details of all monitoring of the project to be undertaken; (d) the parameters of the project to be monitored; (e) the frequency of monitoring to be undertaken; (f) the location of monitoring; (g) the reporting of monitoring results and analysis of results against relevant criteria; (h) details of the methods that will be used to analyse the monitoring data; (i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts; (j) a consideration of SMART principles; and (k) any consultation to be undertaken in relation to the monitoring programs.		Section 7.4.1 and 7.6 Flora and Fauna Construction Monitoring Program (Appendix G)						
C15	The CMP must be endorsed by the ER. The endorsed CMP must be submitted to the Planning Secretary for approval no later than one month before the commencement		Section 1.4 and 7.4.1						

NSW CoA No.	Condition requirements	Document reference
	of construction, or where construction is staged, no later than one month before the commencement of each stage.	
C16	Construction must not commence until the relevant CMPs have been approved by the Planning Secretary and all relevant baseline data for the specific construction activity has been collected.	Section 1.4 and 7.4.1
C17	The CMPs, as approved, including any minor amendments approved by the ER, must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.	Section 1.4 and 7.4.1
C18	The results of the CMPs must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant CMP. The Construction Monitoring Report(s) must include an analysis of the results including, but not limited to, exceedances of relevant criteria/targets/goals, reasons for any exceedances, trends in the data, and maximum, minimum and average data results for all monitored parameters. The report must also detail any management and mitigation measures that were implemented to address exceedances during the reporting period. Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	Section 7.4.1 and 7.6 Flora and Fauna Construction Monitoring Program (Appendix G)
E2	An Unexpected Finds Protocol must be developed for threatened species and threatened ecological communities before the commencement of Work. The Unexpected Finds Protocol must be submitted to the Planning Secretary for approval at least one month before the commencement of Work. Work cannot commence until the unexpected finds protocol is approved by the Planning Secretary. The Unexpected Finds Protocol must be implemented throughout the duration of Work.	Section 6.1.2 Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol
E3	On the discovery of potential or actual impacts to any threatened species or ecological communities not listed in Condition E7, all work in the associated location must stop to prevent further impact and the Planning Secretary and BCS notified. Work in the associated location is not to recommence until approval to recommence work in the associated location has been issued by the Planning Secretary in consultation with BCS.	Section 6.1.2 Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol
E4	Impacts to threatened species and threatened ecological communities exceeding those identified as impacted in the documents listed in Condition A1 must not occur.	Table 6-1 (FFMM3) and Section 6.2 Flora and Fauna Protection Procedure (Appendix D)
E5	The clearing of native vegetation, in particular Koala habitat and mangroves, must be minimised with the objective of reducing impacts to threatened species and ecological communities and threatened species habitat.	Table 6-1 (FFMM7) and Section 6.1.5 Flora and Fauna Protection Procedure (Appendix D)
E6	A report on the final construction footprint demonstrating how clearing of native vegetation has been minimised, in particular Koala habitat and mangroves, must be provided to the Planning Secretary, BCS and AG DCCEEW for information, within 12 months of the commencement of construction.	Section 6.1.8 Biodiversity Offset Strategy
E7	The Proponent must meet the biodiversity offset obligations for ecosystem and species credits as set out in Table 3 and Table 4 within 12 months of the commencement of construction. The retirement of the biodiversity credits must be carried out in accordance with the NSW Biodiversity Offsets Policy for Major Projects and can be achieved by: (a) acquiring and retiring "biodiversity credits" within the meaning of the Biodiversity Conservation Act 2016; and/or (b) properties secured with the NPWS, on the basis of a draft credit report to show what the property would provide and written confirmation from NPWS that the financial contributions for acquisition and management have been received; and/or (c) making a payment into the Biodiversity Conservation Fund; and/or	Transport retains the obligation for any biodiversity offsetting requirements. JHGA will provide information, relevant to the BH2T scope of works, required to inform the offsetting requirements. Section 6.1.8 Biodiversity Offset Strategy

NSW CoA No.	Condition requirements	Document reference																														
	(d) a Biodiversity Offset Strategy prepared in consultation with Biodiversity Conservation Trust, BCS and AG DCCEEW that provides supplementary measures or where the Proponent intends to utilise the biodiversity credit variation rules. Notes: - Following repeal of the Threatened Species Conservation Act 1995 on 25 August 2017, “biodiversity credits” created under that Act are taken to be “biodiversity credits” under the Biodiversity Conservation Act 2016 by virtue of clause 19 of the Biodiversity Conservation (Savings and Transitional) Regulation 2017. - The determination of biodiversity credits under the Biodiversity Conservation Act 2016 that are reasonably equivalent to biodiversity credits created under the Threatened Species Conservation Act 1995 remaining to be retired must be carried out in accordance with clause 22 of the Biodiversity Conservation (Savings and Transitional) Regulation 2017. - The timing triggers of this condition does not apply should impacts occur to threatened species and ecological communities and threatened species habitat from Low Impact Work. Ecosystem Credits to be Retired (Table 3 in CoAs) <table> <tr> <th>Plant Community Type (PCT) ID and name</th><th>Amended construction footprint (hectares)</th><th>Number of credits</th></tr> <tr> <td>1590: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest</td><td>40.93</td><td>2274</td></tr> <tr> <td>1588: Grey Ironbark – Broad-leaved Mahogany – Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast</td><td>7.74</td><td>497</td></tr> <tr> <td>1646: Smooth-barked Apple - Blackbutt – Old Man Banksia woodland on coastal sands of the Central and Lower North Coast</td><td>27.73</td><td>1383</td></tr> <tr> <td>1649: Smooth-barked Apple – Red Mahogany – Swamp Mahogany – <i>Melaleuca sieberi</i> heathy swamp woodlands of coastal lowlands</td><td>1.33</td><td>70</td></tr> <tr> <td>1598: Forest Red Gum grassy open forest on floodplains of the lower Hunter</td><td>0.51</td><td>31</td></tr> <tr> <td>1716: Prickly-leaved Paperbark Forest on coastal lowlands of the Central Coast and Lower North Coast</td><td>1.88</td><td>107</td></tr> <tr> <td>1717: Broad-leaved Paperbark - Swamp Mahogany – Swamp Oak – Saw Sedge swamp forest of the Central Coast and Lower North Coast</td><td>10.56</td><td>473</td></tr> <tr> <td>1724: Broad-leaved Paperbark - Swamp Oak – Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast</td><td>1.64</td><td>77</td></tr> <tr> <td>1727: Swamp Oak – Sea Rush – <i>Baumea juncea</i> swamp forest on coastal lowlands of the Central Coast and Lower North Coast</td><td>8.84</td><td>427</td></tr> </table>	Plant Community Type (PCT) ID and name	Amended construction footprint (hectares)	Number of credits	1590: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest	40.93	2274	1588: Grey Ironbark – Broad-leaved Mahogany – Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast	7.74	497	1646: Smooth-barked Apple - Blackbutt – Old Man Banksia woodland on coastal sands of the Central and Lower North Coast	27.73	1383	1649: Smooth-barked Apple – Red Mahogany – Swamp Mahogany – <i>Melaleuca sieberi</i> heathy swamp woodlands of coastal lowlands	1.33	70	1598: Forest Red Gum grassy open forest on floodplains of the lower Hunter	0.51	31	1716: Prickly-leaved Paperbark Forest on coastal lowlands of the Central Coast and Lower North Coast	1.88	107	1717: Broad-leaved Paperbark - Swamp Mahogany – Swamp Oak – Saw Sedge swamp forest of the Central Coast and Lower North Coast	10.56	473	1724: Broad-leaved Paperbark - Swamp Oak – Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast	1.64	77	1727: Swamp Oak – Sea Rush – <i>Baumea juncea</i> swamp forest on coastal lowlands of the Central Coast and Lower North Coast	8.84	427	
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E8	The Proponent may review and update the ecosystem and species credit requirements in Table 3 and Table 4 to reflect the final construction footprint and resulting extent and type of plant community types to be cleared and the extent of threatened species habitat impacted by the construction of the CSSI. Amendments to the ecosystem and species credit requirements must be undertaken in consultation with BCS and AG DCCEEW and submitted to the Planning Secretary for approval within six months of determining the final construction footprint. Note: Any changes or updates of the Biodiversity Assessment Report or credit calculator must be undertaken in accordance with the Framework for Biodiversity, the Biobanking Assessment Methodology and any guidelines pertaining to surveying threatened species, including the Threatened Biodiversity Data Collection database.	Transport retains the obligation for this condition. JHGA will provide information to Transport where required. Section 6.1.8 Biodiversity Offset Strategy																																													
E9	The review and update of credit requirements must be undertaken by: - using the vegetation mapping in the M1 Pacific Motorway extension to Raymond Terrace Submissions Report - Appendix E- Revised biodiversity assessment report June 2022; and/or - completing verification surveys to confirm the extent, type and condition of threatened species and threatened ecological communities to be impacted.	Section 6.1.8 Biodiversity Offset Strategy It is noted that Transport will review and update the credit requirements based on verification survey provided by JHGA																																													
E10	Where verification surveys are required, they must be undertaken in consultation with BCS. Any additional surveys must be undertaken at the time of year when groundcover is most likely to be predominantly native. If verification surveys are not possible at a time when groundcover is most likely to be native, the assumed presence of any relevant species and ecosystems may be applied to conservatively evaluate impacts and associated credit requirements. Note: Any changes or updates of the Biodiversity Assessment Report or credit calculator must be undertaken in accordance with the Framework for Biodiversity, the Biobanking Assessment Methodology and any guidelines pertaining to surveying threatened species, including the Threatened Biodiversity Data Collection database	Section 6.1.8 Biodiversity Offset Strategy It is noted that Transport will undertake any changes or updates of the Biodiversity Assessment Report or credit calculator required based on																																													

NSW CoA No.	Condition requirements	Document reference
		verification survey provided by JHGA
E11	The Proponent must submit to the Planning Secretary and AG DCCEEW for information: (c) a copy of the Credit Retirement Report; and/or (d) a receipt confirming payment to the Biodiversity Conservation Fund; and/or (e) correspondence from NPWS, for the retirement of the ecosystem and species credits required by Condition E7 within one month of receiving the report and/or making the payments and/or receiving correspondence from NPWS.	Transport retains the obligation for this condition. Section 6.1.8 Biodiversity Offset Strategy
E12	The Proponent must minimise impacts to Key Fish Habitat (KFH) as defined in the Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013 update). Residual impacts to KFH must be offset at a ratio of 2:1 habitat offset requirement in accordance with the Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013 update) and in consultation with DPIRD Fisheries. The habitat offsets must be provided by no later than 18 months following the commencement of operation.	Table 6-1 (FFMM37) and Section 6.1.8 Biodiversity Offset Strategy
E13	Impacts that cannot be offset under Condition E12, must be offset by making a payment to the DPI Fish Conservation Trust Fund for KFH. Payment into the fund must be made no later than 24 months following the commencement of operation. Note: <i>The monetary offset (i.e. contribution to the Biodiversity Offset Fund for fish habitat) should be the last alternative and only be pursued if all on-ground offset opportunities have been investigated at length and determined to be unachievable.</i>	Section 6.1.8 Biodiversity Offset Strategy
E14	The Proponent must submit to the Planning Secretary a receipt confirming payment to the DPI Fish Conservation Trust Fund within one month of making the payment.	Section 6.1.8 Biodiversity Offset Strategy
E15	The Estuary Cod (<i>Epinephelus coioides</i>) must be assumed to be present in the Hunter River. Management measures must be developed to minimise impacts to the Estuary Cod (<i>Epinephelus coioides</i>) and documented in the Flora and Fauna CEMP Sub-plan required under Condition C5. The management measures must be implemented prior to and during works that have the potential to impact on Estuary Cod habitat.	Table 6-1 (FFMM39), and Section 6.1.5 and 7.4 Section 7.1 of the Flora and Fauna Protection Procedure (Appendix D)
E16	Suitable methods must be used to protect Estuary Cod habitat and individuals (if detected) within the construction footprint and surrounding 100 metres at the proposed Hunter River bridge site in accordance with the Appendix E of the Submissions Report as listed in Condition A1(b) and the provisions of <i>Fisheries Management Act 1994</i>.	Table 6-1 (FFMM40), and Section 6.1.5 and 7.4 Section 7.1 of the Flora and Fauna Protection Procedure (Appendix D)
E17	The CSSI must maximise the reuse of native vegetation and other habitat features that have been approved for removal. Where reuse by the CSSI is not possible, relevant council(s), NPWS, Local Land Services, local Landcare groups, DPIRD Fisheries and any additional relevant government agencies must be consulted prior to the removal of vegetation and other habitat to determine if: (a) hollows, tree trunks (greater than 25-30 centimetres in diameter and 2-3 metres in length), mulch, bush rock and root balls salvaged from native vegetation impacted by the CSSI; and (b) collected plant material, seeds and/or propagated plants from native vegetation impacted by the CSSI, could be used by others in habitat enhancement and rehabilitation work, before pursuing other disposal options. If the timber can be re-used by others, the Proponent must advise them and facilitate access for salvage.	Section 6.1.3 Replacement Habitat Strategy (Appendix C)
E18	Where trees are to be removed, the Proponent must provide a net increase in the number of replacement trees at a ratio of 2:1, except trees that are offset under Condition E7. Replacement trees must be located on public land and prioritised within and up to 500 meters from the construction footprint in consultation with the relevant authority.	Section 6.1.3 of this Plan Section 7 of the Replacement Habitat Strategy (Appendix C)

NSW CoA No.	Condition requirements	Document reference
	Replacement tree pot size must be consistent with the relevant authority's plans / programs / strategies for vegetation management, street planting, or open space landscaping, or as agreed by the relevant authority(ies). The replacement trees must be planted prior to the commencement of operation unless otherwise agreed by the Planning Secretary. The Proponent must retain a record of the number of trees removed and replaced in accordance with this condition including number, location, size and species. The record must be made available to the Planning Secretary upon request within one week of the request. Note: For the purposes of this condition, the relevant authority is that State or local government authority that owns or manages the land on which the replacement trees will be planted.	
E145	Waste generated during construction and operation must be dealt with in accordance with the following priorities: (a) waste generation must be avoided and where avoidance is not reasonably practicable, waste generation must be reduced (b) where avoiding or reducing waste is not possible, waste must be re-used, recycled, or recovered, and (c) where re-using, recycling or recovering waste is not possible, waste must be treated or disposed of.	Table 6-1 (FFMM55)
E150	Works on waterfront land and within watercourses must have regard to <i>Guidelines for controlled activities on waterfront land</i> (NRAR, 2018). This includes outlets and watercourse crossings.	Table 6-1 (FFMM55)
E151	Proposed revegetation within riparian zones should have regard to NRARs guidelines for Vegetation Management Plans and accommodate a fully structured vegetated riparian zone using indigenous species.	Table 6-1 (FFMM55)

3.3. Environmental Management Measures

Relevant REMMs are listed in Table 3-3. This includes reference to required outcomes, the timing of when the commitment applies and cross reference to indicate where the requirement is addressed in this Plan or other Project management documents.

Table 3-3 Revised Environmental Management Measures relevant to this FFMP

Impact	Ref #	Commitment	Timing	Document Reference
Loss of vegetation and habitat for flora and fauna including threatened species	B01	A Flora and Fauna Management Plan (FFMP) will be prepared in accordance with the 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011). It will address terrestrial and aquatic matters and include, but not necessarily be limited to: - Plans for the construction footprint and adjoining areas showing native vegetation, flora and fauna habitat, threatened species and endangered ecological communities - Procedures addressing relevant matters specified in the 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011) - Procedures for the protection of aquatic fauna associated with instream works. All personnel working on site will receive training to ensure awareness of requirements of the FFMP and relevant statutory responsibilities.	Detailed design/ prior to construction	This Plan Section 4 Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol Fauna Crossing and Connectivity Strategy (Appendix B) Replacement Habitat Strategy (Appendix C) Flora and Fauna Protection Procedure (Appendix D) Weed and Pathogen Control Procedure (Appendix E)

Impact	Ref #	Commitment	Timing	Document Reference
				Flora and Fauna Protection Procedure (Appendix D)
	B02	Pre-clearing surveys will be carried out in accordance with 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (Guide 1: Pre-clearing process) (RTA 2011).	Prior to construction	Table 6-1 (FFMM8) Section 6.3 of the Flora and Fauna Protection Procedure (Appendix D)
	B03	If any threatened species, not assessed in the biodiversity assessment, are identified in the construction footprint, the unexpected species find procedure is to be followed under 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011).	Construction	Section 6.1.2 Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol
	B04	Vegetation and habitat removal will be carried out in accordance with 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (Guide 4: Clearing of vegetation and removal of bushrock) (RTA 2011).	Construction	Table 6-1 (FFMM8) (Vegetation Clearing, Protection and Management) Replacement Habitat Strategy (Appendix C)
	B05	Revegetation will be carried out in accordance with 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011) (Guide 3: Re-establishment of native vegetation) and the Landscape Plan prepared for the project.	Construction	Section 1.3.1 Section 7 of the Replacement Habitat Strategy (Appendix C) Design and Landscape Plan
	B06	Re-use of woody debris and bushrock and installation of nest boxes would be carried out in accordance with the 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011), Guide 5 & Guide 8.	Construction	Section 4.2 and 5 of the Replacement Habitat Strategy (Appendix C)
Potential impacts to aquatic habitat	B07	Aquatic habitat will be protected in accordance with Guide 10: Aquatic habitats and riparian zones of the 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011) and where practicable, Section 3.3.2 Standard precautions and mitigation measures of the 'Policy and guidelines for fish habitat conservation and management Update 2013' (DPI 2013a). Management measures will be developed in consultation with DPIRD Fisheries.	Detailed design / Construction	Section 9 of the Flora and Fauna Protection Procedure (Appendix D) Consultation Records (Appendix A)
Fragmentation of habitat and barrier effects and fauna mortality during operation	B08	Fauna crossing and exclusion fencing structures would be designed and constructed to facilitate fauna connectivity and exclusion across the project in accordance with the Biodiversity Assessment Report.	Detailed design/ construction	Section 5 of the Fauna Crossing and Connectivity Strategy (Appendix B)
Edge effects on adjacent native	B09	Exclusion zones will be set up at the limit of clearing in accordance with 'Biodiversity Guidelines: Protecting and managing biodiversity	Construction	Section 6 of the Flora and Fauna Protection

Impact	Ref #	Commitment	Timing	Document Reference
vegetation and habitat		on RTA projects' (RTA 2011) (Guide 2: Exclusion zones).		Procedure (Appendix D)
Injury and mortality of fauna during clearing and construction	B10	Fauna will be managed in accordance with 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011) (Guide 9: Fauna handling)	Construction	Flora and Fauna Protection Procedure (Appendix D)
Invasion and spread of weeds	B11	Weed species will be managed in accordance with 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011) (Guide 6: Weed management).	Construction	Table 6-1 (FFMM50) Weed and Pathogen Control Procedure (Appendix E)
Invasion and spread of pest animal, pathogens and disease	B12	Pest species and pathogens will be managed in accordance Guide 2: Exclusion zones of the 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011), the Commonwealth Biosecurity Act 2015, NSW Biosecurity Act 2015 and where relevant, the Australian Ballast Water Management Requirements.	Construction	Table 6-1 (FFMM51) Weed and Pathogen Control Procedure (Appendix E)
Noise, light and vibration	B13	The need for artificial lighting during construction and operation will be minimised where feasible, including directing lighting away from vegetated areas where practicable.	Detailed design/construction	Section 4 (Flora and Fauna Protection Procedure (Appendix D)

3.4. EPBC Act Approval

Relevant EPBC Act Approval CoAs are listed in Table 3-4. This includes reference to required outcomes, the timing of when the commitment applies and cross reference to indicate where the requirement is addressed in this Plan or other Project management documents.

Table 3-4. Commonwealth (EPBC) CoA relevant to this FFMP

EPBC CoA No.	Condition requirements	Document reference
1	The approval holder must only undertake the action as described in, and in accordance with, the NSW Approval.	This Plan Section 3.2
2	The approval holder must not clear protected matters outside of the final project area	Table 6-1 (FFMM05 & FFMM10)
2A	The approval holder must submit to the department a map(s) of the final project area within six months of the final project area being determined, and within six months of undertaking any subsequent consistency assessments in accordance with Condition 2B, and where the action is staged, a map of the final project area for each stage, within six months of the final project area for that stage being determined.	This Plan Section 6.1.8 Biodiversity Offset Strategy
2B	Before undertaking clearing outside the project area, the approval holder must undertake a consistency assessment. The approval holder must ensure that the consistency assessment shows that the additional works outside the project area does not result in greater overall impacts on protected matters than what is approved in this approval. If the consistency assessment shows that the impact will be greater, or any new protected matters are identified, the additional work may not proceed.	Table 6-1 (FFMM5 & FFMM9) Section 7.6
3	The approval holder must not clear more than: (a) 89.1 hectares (ha) of Koala habitat (b) 43.74 ha of Australasian Bittern habitat (c) 83.43 ha of Grey-headed Flying-fox habitat (d) 82.1 ha of Regent Honeyeater habitat (e) 81.1 ha of Swift Parrot habitat (f) 34 Earp's Gum individuals (g) 3 Tall Knotweed individuals	Section 6.1.8 Biodiversity Offset Strategy

EPBC CoA No.	Condition requirements	Document reference
4	The approval holder must provide the report specified in Condition E6 of the NSW Approval to the department within 12 months of the commencement of construction to demonstrate how clearing impacts on protected matters have been minimised.	Transport retains all offsetting requirements for the Project Section 6.1.8
5	The approval holder must comply with Conditions E7 to E11 of the NSW Approval to offset impacts on the Koala and Australasian Bittern. The approval holder, in accordance with Condition E7 of the NSW Approval, must retire: (a) 2,317 species credits for Koala habitat (b) 569 species credits for Australasian Bittern habitat	Transport retains all offsetting requirements for the Project Biodiversity Offset Strategy
6	The approval holder must prepare, in consultation with the department, a CEMP Flora and Fauna sub-plan to avoid, mitigate and manage impacts on protected matters during construction. The approval holder must:	This Plan
	(a) ensure the CEMP Flora and Fauna sub-plan meets the requirements specified in Condition C6 of the NSW Approval; and	Section 3.2
	(b) comply with Conditions C10 and C11 of the NSW Approval as they relate to the submission and implementation of the CEMP Flora and Fauna sub-plan.	Section 3.2
7	The approval holder must prepare, in consultation with the department, a Fauna and Flora Construction Monitoring Program (FFCMP) to ensure the environmental performance outcomes in Condition A1 of the NSW Approval or the CEMP Flora and Fauna sub-plan will be achieved for protected matters.	Appendix G
8	The approval holder must:	
	(a) ensure the FFCMP is consistent with Commonwealth approved conservation advices and made or adopted recovery plans for relevant protected matters;	Appendix G
	(b) ensure the FFCMP meets the requirements of Condition C13 of the NSW Approval; and	Appendix G
	(c) comply with Conditions C16 and C17 of the NSW Approval as they relate to the submission and implementation of the FFCMP.	Appendix G
9	The approval holder must submit each Construction Monitoring Report (CMR), as required by Condition C18 of the NSW Approval, to the department for information within 10 business days of that CMR being accepted by the Planning Secretary.	Section 7.4.1
10	Unless otherwise agreed to in writing by the Minister, the approval holder must publish each CMR on the website within 15 business days of submitting it to the department. All published CMRs must remain on the website until the expiry date of this approval.	Section 7.4.1
12	If the approval holder submits a revised version of a plan for the Planning Secretary's approval, the approval holder must provide the revised plan to the department within 10 business days and an explanation of the differences between the approved plan and the revised plan.	Section 8.2
13	If a revised version of a plan is approved by the Planning Secretary, the approval holder must provide the revised plan to the department within 10 business days of the Planning Secretary's approval.	Section 8.2
20	The approval holder must maintain accurate and complete compliance records.	Section 7.4
21	If the department makes a request in writing, the approval holder must provide electronic copies of compliance records to the department within the timeframe specified in the request.	Section 7.4
22	The approval holder must ensure that any monitoring data (including sensitive ecological data), surveys, maps, and other spatial and metadata required under the conditions of this approval are prepared in accordance with the <i>Guidelines for biological survey and mapped data</i> (Commonwealth of Australia 2018), or as otherwise specified by the Minister in writing.	Section 7.4.1
23	The approval holder must ensure that any monitoring data (including sensitive ecological data), surveys, maps, and other spatial and metadata required under the conditions of this approval are prepared in accordance with the <i>Guide to providing maps and boundary data for EPBC Act projects</i> (Commonwealth of Australia 2021), or as otherwise specified by the Minister in writing.	Section 7.4.1

EPBC CoA No.	Condition requirements	Document reference
24	The approval holder must submit all monitoring data (including sensitive ecological data), surveys, maps, other spatial and metadata and all species occurrence record data (sightings and evidence of presence) electronically to the department within 12 months of this approval or in accordance with the requirements of the CEMP Flora and Fauna sub-plan and FFCMP.	Section 7.4.1

4. Existing Environment

The following sections summarise existing flora and fauna within and adjacent to the construction footprint, including species, communities and habitats.

4.1. Key Reference Documents

The key reference documents are detailed below:

- EIS Chapter 9 – Biodiversity
- EIS Appendix I – Biodiversity Assessment Report
- Submissions Report Appendix E – Updated Biodiversity Assessment Report
- Assessment Report, Section 6.4
- Relevant guidelines, specifications, and policy documents (Section 3.1 of this Plan).

The Project boundary and relevant ecological data is shown on the Sensitive Area Plans and associated Environmental Control Map(s) included in Appendix A5 of the CEMP.

4.2. Landscape Features

Table 4-1 summarises the relevant biodiversity landscape features identified in the EIS. Important wetlands, waterways and the existing BioBanking site are shown in Figure 4-1 and Figure 4-2. Native vegetation extent and fauna corridors are shown in Figure 4-3.

Table 4-1: Biodiversity landscape features

Landscape features	Description
Interim Biogeographic Rationalisation for Australia bioregions and subregions	• Sydney Basin Bioregion (Hunter subregion) • NSW North Coast Bioregion (Karuah Manning subregion).
NSW Landscape Regions (Mitchell landscapes)	• Newcastle Coastal Ramp • Lower Hunter Channels and Floodplains • Sydney – Newcastle Barriers and Beaches.
Rivers and streams	The construction footprint is located within the Hunter River catchment and traverses the Hunter River and its floodplain. The Hunter River catchment covers an area of about 22,000 km² and is a major river in NSW. The confluence of the Williams River and the Hunter River is at Raymond Terrace about 5km upstream of the construction footprint. In addition to the Hunter River, the project will cross several waterways including: • A tributary of Viney Creek • 'Glenrowan Creek' (Note: This is an unnamed local tributary of Mid Site Creek and is referred to as Glenrowan Creek for ease of interpretation only) • Purgatory Creek • Hunter River.
Wetland and aquatic habitat	Aquatic habitats within the landscape buffer area include mangroves and saltmarsh, freshwater wetlands, ephemeral streams and drainage channels that are located on the floodplains and flow toward the Hunter River. Three waterways have been identified as Key Fish Habitat (KFH) within the construction footprint • Purgatory Creek (downstream of floodgates at the junction with Hunter River) (Type 1 KFH) • Hunter River (Type 1 KFH) • Unnamed wetland listed under SEPP (Resilience and Hazards) 2021 (Type 1 KFH). Three wetlands listed under SEPP (Resilience and Hazards) are located within the construction footprint: • South of the existing New England Highway at Tarro • On the western banks of the Hunter River • The eastern bank of the Hunter River, north of the Pacific Highway. Other SEPP (Resilience and Hazards) 2021 mapped coastal wetlands occur within 500m of the construction footprint. Although not classified under the SEPP (Resilience and Hazards) 2021 or a protected wetland, a wetland (referred to as the Hunter River wetland, site M12RT8) is located

Landscape features	Description
	adjacent to the Hunter Region Botanic Gardens on the north-eastern side of the Hunter River. This wetland is considered likely to be supported by groundwater discharge and is likely to be a groundwater dependent ecosystem. Hexham Swamp Nature Reserve forms part of the floodplain environment on the southern side of the Hunter River. The Hexham Swamp Nature Reserve, and the surrounding wetland area, are classified as Coastal Wetland under the SEPP (Resilience and Hazards) 2021. The boundary of the Hexham Swamp Nature Reserve is located about 2km south of the construction footprint. The Hunter Estuary Wetlands Ramsar site is located within 10km of the construction footprint and is comprised of: • Kooragang Nature Reserve (as part of the Hunter Wetlands National Park). The Reserve is located about 1.9km to the south-east of the construction footprint at its nearest point at Tomago Road. The reserve is located about 5.1km downstream of the proposed crossing of the Hunter River • Hunter Wetlands Centre Australia in Shortland, located about 3.8km south of the construction footprint.
State, regional, local biodiversity links and connectivity value	No plan detailing regionally significant biodiversity links approved by the Environment Energy Science Group Chief Executive exists for the landscape buffer area and there are no state significant or regionally significant biodiversity links intersected by the construction footprint. However, the following corridors have been identified within the landscape buffer area: • The construction footprint is wholly within the Watagan to Stockton Green Corridor as identified in the Lower Hunter Regional Strategy (NSW Department of Planning 2006) • The northern portion of the construction footprint is within the regional corridor referred to as Richardson Road (Scotts 2003), which provides a link from the Hexham Swamp Nature Reserve north and east across the Hunter River to Grahamstown Dam • The Newcastle and Karuah-Hunter coastal climate change corridors (i.e. Newcastle and Karuah-Hunter) join at the Hunter River (DECC 2007a) and identify a north-south regional link traversing to the west of Newcastle within the construction footprint • The riparian buffer of the Hunter River (as a 6th order stream or greater) located in the construction footprint supports Mangrove and Swamp Oak forests as well as Coastal Saltmarsh.
Existing BioBanking sites	The construction footprint impacts on about 0.6ha of a site with an existing BioBanking Agreement, located around the Hunter Region Botanic Gardens and east of the existing Pacific Highway. The entire BioBanking site is around 106ha in size.

Black Hill to Tomago

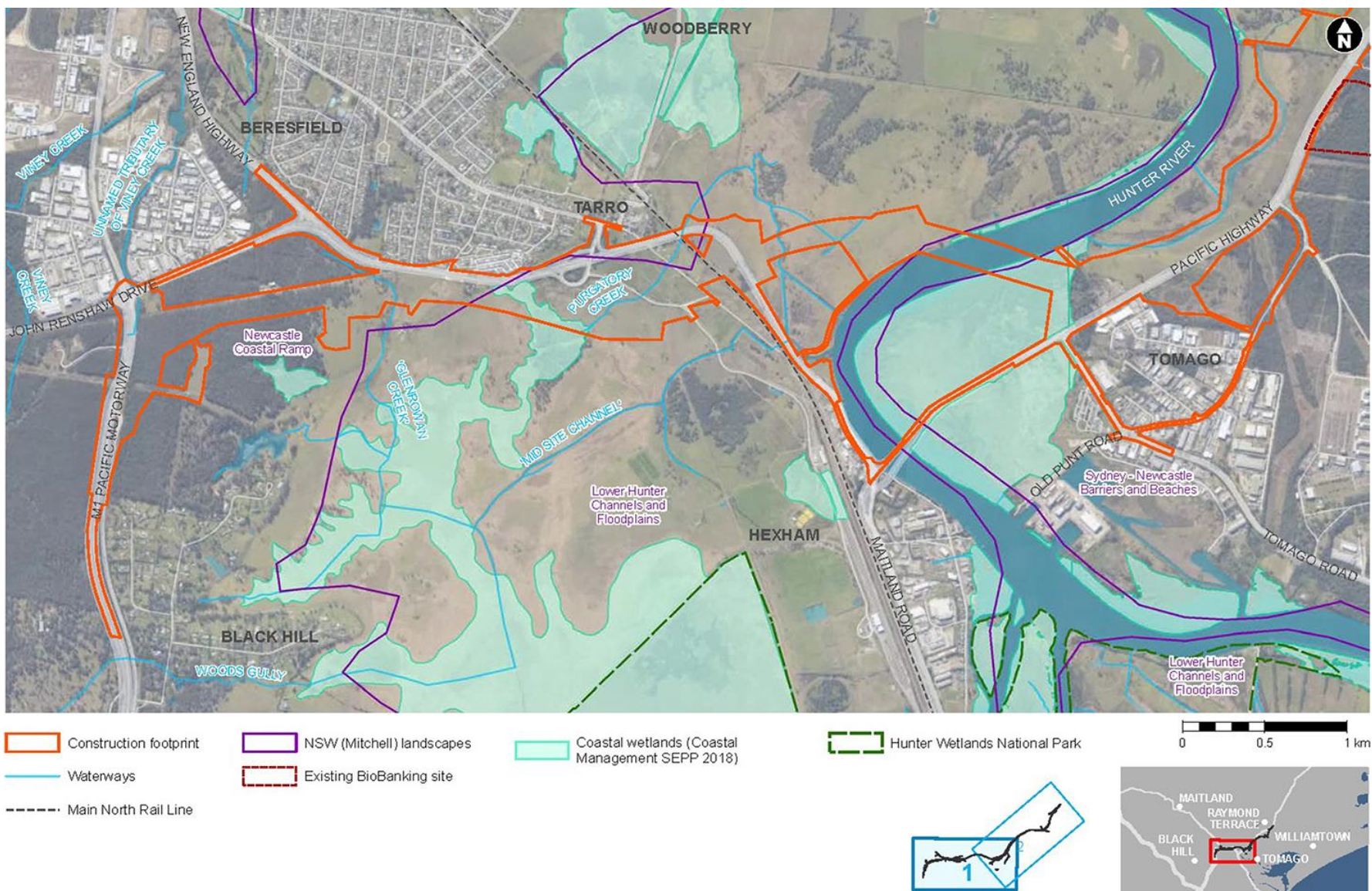
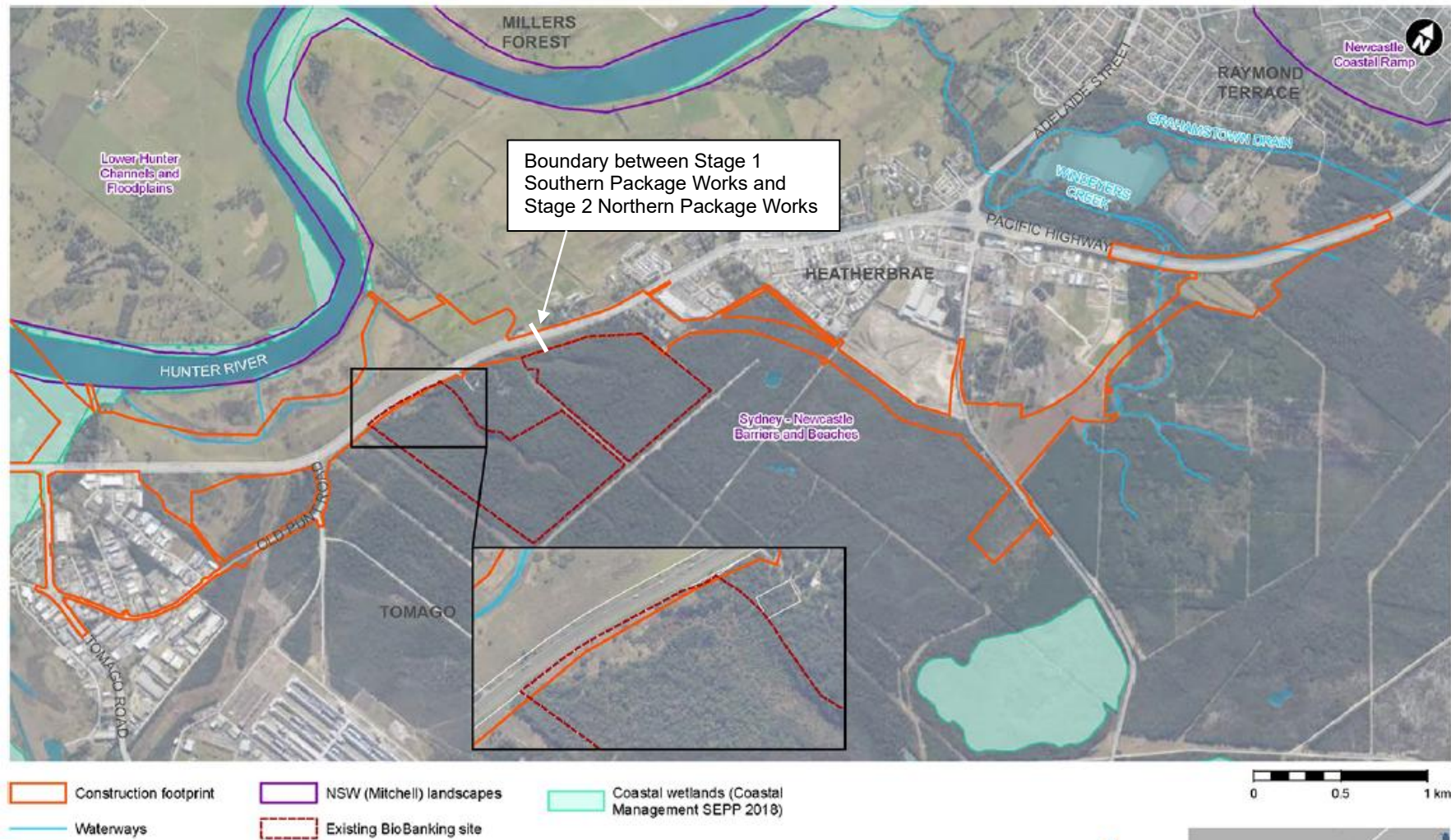


Figure 4-1: National Parks and Important Wetlands (map 1 of 2)



Page 2 of 2



Figure 4-2 National Parks and Important Wetlands (map 2 of 2)

Black Hill to Tomago

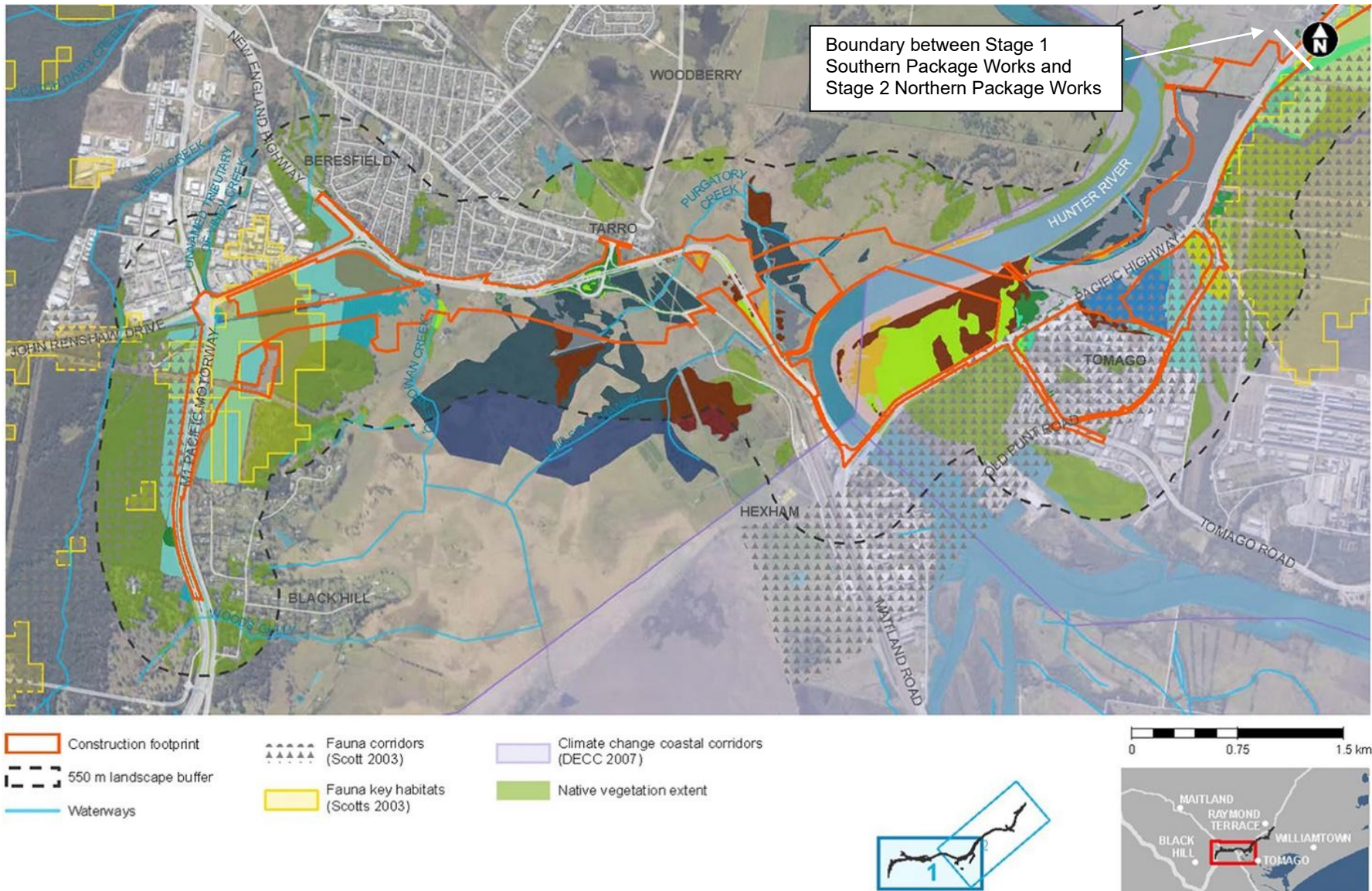


Figure 4-3: Native vegetation extent and fauna corridors

4.3. Plant Community Types

Thirteen (13) Plant Community Types (PCTs) were identified within the construction footprint and are summarised below in Table 4-2. As these PCTs have largely been decommissioned, legacy PCTs have been referenced consistent with the Revised Biodiversity Assessment Report (June 2022) (Appendix E of the Submissions Report). The area of non-native vegetation within the construction footprint is also presented in the table below.

Table 4-2. Plant Community Types identified within the construction footprint.

PCT No.	PCT Name	Threatened Ecological Community (TEC)	Area Within Construction Footprint (ha)
1590	Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest of the Lower Hunter	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	37.89
1588	Grey Ironbark – Broad-leaved Mahogany – Forest Red Gum shrubby open forest on Coastal	Not a TEC	7.60
1646	Smooth-barked Apple – Blackbutt – Old Man Banksia woodland on coastal sands of the Central and Lower North Coast	Not a TEC	3.62
1598	Forest Red Gum grassy open forest on floodplains of the lower Hunter	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	0.51
1716	Prickly-leaved Paperbark forest on coastal lowlands of the Central Coast and Lower North Coast	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	1.88
1717	Broad-leaved Paperbark – Swamp Mahogany – Swamp Oak – Saw Sedge swamp forest of the Central Coast and Lower North Coast		1.74
1724	Broad-leaved Paperbark – Swamp Oak – Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast		1.64
1727	Swamp Oak – Sea Rush – <i>Baumea juncea</i> swamp forest on coastal lowlands of the Central Coast and Lower North Coast	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	8.57
1736	Water Couch – Tall Spike Rush freshwater wetland of the Central Coast and lower Hunter	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	57.92
1742	Jointed Twig-rush sedgeland		0.10
1071	<i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands of the Sydney Basin Bioregion		7.74
1746	Saltmarsh Estuarine Complex	Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregion	1.27
1747	Grey Mangrove low closed forest	Not a TEC	2.27
N/A	Planted native vegetation	Not a TEC	12.73
N/A	Exotic vegetation	Not a TEC	0.69

4.4. Threatened Ecological Communities

Threatened Ecological Communities (TECs) listed in NSW under the former *Threatened Species Conservation Act 1995* (repealed by the *Biodiversity Conservation Act 2016* [BC Act]) have been located in the study area and are listed below:

- Coastal Saltmarsh

- Freshwater Wetlands on Coastal Floodplains
- Hunter Lowland Redgum Forest
- Lower Hunter Spotted Gum Ironbark Forest
- Swamp Oak Floodplain Forest
- Swamp Sclerophyll Forest on Coastal Floodplains.

The location of these TECs in relation to the Project is shown on Figure 4-4 to Figure 4-7, on the Sensitive Area Plans included in Appendix A5 of the CEMP.

The Plant Community Type 1746 (Saltmarsh Estuarine Complex) is consistent with the listed Subtropical and Temperate Coastal Saltmarsh community, identified as vulnerable under the EPBC Act. None of the occurrences of PCT 1727 within the construction footprint are listed as endangered as they are not of sufficient size or condition to meet the eligibility for the EPBC Act listed Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community.

It is noted that under Part 4 of the *Biodiversity Conservation (Savings and Transitional) Regulation 2016* any species or threatened ecological community that was listed under the *Threatened Species Conservation Act 1995* remain listed under the *Biodiversity Conservation Act 2016*.

4.5. Coastal Wetlands

Three wetlands listed under the State Environmental Planning Policy (Resilience and Hazards) 2021 are located within the construction footprint, as identified in the maps on the following pages, including:

- South of the existing New England Highway at Tarro
- On the western banks of the Hunter River
- The eastern bank of the Hunter River, north of the Pacific Highway.

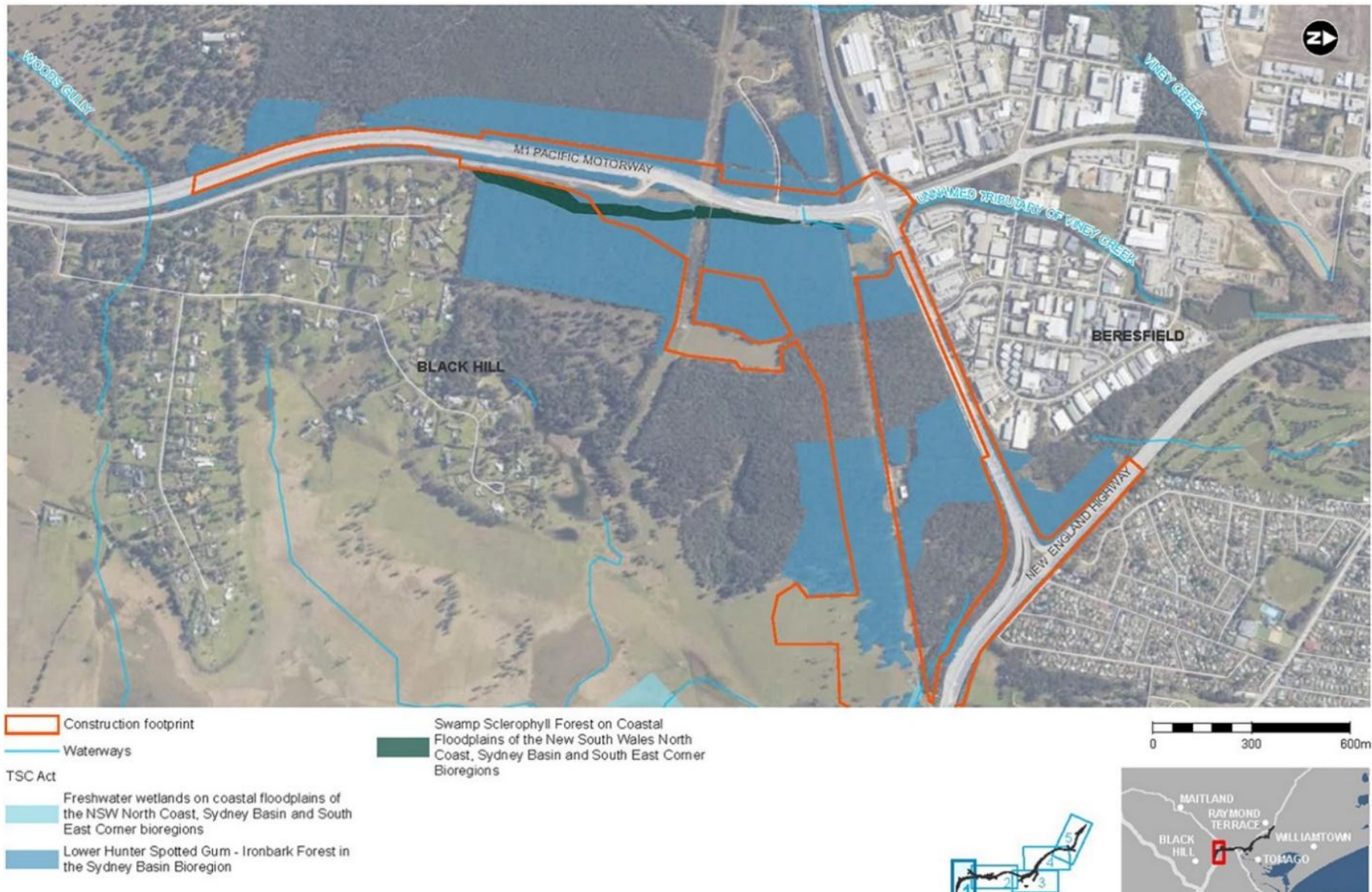


Figure 4-4: Threatened ecological communities identified in the construction footprint (map 1 of 4)

Black Hill to Tomago

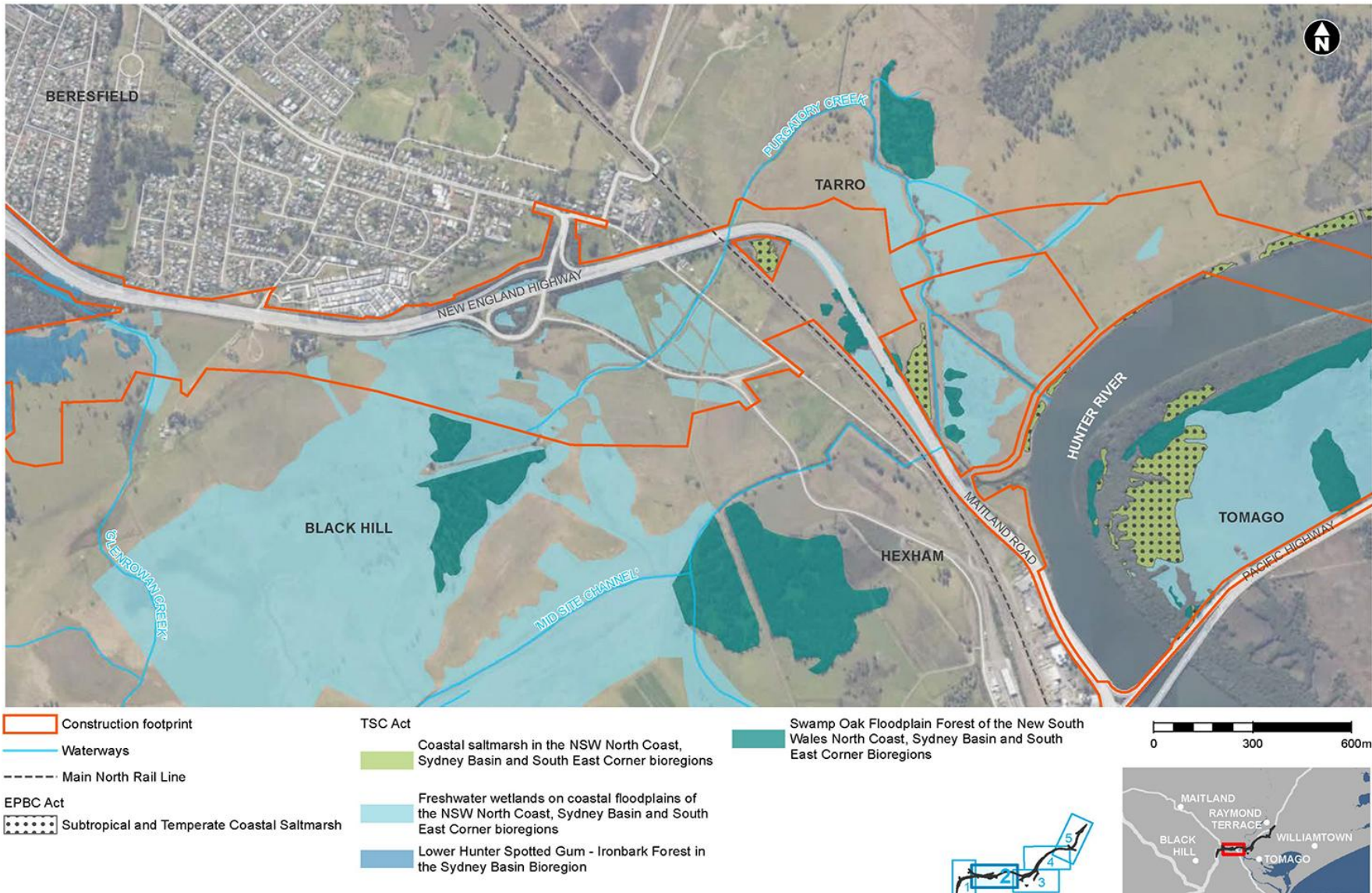


Figure 4-5: Threatened ecological communities identified in the construction footprint (map 2 of 4)

Black Hill to Tomago

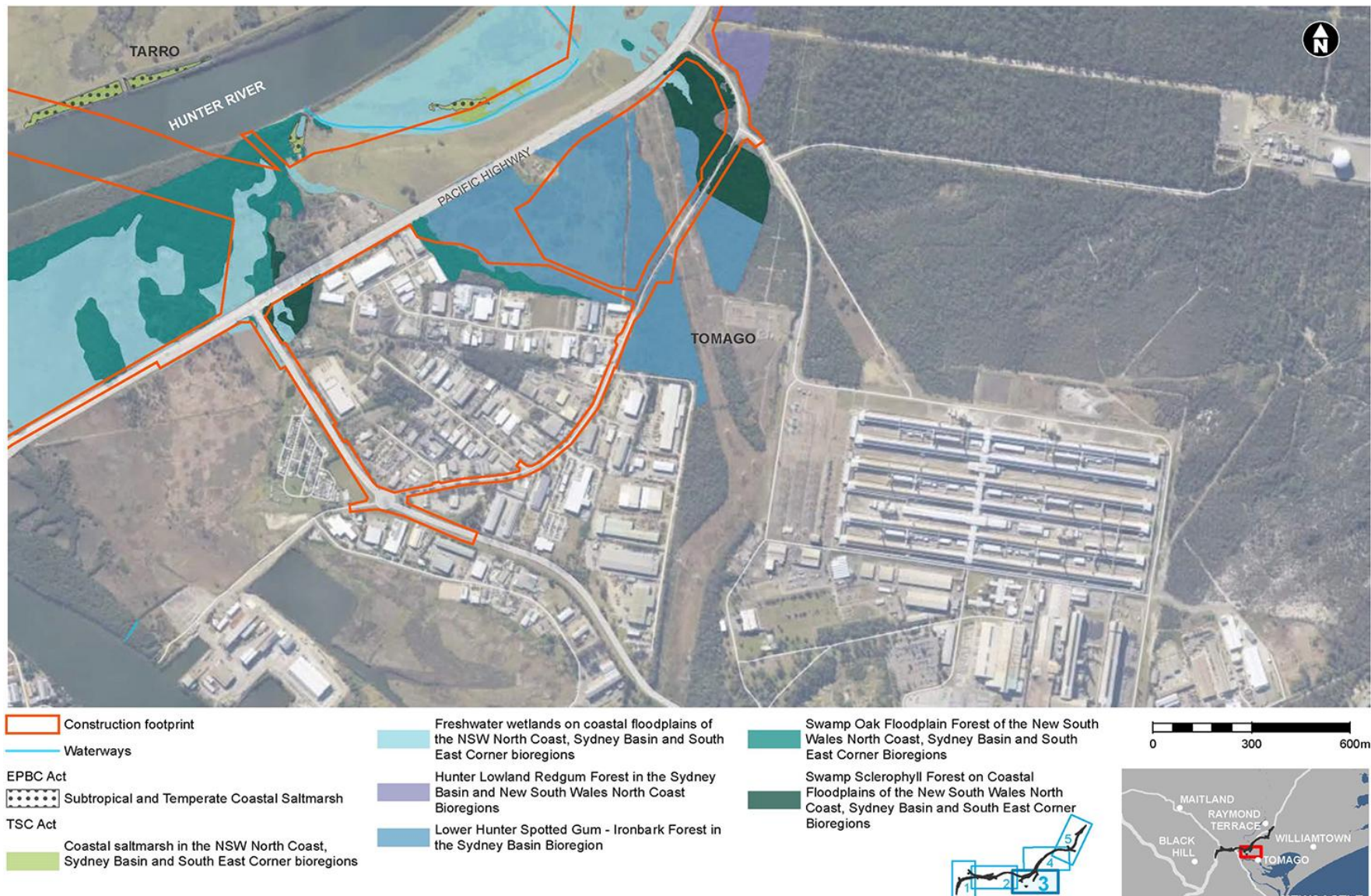


Figure 4-6: Threatened ecological communities identified in the construction footprint (map 3 of 4)

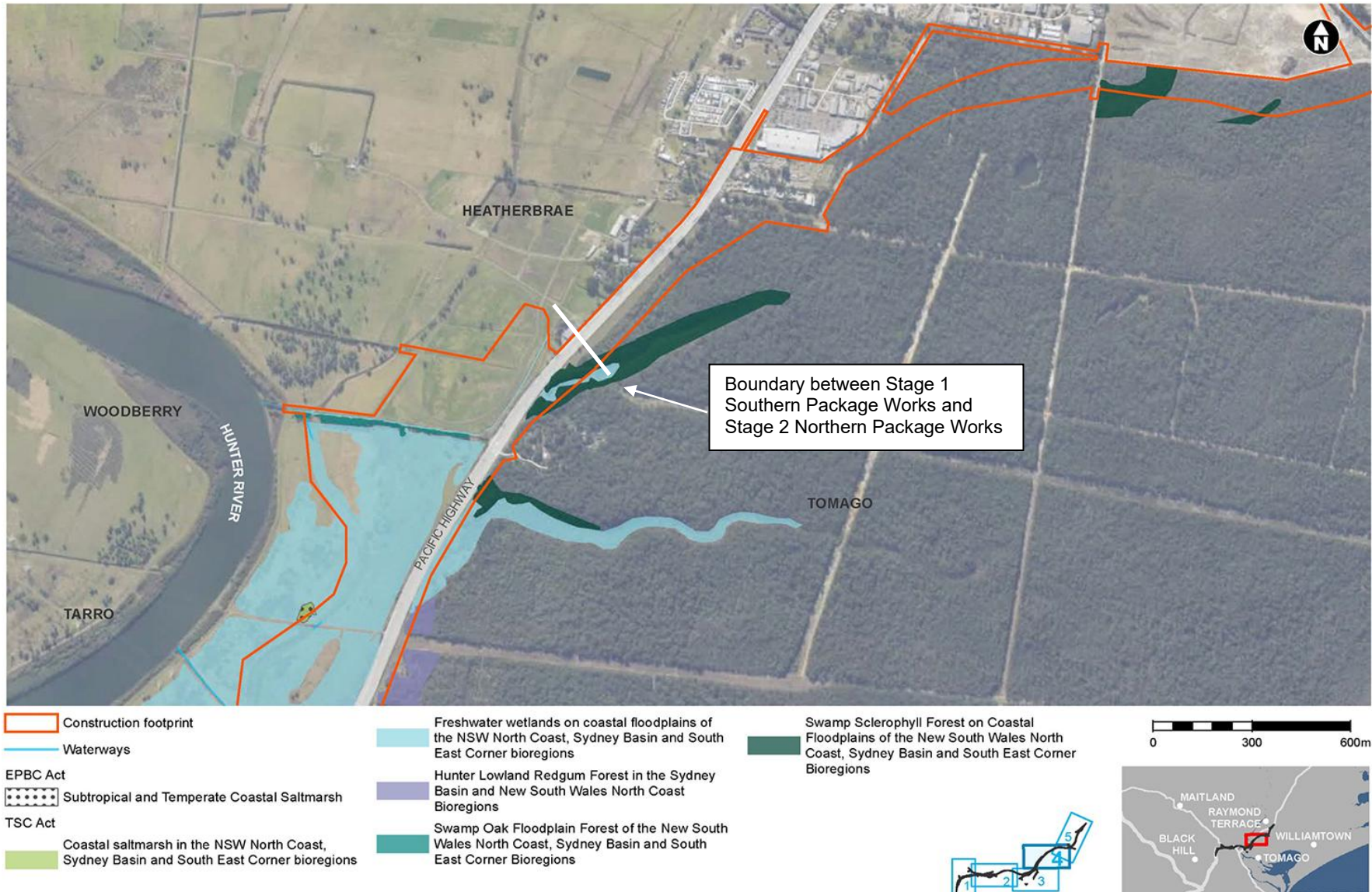


Figure 4-7: Threatened ecological communities identified in the construction footprint (map 4 of 4)

4.6. Flora

4.6.1. Threatened Flora

Threatened flora species identified, or with the potential to occur, within the construction footprint and their conservation statuses, are listed in Table 4-3.

Table 4-3: Threatened flora species.

Common name	Scientific name	EPBC Act	TSC Act	Occurrence
Tall Knotweed	<i>Persicaria elatior</i>	Vulnerable	Vulnerable	Known to occur within construction footprint
Sand Doubletail	<i>Diuris arenaria</i>	N/A	Vulnerable	Recorded near the construction footprint
Netted Bottlebrush	<i>Callistemon linearifolius</i>	N/A	Vulnerable	Known to occur within construction footprint
Small-flower Grevillea	<i>Grevillea parviflora subsp. parviflora</i>	Vulnerable	Vulnerable	Recorded near the construction footprint

The location of these flora species in relation to the Project is shown on Figure 4-8 to Figure 4-11, and are shown on the Sensitive Area Plans included in Appendix A5 of the CEMP.

4.7. Fauna

4.7.1. Fauna habitat

Seven broad fauna habitat types were identified in the EIS. These are listed below in Table 4-4 and are shown on the Sensitive Area Plans included in Appendix A5 of the CEMP.

Table 4-4: Fauna habitat types.

Habitat	Description	Key Habitat Characteristics	Threatened fauna species recorded or likely to occur	Migratory fauna species recorded or likely to occur
Rivers and streams	Ephemeral streams and pools, drainage channels, estuarine systems (e.g. Purgatory Creek) and major waterways (Hunter River)	Foraging and breeding habitat for threatened and protected species	Wallum Froglet (<i>Crinia tinnula</i>) Mahony's Toadlet (<i>Uperoleia mahonyi</i>)	White-bellied Sea-Eagle (<i>Haliaeetus leucogaster</i>)
Freshwater wetlands	This habitat type occurs on low elevated poorly drained floodplain areas and sandy soils along drainage lines, often with standing water.	Foraging habitat for wading birds and other common bird species.	Wallum Froglet (<i>Crinia tinnula</i>) Little Bent-winged Bat (<i>Miniopterus australis</i>) Eastern False Pipistrelle (<i>Falsistrellus tasmaniensis</i>) Eastern Coastal Free-tailed Bat (<i>Micronomus norfolkensis</i>) Mahony's Toadlet (<i>Uperoleia mahonyi</i>)	White-bellied Sea-Eagle (<i>Haliaeetus leucogaster</i>) Black Bittern (<i>Ixobrychus flavicollis</i>) Australian Bittern (<i>Botaurus poiciloptilus</i>) Migratory woodland species (such as the Rufous Fantail) could occasionally use this habitat. However, they are unlikely to depend on it other than as stepping stones across the urban landscape.
Forested wetlands	This habitat type occurs on the edges of the Hunter River floodplain at Tomago, comprising fragmented patches of modified forest. It also	Foraging habitat for wading birds and other common bird species.	Wallum Froglet (<i>Crinia tinnula</i>) Little Bent-winged Bat (<i>Miniopterus australis</i>) Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)	White-bellied Sea-Eagle (<i>Haliaeetus leucogaster</i>)

Habitat	Description	Key Habitat Characteristics	Threatened fauna species recorded or likely to occur	Migratory fauna species recorded or likely to occur
	occurs along a drainage line that runs parallel to the M1 Pacific Motorway at Black Hill. Poorly drained soils and standing water are part of this habitat type.		Eastern False Pipistrelle (<i>Falsistrellus tasmaniensis</i>) Eastern Coastal Free-tailed Bat (<i>Micronomus norfolkensis</i>) Koala (<i>Phascolarctos cinereus</i>)	
Saline wetlands	Variable habitat. Can occur in rarely tidally inundated, salt-tolerant herbaceous community which may be dominated by chenopods or grasses depending on local conditions or saline muds within the tidal zone of estuaries.	Foraging habitat for wading birds and other common bird species.	Eastern Coastal Free-tailed Bat (<i>Micronomus norfolkensis</i>)	Black Bittern (<i>Ixobrychus flavicollis</i>) White-bellied Sea-Eagle (<i>Haliaeetus leucogaster</i>)
Dry sclerophyll forests	Forest dominated by eucalypts on undulating slopes and/ or sandy soils.	Breeding and foraging habitat for threatened and protected species.	Squirrel Glider (<i>Petaurus norfolkensis</i>) Grey-crowned Babbler (<i>Pomatostomus temporalis temporalis</i>) Varied Sittella (<i>Daphoenositta chrysoptera</i>) Little Bent-winged Bat (<i>Miniopterus australis</i>) Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>) Masked Owl (<i>Tyto novaehollandiae</i>) Eastern False Pipistrelle (<i>Falsistrellus tasmaniensis</i>) Eastern Coastal Free-tailed Bat (<i>Micronomus norfolkensis</i>) Koala (<i>Phascolarctos cinereus</i>) Little Lorikeet (<i>Glossopsitta pusilla</i>)	Migratory woodland species (such as the Rufous Fantail) could occasionally use this habitat. However, they are unlikely to depend on it other than as stepping stones across the urban landscape.
Tree hollows	Critical habitat for a number of threatened species. Hollow-bearing trees were found to be most common in the dry sclerophyll forests, but also noted in lower abundance in the forested wetlands and mangrove forests (saline wetlands)	Roosting and breeding habitat for a range of threatened and protected birds and mammals.	Squirrel Glider (<i>Petaurus norfolkensis</i>) Little Bent-winged Bat (<i>Miniopterus australis</i>) Masked Owl (<i>Tyto novaehollandiae</i>) Eastern False Pipistrelle (<i>Falsistrellus tasmaniensis</i>) Eastern Coastal Free-tailed Bat (<i>Micronomus norfolkensis</i>) Powerful Owl (<i>Ninox strenua</i>) Yellow-bellied Sheath-tail-bat (<i>Saccolaimus flaviventris</i>) Greater Broad-nosed Bat (<i>Scoteanax rueppellii</i>) Glossy Black-cockatoo (<i>Calyptorhynchus lathami</i>) Little Lorikeet (<i>Glossopsitta pusilla</i>)	None

4.7.2. Threatened fauna

Threatened fauna species identified during survey (confirmed) and those that have been assumed present in the EIS are listed in Table 4-5 and identified in Figure 4-8 to Figure 4-11 on the following pages.

Table 4-5: Threatened fauna species.

Common name	Scientific name	EPBC Act	BC Act	Presence in study area
Wallum Froglet	<i>Crinia tinnula</i>	N/A	Vulnerable	Recorded
Squirrel Glider	<i>Petaurus norfolcensis</i>	N/A	Vulnerable	Recorded
Grey-crowned Babbler	<i>Pomatostomus temporalis temporalis</i>	N/A	Vulnerable	Recorded
Varied Sittella	<i>Daphoenositta chrysoptera</i>	N/A	Vulnerable	Recorded
Little Bent-winged bat	<i>Miniopterus australis</i>	N/A	Vulnerable	Recorded
Grey-headed Flying Fox	<i>Pteropus poliocephalus</i>	Vulnerable	Vulnerable	Recorded
Masked Owl	<i>Tyto novaehollandiae</i>	N/A	Vulnerable	Recorded
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	Migratory	Vulnerable	Recorded
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	N/A	Vulnerable	Recorded
Eastern Coastal Free-tailed Bat	<i>Micronomus norfolkensis</i>	N/A	Vulnerable	Recorded
Koala	<i>Phascolarctos cinereus</i>	Endangered	Endangered	Assumed present
Australasian Bittern	<i>Botaurus poiciloptilus</i>	Endangered	Endangered	Assumed present
Black Bittern	<i>Ixobrychus flavicollis</i>	N/A	Vulnerable	Assumed present
Mahony's Toadlet	<i>Uperoleia mahonyi</i>	N/A	Endangered	Assumed present
Latham's Snipe	<i>Gallinago hardwickii</i>	Migratory	N/A	Recorded
Satin Flycatcher	<i>Myiagra cyanoleuca</i>	Migratory	N/A	Recorded
Rufous Fantail	<i>Rhipidura rufifrons</i>	Migratory	N/a	Recorded

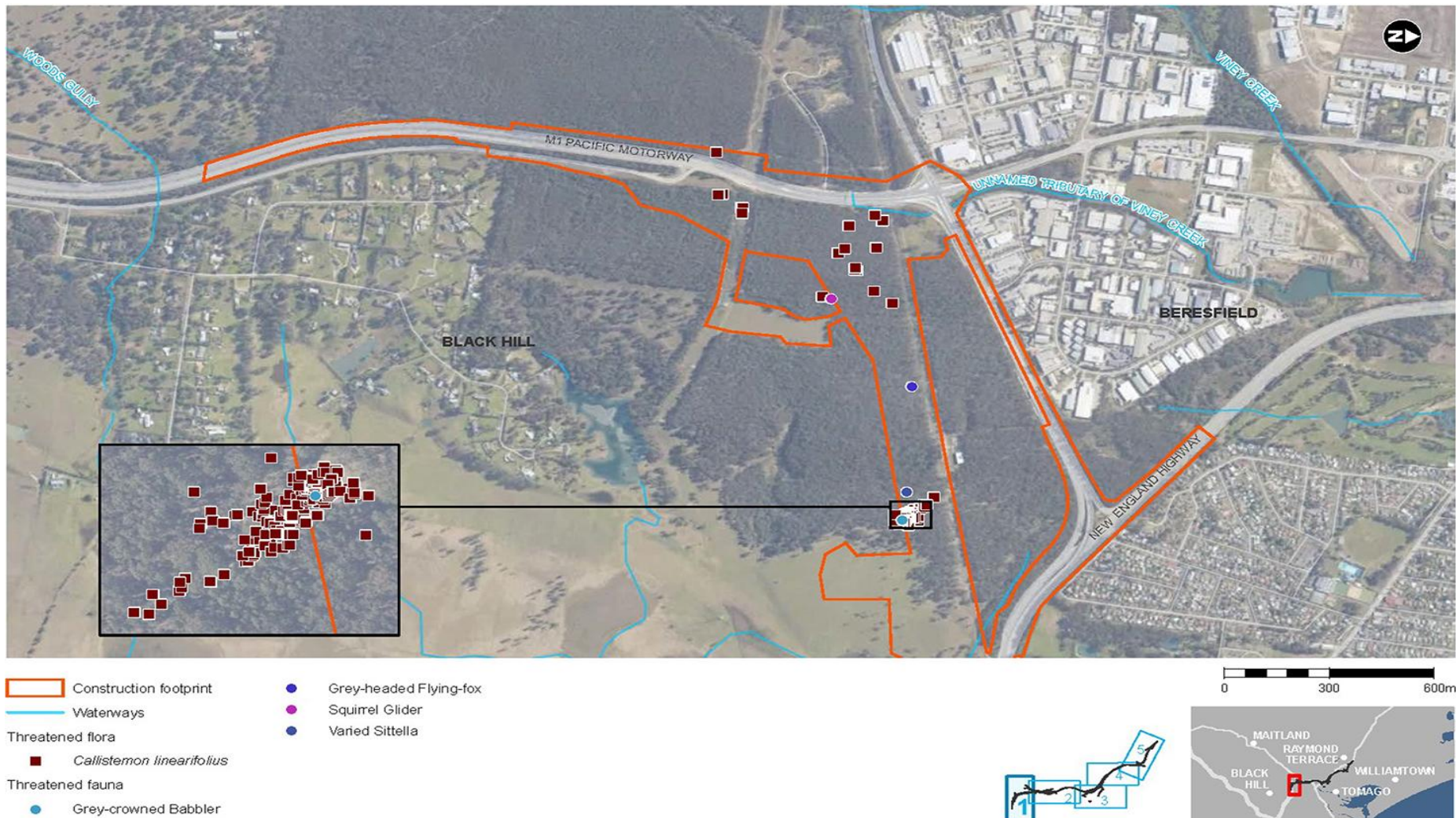


Figure 4-8: Recorded threatened species (map 1 of 4)

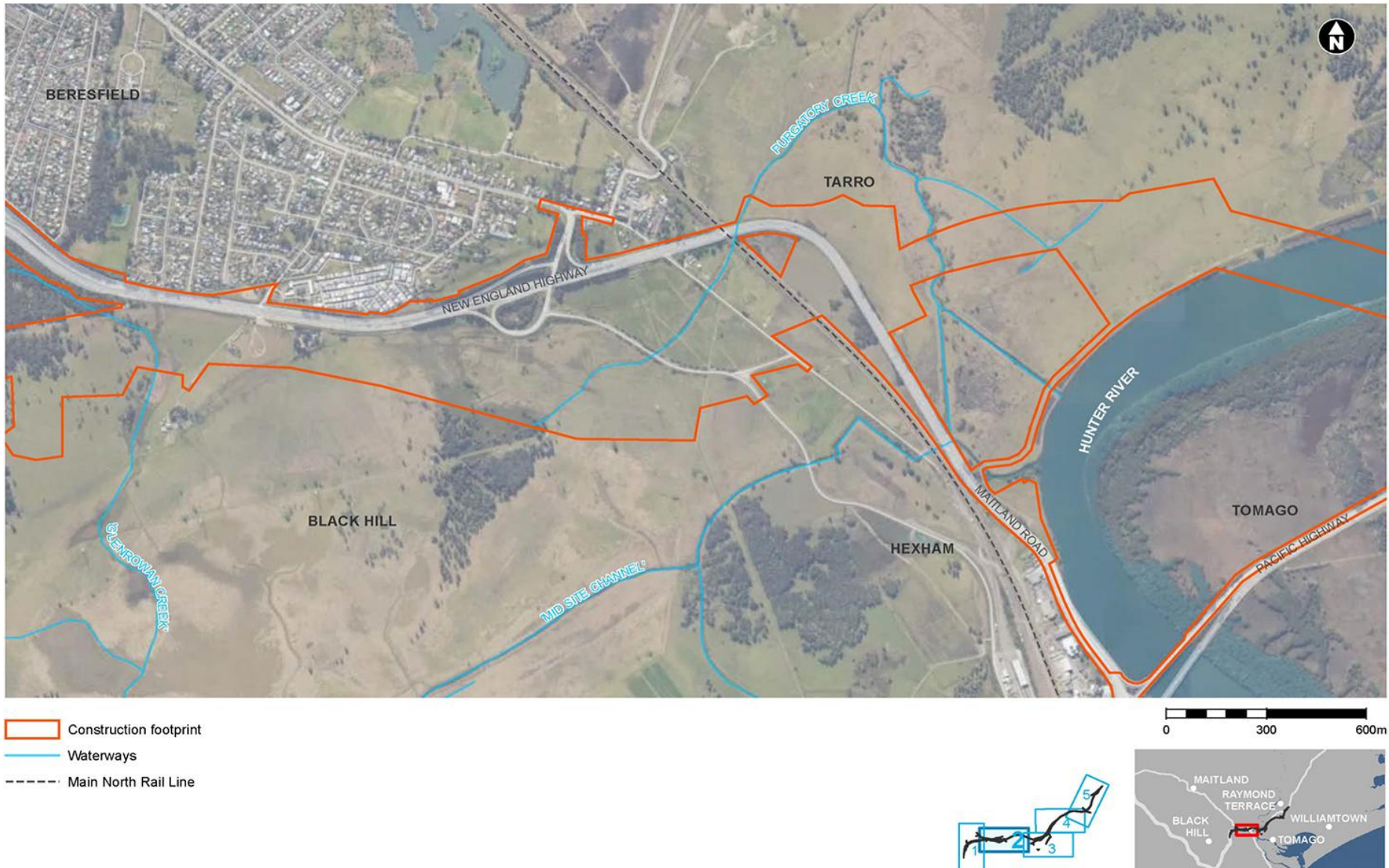


Figure 4-9: Recorded threatened species (map 2 of 4)

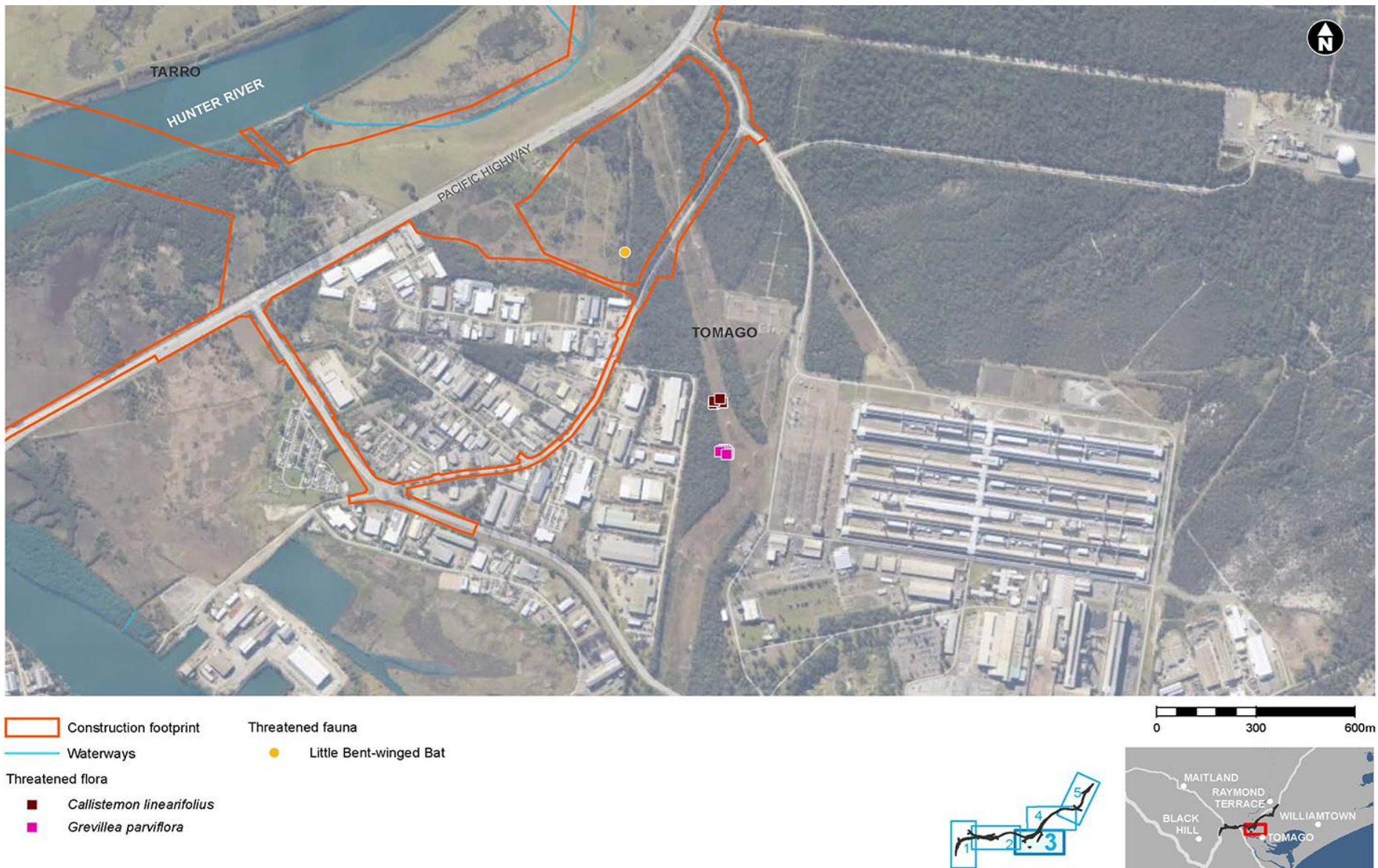


Figure 4-10: Recorded threatened species (map 3 of 4)

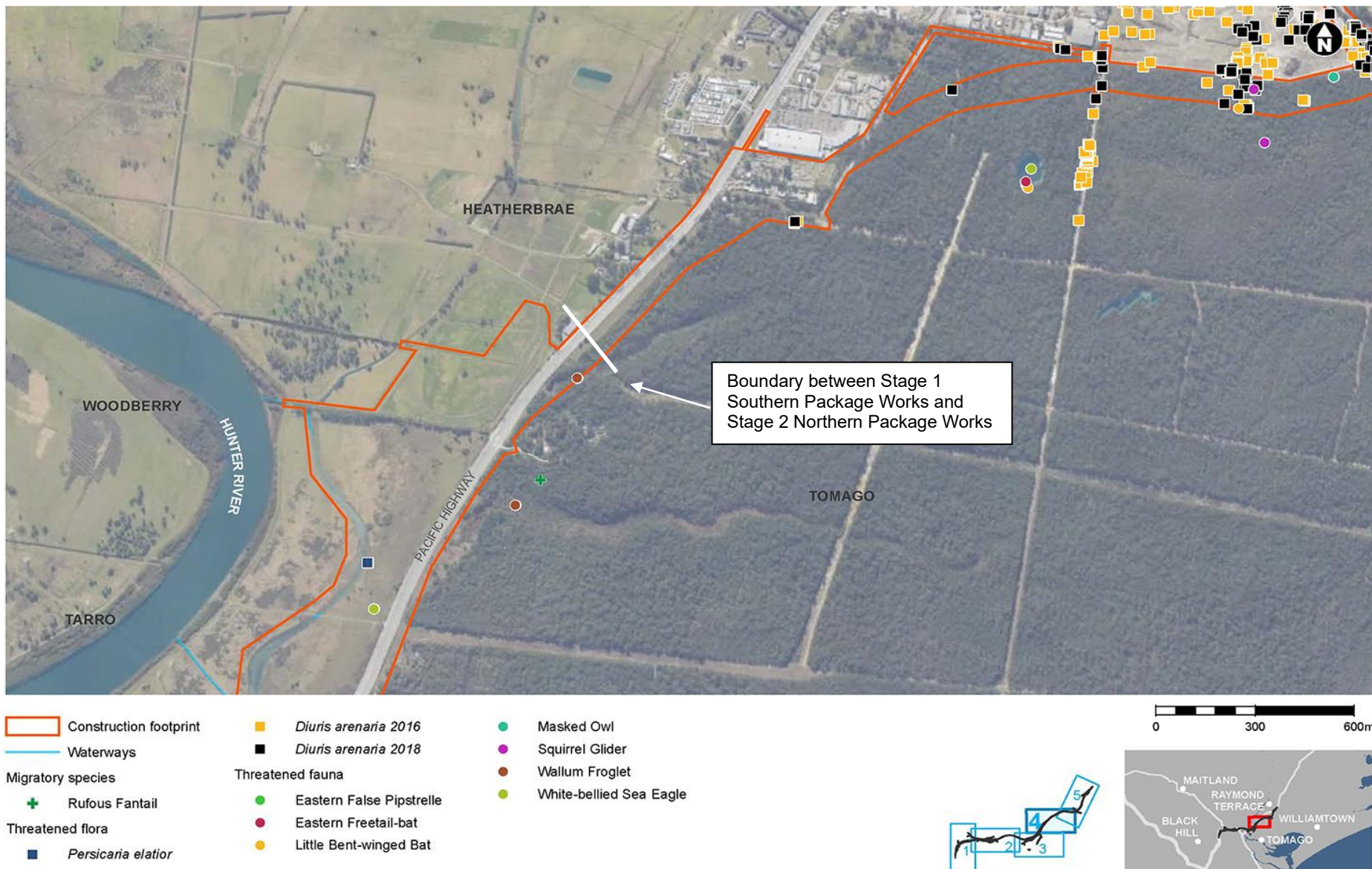


Figure 4-11: Recorded threatened species (map 4 of 4)

4.7.3. Aquatic Fauna and Habitat

Aquatic fauna species recorded in freshwater and estuarine habitats during investigations for the EIS Report are shown in Table 4-6. Of these, there are three waterways in the Project area that are classified as key fish habitat (KFH) and those predicted to occur, as shown in the maps on the following pages.

The Hunter River is a ninth-order major river that originates in the Liverpool Range and flows generally in a south-easterly direction, reaching the Tasman Sea at Newcastle. In general, the benthic habitats of the Hunter River estuary are considered disturbed from the surrounding land use and due to the largely saline conditions of the Hunter River and tributaries, it is considered unlikely any threatened aquatic species are likely within the constriction footprint, though these habitats may still provide important habitat for fish and invertebrates.

Table 4-6: Aquatic fauna and habitat within the project area.

Waterway Name	Key Fish Habitat (KFH) Type	Waterway Classification	Threatened Species
Purgatory Creek downstream of floodgates at junction with Hunter River	Type 1 – Highly sensitive Key Fish Habitat	Class 2 – Moderate fish habitat	None modelled
Hunter River estuary – at proposed Hunter River crossing	Type 1 – Highly sensitive Key Fish Habitat	Class 1 – Major fish habitat	<i>Epinephelus coioides</i> (Estuary Cod)
Unnamed wetland listed under the Coastal Management SEPP	Type 1 – Highly sensitive Key Fish Habitat	Class 1 – Major fish habitat	None modelled

Black Hill to Tomago

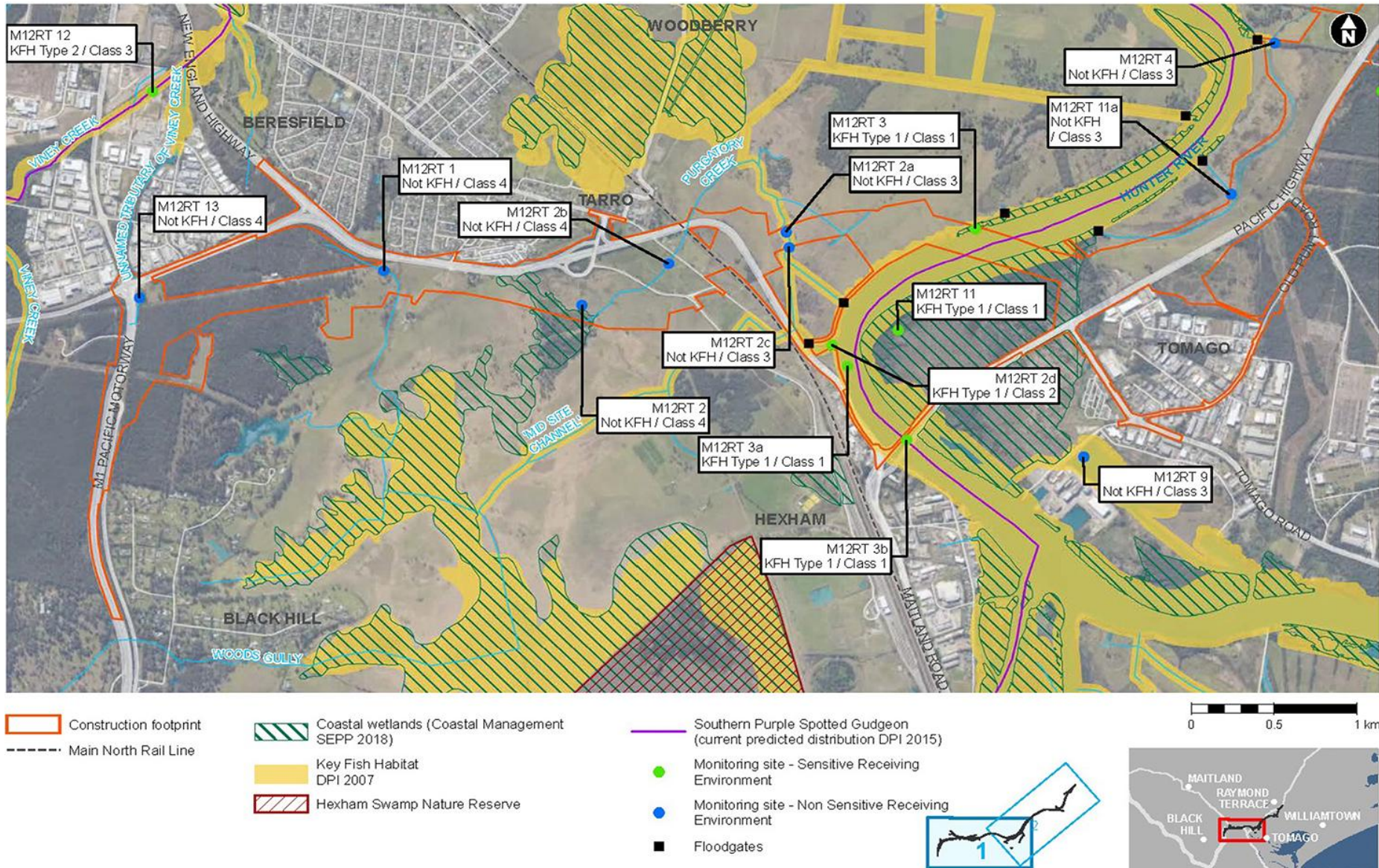


Figure 4-12: Aquatic habitat and key fish habitat assessment sites (map 1 of 2)

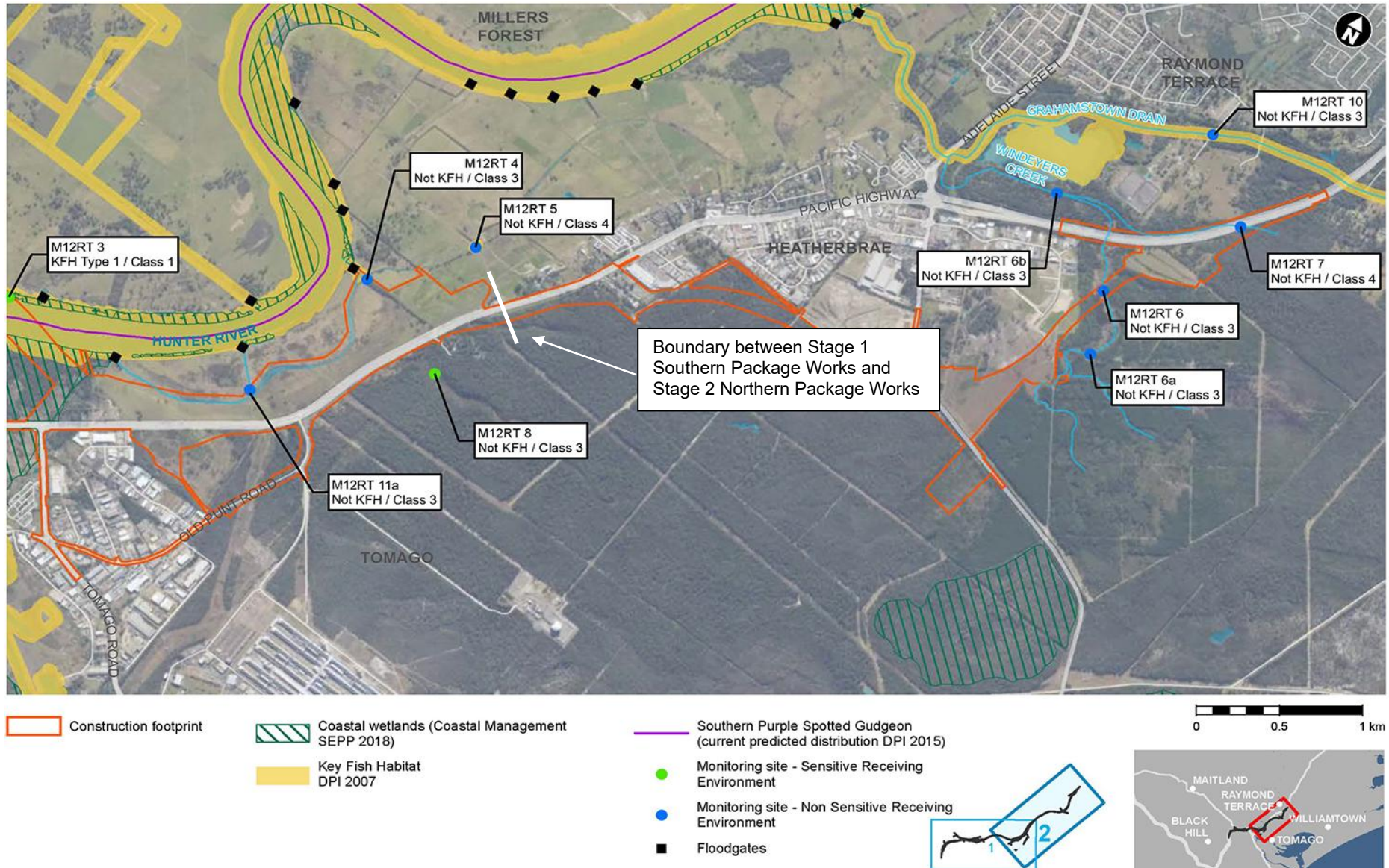


Figure 4-13: Aquatic habitat and key fish habitat assessment sites (map 2 of 2)

4.8. Groundwater Dependent Ecosystems

Known aquatic groundwater dependent ecosystems (GDEs) within the construction footprint and Project surrounds include:

- Floodplain wetlands (Hexham Swamp Nature Reserve and surrounding wetlands, Hunter Wetlands National Park)
- Hunter River.

Potential terrestrial GDEs include:

- Coastal Floodplain Wetlands on the floodplain of the Hunter River (Tarro, Hexham and Tomago)
- Mangrove Swamps on margins of the Hunter River
- Coastal Dune Dry Sclerophyll Forests on the Tomago Sandbeds (Tomago and Heatherbrae)
- Freshwater wetlands adjacent to the floodplain such as sedgeland plant communities.

Refer to Section 5.2.6 of the Groundwater Management Sub-Plan for impacts to Groundwater Dependent Ecosystems.

4.9. Weeds and Pathogens

During field surveys, 300 species of plants were recorded. Of these 238 were native and 62 were introduced species. Of the 62 introduced species recorded within the Project site, 11 species are listed under the *NSW Biosecurity Act 2015* as priority weeds for the Hunter region (DPI 2023) of which five (5) are also listed as Weeds of National Significance (WoNS) (Australian Weeds Committee, 2018) (see Table 4-7).

Table 4-7: Weeds of national significance and priority weeds for the Hunter region recorded on site

Scientific Name	Common Name	Weed Status
<i>Ageratina adenophora</i>	Crofton Weed	Priority weed
<i>Alternanthera philoxeroides</i>	Alligator Weed	WoNS, priority weed
<i>Asparagus aethiopicus</i>	Ground Asparagus	WoNS, priority weed
<i>Baccharis halimifolia</i>	Groundsel Bush	Priority weed
<i>Cortaderia selloana</i>	Pampas Grass	Priority weed
<i>Eragrostis curvula</i>	African Lovegrass	Priority weed
<i>Juncus acutus</i>	Spiny Rush	Priority weed
<i>Lantana camara</i>	Lantana	WoNS, priority weed
<i>Olea europaea</i>	African Olive	Priority weed
<i>Rubus fruticosus</i> agg.	Blackberry	WoNS, priority weed
<i>Senecio madagascariensis</i>	Fireweed	WoNS, priority weed

The construction footprint is currently habitat for a range of pest species including rabbits, cats, foxes, and Plague Minnow. Pathogens were not observed in the construction footprint.

A Weed and Pathogen Control Procedure has been prepared. Refer to Appendix E, detailing weed duties and associated control measures to manage risk associated with impacting on and managing weed spread.

5. Environmental Aspects and Impacts

5.1. Construction Activities

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

- Topsoil stripping and earthworks, including handling, storage and disposal of excavated materials
- Clearing of native vegetation (including habitat). The Submissions Report (Appendix E – Updated Biodiversity Assessment Report) identifies a local and regional loss of around 173.82 hectares of native vegetation and around 136.07 hectares of state listed communities will be cleared across M12RT.
- Bridge and viaduct construction
- Excavation of drainage and service trenches
- Works around and within watercourses
- Disturbance of soils (including acid sulphate soils), consequential erosion and the mobilisation of sediment and other potential contaminants into stormwater systems and the receiving environment
- Use of chemicals/fuels (potential for spills)
- Litter and pollutants associated with building materials or waste being mobilised by wind and stormwater runoff into waterways
- Vehicle movements introducing new and spreading existing weed species, pathogens, diseases and other pests
- Mobilisation of dust or other particulates
- Light spill during nightworks
- Noise and vibration affecting fauna behaviour.

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

5.2. Ecological Impacts

Direct impacts to biodiversity values include clearing of native vegetation, the clearing of suitable habitat for threatened and protected flora and fauna species, and the installation of infrastructure.

Indirect impacts to biodiversity values include ground water drawdown, soil and water contamination, creation of barriers to fauna movement or the generation of excessive dust, light or noise upon the surrounding environment.

Table 5-1 details the type and intensity of the direct and indirect impacts to biodiversity values that may occur as a result of the Project. Impacts to biodiversity were described in detail in the EIS Chapter 9 and Appendix I Biodiversity Assessment Report. These impacts were re-evaluated following the submission of the EIS. The updated impacts are identified in Appendix E – Updated Biodiversity Assessment Report of the Submissions Report.

Likely and/or potential impacts associated with Project are discussed in Chapter 8 Appendix E – Updated Biodiversity Assessment Report of the Submissions Report. The likely and/or potential impacts include:

- Removal of native vegetation, including removal of habitat or potential habitat for threatened species
- Loss of threatened plant species, threatened ecological communities, GDEs and habitats
- Indirect impacts to flora, fauna and habitats through fragmentation and edge effects
- Impacts on vegetation in the riparian buffer zone bordering rivers and streams
- Impacts on important wetlands and their buffers
- Impacts on biodiversity links and habitat corridors
- Impacts in the buffer zone along estuaries
- Impacts to aquatic ecosystems through changes in water quality, habitat loss, temporary instream barriers and impacts to KFH
- Invasion and spread of weeds, pests, pathogens and disease
- Localised groundwater drawdown
- Fauna injury and mortality

- Disturbance to habitats from noise, dust, light and contaminants.
- Changes to hydrology
- Cumulative impacts.

Mitigation and management measures provided in Section 6 of this Plan, aim to minimise the above likely and potential impacts on those threatened species identified in Section 4.6 and Section 4.7 of this Plan.

Table 5-1: Impacts associated with M12RT, as summarised in the updated BAR (Appendix E of the Submissions Report)

Ecological Impact	Description
Removal of vegetation	Construction of the Project will require the removal of vegetation, from 13 PCTs across three Mitchell landscapes, including a small area of riparian vegetation) comprising six Endangered Ecological Communities under the TSC Act (NSW), including habitat for a range of ecosystem credit fauna. Local and regional loss of around 173.82 hectares of vegetation. Loss of around 136.07 hectares of state-listed communities. Threatened flora species confirmed and species-credit species assumed present include (impact): • <i>Diuris arenaria</i> (vulnerable TSC Act) • <i>Callistemon linearifolius</i> (vulnerable TSC Act) • <i>Persicaria elatior</i> (vulnerable TSC Act, EPBC Act) Biodiversity offsets are required for the removal of vegetation as part of the Project and are set out in Chapter 10 of the BAR.
Invasion and spread of weeds, pathogens, and disease	An increase in the movement of people, vehicles, machinery, vegetation waste and soil during and following construction activities may facilitate the introduction or spread of exotic grasses and other weeds that currently occur. Disturbed areas, such as those in which earthworks are to be carried out, would be particularly susceptible to weed establishment. The importation of soil material from offsite for the purposes of increasing the levels of the site may also increase the risk of invasion and spread of weeds. In addition, the project has the potential to increase the spread of pathogens that threaten native biodiversity values, such as the soil-borne pathogen <i>Phytophthora cinnamomi</i> (Phytophthora). This pathogen is associated with damage and death to native plants. Construction of the project has the potential to increase the spread of this pathogen which could be dispersed by vehicles, animals, walkers and the movement of soil, or over large distances in flowing water, such as stormwater runoff.
Invasion and spread of pests	The construction footprint is currently habitat for a range of pest species including rabbits, foxes, and dogs. Project activities have the potential to disperse pest species out of the construction footprint across the surrounding landscape and increase the ability of pest species to utilise habitats due to habitat removal, noise, and human presence during construction and operation. Construction of linear infrastructure through large patches of intact vegetation can result in the establishment of pest species (particularly predators such as foxes and cats) into areas where they are currently absent or in low numbers.
Removal of fauna habitat	The removal of flowering and fruiting trees, hollow bearing trees, shrubs and ground layer vegetation would result in the loss of potential roosting, foraging and sheltering habitat to several threatened fauna species known or considered likely to occur in the Project Area. Threatened fauna species confirmed and species-credit species assumed present include (impact): • Wallum Froglet (vulnerable TSC Act) • Squirrel Glider (vulnerable TSC Act) • Grey-crowned Babbler (vulnerable TSC Act) • Varied Sittella (vulnerable TSC Act) • Little Bent-winged bat (vulnerable TSC Act) • Grey-headed Flying Fox (vulnerable TSC Act) • Masked Owl (vulnerable TSC Act) • White-bellied Sea-Eagle (vulnerable BC Act) • Eastern False Pipistrelle (vulnerable TSC Act) • Eastern Coastal Free-tailed Bat (vulnerable TSC Act) • Mahony's Toadlet (endangered BC Act) • Koala (vulnerable (TSC Act), endangered (EPBC Act) • Australasian Bittern (endangered TSC Act, EPBC Act) • Black Bittern (vulnerable TSC Act) Biodiversity offsets are required for the removal of fauna habitat as part of the Project and are set out in Chapter 10 of the BAR.

Ecological Impact	Description
Removal of migratory species habitat	Removal of habitat for wetland and terrestrial migratory species listed under the EPBC Act: - Latham's snipe (wetland species) - Rufous Fantail and Satin Flycatcher (terrestrial species)
Fauna injury and mortality	The majority of fauna species recorded within the construction footprint are highly mobile bird and mammal species that are likely to be able to move away from these types of activities quite readily. If unmanaged there is potential that terrestrial fauna injury or mortality would occur as a result of construction activities such as vegetation clearing (particularly during the felling of trees), or may result from collisions with work vehicles or plant, or accidental entrapment in plant, trenches or other works.
Loss of aquatic habitat and water quality impacts	Construction and operation of the project has the potential to impact aquatic ecosystems due to changes in water quality, habitat loss and instream barriers during construction. The project crosses Key Fish Habitat (KFH) identified in the downstream stretch of Purgatory Creek and the Hunter River. Construction of the waterway crossings would also result in temporary localised disturbance and loss of riparian habitat along the western bank of the Hunter River.
Groundwater dependent ecosystems	Thirteen PCTs likely to have some degree of groundwater dependence, including those located on the western extent of the Tomago Sandbeds aquifer and the Hunter River floodplain.
Changes to hydrology	If unmitigated, the highest risk would occur during construction: - Disturbance/mobilisation of sediment associated with the clearing of riparian vegetation along the Hunter River and Windeyers Creek as well as unnamed creek lines, especially where large cut and fill activities are required - Construction upstream of waterways such as the Hunter River, Purgatory Creek and Windeyers Creek, as well as the coastal wetlands on the floodplain near the Tarro interchange. - Construction of in-stream structures to cross the Hunter River and Windeyers Creek. - Temporary haulage road and culvert at bridge 2 - Construction of embankments / causeways over flat flood plains and soft soil areas – this would result in compaction/consolidation of soils resulting in reduced hydraulic properties and displacement of groundwater. - Temporary construction dewatering where excavations occur below the water table - General earthwork, including stripping of topsoil, excavation or filling, particularly larger fills at bridge abutments - Stockpiling of topsoil and vegetation - Transportation of cut and/or fill materials - Accidental spills of chemical or hazardous materials - Movement of heavy vehicles across exposed earth.
Fragmentation of identified biodiversity links and habitat corridors	The project would result in minor small-scale localised fragmentation of small patches of habitat (five to 20 hectares), including habitat used by threatened flora and fauna. If unmitigated, the greatest fragmentation risks to identified biodiversity links and habitat corridors would occur when fauna is moving outside of corridor areas during construction and operation as follows: - Fauna injury and mortality during clearing of vegetation for construction and vehicle strike during operation - Entrapment of wildlife in open trenches during construction and drainage lines during operation.
Edge effects on native vegetation and habitat	Edge effects may be difficult to identify in the expansive areas of floodplain freshwater wetlands which have been extensively cleared, drain and grazed. Similarly, some forested areas are already edge affected next to the M1 Pacific Motorway and at the far northern end of the project. The greatest potential for edge effects would be within the newly created edges traversing the dry sclerophyll forests and forested wetland habitats, in particular at Black Hill and Heatherbrae
Noise, dust, light and contaminants	Noise, dust, light and contaminant pollution are direct impacts that can occur during all phases of the project, although risk would be greatest where activities take place near vegetated areas and during construction
Cumulative impacts	Potential cumulative impacts associated with the construction of the Project were presented and assessed in Section 8.5.9 (Cumulative impacts) of the BAR. The assessment concluded that in all locations associated with the construction of the Project, cumulative impacts to biodiversity were considered to be negligible. The impact of vegetation removal on listed and locally significant (common) fauna species are acknowledged, and the revegetation requirements as described in this document will be implemented for all vegetation removal.

6. Environmental Control Measures

6.1. Flora and Fauna Management During Construction

Specific measures and requirements to meet the objectives of this FFMP and to address impacts on flora and fauna are outlined in Table 6-1. Further explanatory detail on particular measures / requirements where noted in the evidence column is provided in Section 6.1.1 through 6.1.8.

Table 6-1: Flora and fauna management measures.

ID	Measure/Requirement	When to Implement	Responsibility	Reference	Evidence
General					
FFMM1	Training will be provided to all project personnel, including relevant sub-contractors on flora and fauna requirements from this plan through inductions, toolboxes, and targeted training. The induction should be performed by a suitably knowledgeable and experienced person.	Pre-construction/ Construction	Induction staff Environment and Sustainability Manager Foreperson	REMM B01 SWTC App 4 CI 4.16 Best practice	Section 7.2 of this Plan Induction and Training Records
FFMM2	A Flora and Fauna Management Sub-Plan will be prepared to provide controls to protect all native flora, fauna, and fish from the impact of the Contractor's Activities.	Pre-construction	Environment and Sustainability Manager Project Ecologist	CoA C5 REMM B01 TfNSW G36 CI 4.8	This Plan and associated Appendices
FFMM3	A flora and fauna protection procedure will be prepared and implemented to minimise the impacts on fauna, including threatened and protected fauna and aquatic fauna, caused by Project construction, and developed in consultation with the Project Ecologist.	Pre-Construction	Environment and Sustainability Manager Project Ecologist	REMM B10 TfNSW G36 CI 4.8c) SWTC App 5 CI 5.2.1, 5.2.3, 5.2.5	Section 6.1.5 of this Plan Flora and Fauna Protection Procedure (Appendix D)
FFMM4	An appropriately qualified and experienced Project Ecologist will be appointed prior to the commencement of construction. Where aquatic surveys are required, the Project Ecologist will engage a suitably qualified Aquatic Ecologist to undertake these works.	Pre-construction/ Construction	Environment and Sustainability Manager Project Ecologist	SWTC App 5 CI 5.2.2	Section 7.1 of this Plan Ecologist qualifications
FFMM5	Any works required outside the construction footprint will be referred to the Environment and Sustainability Manager for advice on further assessment and approval requirements.	Detailed Design Pre-construction/ Construction	Environment and Sustainability Manager	TfNSW G36 CI 3,1 Best Practice	Design Reports
FFMM6	Light spill and noise will be minimised near sensitive areas such as known habitat. Where loud noises are required, for activities such as piling within the Hunter River, a slow start method will be utilised.	Pre-construction/ Construction	Environment and Sustainability Manager Construction Manager Foreperson	Best Practice	Section 4 and 7 of the Flora and Fauna Protection Procedure (Appendix D)

ID	Measure/Requirement	When to Implement	Responsibility	Reference	Evidence
			Project Ecologist		
Vegetation Clearing, Protection and Management					
FFMM7	Native vegetation and fauna (including koala) habitat and mangrove removal will be minimised through detailed design and construction. Particular focus will be given to avoiding and minimising the removal of hollow-bearing trees and native vegetation in riparian zones, from known fauna connectivity corridors and near proposed fauna crossing structures.	Detailed Design Pre-Construction/ Construction	Environment and Sustainability Manager Design Manager	CoA E5, E6 SWTC App 4 CI 4.16 SWTC App 5 CI 5.2.3, 5.2.4 TfNSW G40 CI 2.2	Design Reports Replacement Habitat Strategy (Appendix C)
FFMM8	The pre-clearing, vegetation and habitat removal process will be developed and implemented in accordance with Roads and Maritime Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA projects (RTA, 2011).	Pre-construction/ Construction	Environment and Sustainability Manager Project Ecologist	REMM B02 and B04 SWTC App 4 CI 4.16, App 5 CI 5.2.3 TfNSW G40 CI 2.4.2, 2.4.3, 2.4.4	Section 6.1.5 of this Plan Section 8 of the Flora and Fauna Protection Procedure (Appendix D) Pre-clearing Reports
FFMM9	Pre-clearing surveys will be carried out in accordance with <i>Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA, 2011) by the Project Ecologist to identify or confirm the location of the following within and immediately adjacent to the Project Areas: - Threatened flora and provide guidance - Threatened fauna and associated habitat features (e.g., bridges and structures) and guide subsequent relocation if required - Non-threatened fauna - Hollow-bearing trees or nest-bearing trees - Unsound trees - Native vegetation and habitat features to be considered for re-use, including hollows, tree trunks (greater than 25-30 centimetres in diameter and 2-3 metres in length), mulch, bush rock and root balls. - Temporary stockpiling areas where topsoil and organic material can be retained - Possible pathogens present and any areas of vegetation that could be affected by pathogens - Priority weeds	Pre-construction/ Construction	Environment and Sustainability Manager Project Ecologist	SWTC App 5 CI 5.2.3 TfNSW G40 CI 2.4.2, 2.4.3, 2.4.4	Section 6.1.5 of this Plan Section 8.3 of the Flora and Fauna Protection Procedure (Appendix D) Pre-clearing Reports

ID	Measure/Requirement	When to Implement	Responsibility	Reference	Evidence
FFMM10	An EWMS will be prepared for clearing and grubbing and any activities identified (using the Project Sensitive Area Plans [SAPs] and associated Environmental Control Maps [ECMs]) as including or being in proximity of threatened species or habitat.	Pre-construction/ Construction	Environment and Sustainability Manager Construction Manager	TfNSW G36 CI 3.2.3, 4.8, 4.13	Section 6.2 and 6.3 of this Plan Environmental Work Method Statements SAPs and associated Environmental Control Map(s)
FFMM11	The limits of clearing and exclusion /no-go zones within the construction footprint will be clearly delineated prior to clearing commencement using exclusion fencing, barriers, and appropriate signage in accordance with the Roads and Maritime Biodiversity Guidelines (RTA, 2011a), identified on-site construction drawings, and communicated to construction staff during induction. Vegetation and habitat features, such as hollow-bearing trees, will be clearly identified and protected by suitable fencing, signage and/or markings.	Pre-Construction/ Construction	Foreperson Environmental Team Project Ecologist	REMM B09 SWTC App 4 CI 4.16 and App 5 CI 5.2.3, 5.2.4 TfNSW G36 3.2.4, 4.8 and G40 CI 2.1, 2.2, 2.3, 2.4 and 2.6	Section 6.7 of this Plan Section 6 of the Flora and Fauna Protection Procedure (Appendix D) Pre-clearing Reports SAPs and associated Environmental Control Map(s)
FFMM12	Any fauna encountered during construction will be handled by the Project Ecologist in accordance with the Roads and Maritime Biodiversity Guidelines (RTA, 2011). Relocation of native fauna captured during vegetation clearing will be undertaken by the Project Ecologist and released into a suitable nearby location identified as such by the Project Ecologist.	Pre-construction/ Construction	Environment and Sustainability Manager Foreperson Project Ecologist	REMM B10 SWTC App 5 CI 5.2.2, 5.2.3, 5.2.5 TfNSW G36 CI 4.8	Flora and Fauna Protection Procedure (Appendix D) Post-clearing Reports
FFMM13	Separate post-clearing reports will be prepared for clearing operations (Clearing Report) and the demolition of any structure, including culverts and associated structures (Structures Report).	Construction	Environment and Sustainability Manager Project Ecologist	SWTC App 5 CI 5.2.7 TfNSW G40 CI 2.4.6	Section 10 and 11 of the Flora and Fauna Protection Procedure (Appendix D) Post-Clearing Reports
FFMM14	No materials are to be stockpiled or vehicles parked under the canopy line of trees identified to be retained.	Construction	Foreperson Environment Team	TfNSW G40 CI 2.4.1 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA, 2011) Best practice	Weekly inspections

ID	Measure/Requirement	When to Implement	Responsibility	Reference	Evidence
FFMM15	No excavation, placing of fill or construction of access tracks within the canopy line of trees identified to be retained will occur unless an ecologist or arborist completes an assessment that confirms no detrimental effect, resulting in death or long-term damage to tree health is likely to occur. This assessment will consider the value of the tree, e.g., heritage / retention value and recommend mitigations and limits accordingly.	Construction	Foreperson Environment Team	TfNSW G40 CI 2.4.1 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA, 2011) Best practice	Weekly inspections
FFMM16	The need for artificial lighting during construction and operation will be minimised where feasible, including directing lighting away from vegetated areas where practicable.	Detailed Design Pre-Construction Construction	Design Manager Environment Team	REMM B13 Best practice	Weekly inspections Temporary works designs
FFMM17	Vegetation clearing will be scheduled outside of breeding seasons of threatened species and other fauna that may breed on site. Where this cannot occur, clearing will be staged to reduce the risk of fauna mortality with replacement habitat installed prior to commencement of clearing.	Detailed Design Pre-Construction Construction	Environment and Sustainability Manager Project Ecologist Construction Manager Planner	Best Practice	Project Programme Weekly inspections Pre-clearing reports Post-clearing Reports Environmental Control Maps
FFMM18	Where it is known that a certain species will be displaced by clearing, comparative habitat assessments will be conducted on clearing sites and proposed release sites to ensure that habitat features are available in the released sites. Release sites will be identified and mapped prior to clearing and all appropriate approvals granted by landholders. Translocation will be undertaken in accordance with FFMM23.	Pre-Construction Construction	Environment and Sustainability Manager Project Ecologist Foreman	Best Practice	Section 4 of the Flora and Fauna Protection Procedure Appendix D)
FFMM19	Tree clearing would not occur within periods where ambient air temperatures exceeds 35°C.	Construction	Construction Manager Foreman	Best Practice	Section 4 of the Flora and Fauna Protection Procedure Appendix D)
FFMM20	Clearing will be conducted sequentially and directionally towards areas of refuge, to prevent the creation of vegetation islands.	Construction	Environment and Sustainability Manager Project Ecologist	Best Practice	Section 6 of the Flora and Fauna Protection

ID	Measure/Requirement	When to Implement	Responsibility	Reference	Evidence
			Construction Manager Foreman		Procedure Appendix D)
FFMM21	Felled hollow bearing trees will be positioned so that the hollow is facing upwards, allowing any fauna to later escape	Construction	Construction Manager Foreman	Best Practice	Section 6 of the Flora and Fauna Protection Procedure Appendix D)
FFMM22	Communication will occur with local wildlife rescue organisations and local veterinarians prior to the commencement of clearing to confirm availability for care of captured/injured fauna that cannot be released. Local wildlife rescue organisations include: Hunter Wildlife Rescue: 0418 628 483	Pre-Construction Construction	Environment and Sustainability Manager Project Ecologist Foreman	Best Practice	Section 6 and 7 of the Flora and Fauna Protection Procedure Appendix D)
FFMM23	All translocations will be undertaken in accordance with the 'Translocation operational policy' (DPIE 2019), and any appropriate licensing under the <i>National Parks and Wildlife Act 1974</i> or <i>Biodiversity Conservation Act 2016</i> will be obtained where required. The Project Ecologist will consider any potential impacts on existing faunal populations in the translocation area. The Project Ecologist may recommend additional monitoring, dependant on species types present and the circumstances of the translocation. Translocation will be undertaken by a licenced wildlife carer or ecologist.	Construction	Environment and Sustainability Manager Project Ecologist	Best Practice	Section 4 of the Flora and Fauna Protection Procedure Appendix D)
Threatened Flora/Fauna					
FFMM24	Pre-clearing surveys will be carried out by a suitably qualified person to identify any threatened species and threatened species habitat, including microbat roosts or potential microbat habitat within vegetation or on any buildings or structures identified to be demolished. If roosting microbats or habitat is identified, then individuals are to be excluded from the roosting habitat to be disturbed or demolished.	Pre-Construction/ Construction	Environment and Sustainability Manager Project Ecologist Foreperson	SWTC App 4 Cl. 4.12 and App 5 Cl. 5.2.1, 5.2.3, 5.2.6	Section 8 of the Flora and Fauna Protection Procedure Appendix D) Pre-clearing Survey Reports
FFMM25	In the event that any pre-clearing surveys or assessments and inspections of structures and vegetation indicates the presence of roosting/ hibernating bats or micro-bats, in the structures or elsewhere, a Bat Management Plan will be implemented in consultation with a suitably experienced ecologist and contain a fauna rescue procedure. Pre-clearance surveys will initially be undertaken during the day and should any potential habitat (including roosting habitat) be identified additional surveys will be undertaken at dusk.	Pre-Construction/ Construction	Environment and Sustainability Manager Project Ecologist	SWTC App 4 Cl 4.12 and App 5 5.2.6, 5.2.7	Section 5 of the Bat Management Plan (Appendix F) Pre-clearing Survey Reports

ID	Measure/Requirement	When to Implement	Responsibility	Reference	Evidence
FFMM26	Exclusion measures for microbats will be investigated for culverts identified as having high and medium habitat potential in consultation with a suitably qualified and experienced ecologist. Where required, the timing for exclusion measures will be undertaken outside of breeding and winter torpor periods	Pre-construction/ Construction	Environment and Sustainability Manager Project Ecologist	Best Practice SWTC App 4 4.12	Section 5 of the Bat Management Plan (Appendix F)
FFMM27	Opportunities for providing roosting habitat for microbats in new bridge structures adjacent to areas of known microbat habitat will be investigated where future maintenance issues will not be compromised.	Detailed Design Pre-Construction/ Construction	Design Manager Environment and Sustainability Manager	SWTC App 4 4.12 Best Practice	Section 5.2 of the Bat Management Plan (Appendix F) Design Reports
FFMM28	A monitoring program for threatened entities that may be impacted by the project will be developed and will include: • details of baseline data available and data to be obtained and when • details of all monitoring to be undertaken • parameters and associated targets to be monitored/achieved • frequency and location of monitoring • report and analysis of monitoring results • details of the methods that will be used to analyse the monitoring data • procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts, and • consultation to be undertaken for the monitoring programs.	Pre-Construction/ Construction	Environment and Sustainability Manager Project Ecologist	CoA C12	Flora and Fauna Construction Monitoring Program (Appendix G)
FFMM29	Threatened entities will be managed in accordance with the Flora and Fauna Protection Procedure (FFMM03) and, where appropriate, the Unexpected Threatened Species and Threatened Ecological Communities Protocol (FFMM37)	Pre-Construction/ Construction	Environment and Sustainability Manager Project Ecologist	CoA E2, E3 REMM B03, B10 TfNSW G36 CI 4.8c) SWTC App 5 CI 5.2.1, 5.2.3, 5.2.5	Section 6.1.5 of this Plan Flora and Fauna Protection Procedure (Appendix D) Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol
Fauna Habitat and Connectivity					
FFMM30	A Replacement Habitat Strategy will be prepared and implemented in consultation with the Project Ecologist and in accordance with the requirements of RTA Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (2011), Guide 5: Reuse of woody debris and bushrock and Guide 8: Nest Boxes and the Replacement Habitat Strategy.	Pre-Construction/ Construction	Environment and Sustainability Manager Project Ecologist	SWTC App 5 CI 5.2.4 and App 4 CI 4.11 REMM B05 and B06	Replacement Habitat Strategy (Appendix C)

ID	Measure/Requirement	When to Implement	Responsibility	Reference	Evidence
FFMM31	Fauna crossings and exclusion fencing structures will be designed and constructed to facilitate fauna connectivity and exclusion across the project in accordance with the Biodiversity Assessment Report. A Fauna Connectivity Strategy will be prepared and implemented in facilitating fauna crossings on the Project.	Detailed Design Pre-Construction/ Construction	Design Manager Environment and Sustainability Manager Project Ecologist	REMM B08 SWTC App 5 CI 5.3 TfNSW G40 CI 2.4.2, 2.4.5, 2.4.6	Fauna Crossing and Connectivity Strategy (Appendix B) Design Reports
FFMM32	Revegetation will be carried out in accordance with 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (RTA 2011) (Guide 3: Re-establishment of native vegetation) and the Landscape Plan prepared for the project.	Detailed Design Pre-Construction/ Construction	Design Manager Environment and Sustainability Manager	REMM B05	Replacement Habitat Strategy (Appendix C)
FFMM33	The retention, appropriate storage and reuse of native vegetation, timber, root balls and other habitat features will be maximised to ensure they are preserved for incorporation into the Project Works or for use by relevant council(s), NPWS, Local Land Services, local Landcare groups, DPIRD Fisheries and any additional relevant government agencies who must be consulted prior to the removal of vegetation and other habitat features.	Pre-Construction/ Construction	Environment Team Construction Manager Foreperson	CoA E17 REMM B06 SWTC App 4 CI 4.17 TfNSW G36 4.8, 4.11 and G40 CI 2.4.5	Evidence of consultation with relevant stakeholders Weekly Inspections Salvage and appropriate storage of removed native trees and root balls
FFMM34	Fauna fencing will be provided along lengths of the Main Carriageway, Ramps and Local Roads detailed in the SWTC Appendix 5 Section 5.4 (a) in accordance with TfNSW D&C R201. Fauna fencing will be located to minimise the clearing of vegetation and maximise available habitat, and the proposed location of fauna fencing must be clearly shown in the Design Documentation.	Detailed Design Pre-Construction/ Construction	Design Manager Environment and Sustainability Manager	SWTC App 5 CI 5.4	Design Reports Section 6 of the Fauna Crossing and Connectivity Strategy (Appendix B)
FFMM35	Temporary fauna exclusion fencing will be installed where existing fauna exclusion fencing is removed and is to be replaced by new fauna fencing as part of the Project Works. Temporary fencing will not be removed until the permanent fauna fencing required is installed	Detailed Design/ Construction	Environment and Sustainability Manager Design Manager	SWTC App 5 CI 5.4	Temporary works designs Section 6 of the Fauna Crossing and Connectivity Strategy (Appendix B)

Unexpected Finds

FFMM36	An Unexpected Threatened Species and Threatened Ecological Communities Protocol will be implemented in the event that threatened species or threatened ecological communities are unexpectedly identified during construction.	Construction	Environmental team	CoA E2, E3 REMM B03 TfNSW G36 CI 4.8	Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol
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ID	Measure/Requirement	When to Implement	Responsibility	Reference	Evidence
Aquatic Habitats					
FFMM37	Aquatic habitat will be protected in accordance with Guide 10: Aquatic habitats and riparian zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011a) and Section 3.3.2 Standard precautions and mitigation measures of the 'Policy and Guidelines for Fish Habitat Conservation and Management Update 2013' (DPI 2013a).	Pre-Construction/ Construction	Environment and Sustainability Manager Construction Manager Foreperson Project Ecologist	REMM B07	Section 9 of the Flora and Fauna Protection Procedure (Appendix D)
FFMM38	The Fauna Protection Procedure will address working in waterways to minimise injury to aquatic fauna including procedures to reduce risks to aquatic fauna from vessels and plant, including direct strike, noise, and vibration.	Pre-Construction/ Construction	Environment and Sustainability Manager Construction Manager Foreperson	SWTC App 5 CI 5.2.5	Section 9 of the Flora and Fauna Protection Procedure (Appendix D)
FFMM39	An inspection will be undertaken by an appropriately qualified and experienced ecologist in the 24-hour period prior to works commencing that may impact potential habitat for Estuary Cod (<i>Epinephelus coioides</i>)	Pre-Construction/ Construction	Environment and Sustainability Manager Foreperson Project Ecologist	CoA E15	Section 9 of the Flora and Fauna Protection Procedure (Appendix D) Pre-clearing Reports
FFMM40	Suitable methods will be used to protect Estuary Cod habitat and individuals (if detected) within the construction footprint and surrounding 100 metres at the proposed Hunter River bridge site in accordance the provisions of the <i>Fisheries Management Act 1994</i> .	Pre-Construction/ Construction	Environment and Sustainability Manager Foreperson Project Ecologist	CoA E16	Section 9 of the Flora and Fauna Protection Procedure (Appendix D)
FFMM41	Existing trees, grasses and other ground cover will be retained within 15 metres of rivers, creeks and watercourses and in all drainage lines until immediately before construction commences in the area. All trees in these areas will be felled manually, leaving grasses and small understorey species wherever possible.	Pre-Construction/ Construction	Environment and Sustainability Manager Construction Manager Foreperson	TfNSW G40	Flora and Fauna Protection Procedure (Appendix D)
FFMM42	Waterway crossings will be designed and constructed in consultation with DPI (Fisheries) and in accordance with relevant policies and guidelines including Why do Fish Need to Cross the Road, Fish Passage Requirements for Waterway Crossings (NSW Fisheries, January 2003).	Detailed Design Pre-Construction/ Construction	Design Manager Environment and Sustainability Manager Foreperson	SWTC App 4 CI 5.5	Design Reports Flora and Fauna Protection Procedure (Appendix D) Fauna Crossing and Connectivity Strategy (Appendix B)
FFMM43	All sediment and erosion control measures will be put in place during the construction process in accordance with TfNSW D&C G38 and may include sediment and erosion control curtains in the waterways to control turbidity generated during the construction and restoration process. All care will be taken	Construction	Environment and Sustainability Manager Construction Manager	CoA C9 TfNSW G38 and G40	Flora and Fauna Protection Procedure (Appendix D)

ID	Measure/Requirement	When to Implement	Responsibility	Reference	Evidence
	to mitigate excess sedimentation and/or turbidity arising from construction within and directly adjacent to the Hunter River		Foreperson		
FFMM44	In the event that water is required to be extracted from local waterways, water levels and construction activities will be managed to ensure key fish habitat/aquatic ecosystems are protected (e.g., during periods of low and/or no flow, extraction from local waterways will not occur).	Pre-Construction/ Construction	Environment and Sustainability Manager Foreperson	Best Practice	Flora and Fauna Protection Procedure (Appendix D)
FFMM45	Any machinery used during instream works should be verified as clean and free of potential weeds and pathogens to avoid biosecurity risk.	Construction	Environment and Sustainability Manager Construction Manager Foreperson	REMM B01 Best Practice	Section 9.4 of the Weed and Pathogen Control Procedure (Appendix E)
FFMM46	Coffer dams will be used during work undertaken within or immediately adjacent to waterways where reasonable and feasible to prevent or minimise increased turbidity. In the event that coffer dams are not reasonable and feasible, silt curtains would be used. Any fish (and other aquatic biota) trapped in the coffer dams will be relocated, during dewatering, by a suitably qualified marine ecologist	Pre-Construction/ Construction	Environment and Sustainability Manager Construction Manager Foreperson	Best Practice	Section 9.1.1 of the Flora and Fauna Protection Procedure (Appendix D)
FFMM47	Protection and enhancement of vegetated riparian zones will be undertaken to improve opportunities for fauna movement, and fish habitat and to protect water quality.	Pre-Construction/ Construction	Environment and Sustainability Manager Construction Manager Foreperson	REMM B05, B06, B07	Flora and Fauna Protection Procedure (Appendix D)
FFMM48	The impacted banks and intertidal areas of the Hunter River and all banks of Windeyers Creek will be restored to reflect the condition in the surrounding offsite areas. The creation of Salt Marsh Habitat in all areas of the Hunter River West, Mangrove Forest in all areas of the Hunter River East and the replication of adjacent vegetation types in the entire Windeyers Creek Area areas will be completed except where needed for long-term operational maintenance requirements.	Detailed Design Pre-Construction/ Construction	Design Manager Environment and Sustainability Manager Foreperson	SWTC App 4 CI 4.11	Project Records Replacement Habitat Strategy (Appendix C)
FFMM49	Impact piling within the river should be controlled to ensure that levels do not exceed the physiological tolerances of fish with swim bladders, and if this is not possible, then piling noise should be ramped up from a 'soft start'	Pre-Construction/ Construction	Environment and Sustainability Manager Construction Manager Foreperson	Best Practice	Section 7 of the Flora and Fauna Protection Procedure (Appendix D)
Invasion and spread of weeds, pests, pathogens, and disease					
FFMM50	Weeds within the construction footprint will be managed in accordance with the Weed and Pathogen Control Procedure and the Roads and Maritime Biodiversity Guidelines (RTA, 2011).	Pre-construction/ Construction	Environment and Sustainability Manager Construction Manager	REMM B11 TfNSW G36 CI 4.8 and G40 CI 2.4.2 and 2.4.6	Weed and Pathogen Control Procedure (Appendix E)

ID	Measure/Requirement	When to Implement	Responsibility	Reference	Evidence
			Foreperson		
FFMM51	Measures to prevent the introduction and/or spread of pests (including Fire Ants), pathogens, and disease-causing agents such as bacteria and fungi will be managed in accordance with the Roads and Maritime Biodiversity Guidelines (RTA, 2011), the Commonwealth Biosecurity Act 2015, NSW Biosecurity Act 2015 and where relevant, the Australian Ballast Water Management Requirements, Biosecurity (Fire Ant) Control Order 2023 and Biosecurity (Fire Ant) Emergency Order 2023.	Pre-construction/ Construction	Environment and Sustainability Manager Construction Manager Foreperson	REMM B12 TfNSW G36 CI 4.8	Weed and Pathogen Control Procedure (Appendix E) Biosecurity (Invasive Ant Carriers) Plant Checklist Interstate Biosecurity Certificate
FFMM52	Relevant industry guidance on Varroa mites (<i>Varroa jacobsoni</i> and <i>V. destructor</i>) must be applied when relocating or managing bees and/or beehives of honeybees. Information can be obtained through the Department of Primary Industries.	Pre-construction/ Construction	Environmental Manager Construction Manager Foreperson	Best Practice	Section 11 of the Weed and Pathogen Control Procedure (Appendix E)

Ramsar Wetlands

FFMM53	Ramsar wetlands within the region will be protected by implementing mitigation measures that protect flora and fauna directly, and implementing measures that protect water, soil and air. • Undertaking works within the construction footprint only (unless reviewed and approved by the Environment and Sustainability Manager) • Implementing the mitigation measures within this Plan • Implementing the Flora and Fauna Construction Monitoring Program • Implementing the Flora and Fauna Protection Procedure • Implementing the mitigation measures within the Soil and Surface Water Management Plan • Implementing the mitigation measures within the Air Quality Water Management Plan • Implementing the mitigation measures within the Groundwater Management Plan • Implementing the Surface Water and Groundwater Quality Construction Monitoring Program	Pre-construction/ Construction	Environment and Sustainability Manager Construction Manager Foreperson	TfNSW G36 4.8(b)(iii)	This Plan FFCMP SSWMP GMP AQMP SSWGQCMP
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Waste and Re-use of Materials

FFMM54	In accordance with the waste hierarchy JHGA will avoid the removal of vegetation and habitat. Where vegetation removal must occur JHGA will maximise the reuse of native vegetation and other habitat features that have been approved for removal. Where reuse on the Project is not possible JHGA will consult with relevant council(s), NPWS, Local Land Services, local Landcare groups, DPIRD Fisheries	Pre-construction/ Construction	Environment and Sustainability Manager Construction Manager Foreperson	TfNSW G36 4.11	This Plan Consultation records
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ID	Measure/Requirement	When to Implement	Responsibility	Reference	Evidence
	and any additional relevant government agencies prior to the removal of vegetation and other habitat to see if it can be re-used elsewhere. Where materials cannot be re-used, recycled, or recovered they will be disposed of in accordance with the waste hierarchy.				
Works on Waterfront Land					
FFMM55	Works on waterfront land and within watercourses must have regard to <i>Guidelines for controlled activities on waterfront land</i> (NRAR, 2018). This includes outlets and watercourse crossings.	Pre-construction/ Construction	Environment and Sustainability Manager Construction Manager Foreperson	Best practice	
FFMM56	Proposed revegetation within riparian zones should have regard to NRARs guidelines for Vegetation Management Plans and accommodate a fully structured vegetated riparian zone using indigenous species.	Pre-construction/ Construction	Environment and Sustainability Manager Construction Manager Foreperson	Best practice	

6.1.1. Sensitive Area Plans and Environment Control Maps

Sensitive Area Plans will be prepared for broader construction zones to manage key flora and fauna risks during construction. The plans will clearly identify environmentally sensitive areas including receiving waterways, key terrestrial and aquatic habitat, ecological exclusion / no-go zones (as defined in '*Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects*' (RTA, 2011), and arboricultural protection zones that require specific management measures.

Environment Control Maps will be prepared for each construction site and provide detailed content on the type and location of protection measures, monitoring requirements, site specific environmental obligations and environmentally sensitive areas. It is the practical application of the proposed control measures and an important tool to communicate these to all personnel including subcontractors.

Full details of SAPs and associated Environmental Control Map(s), including the plans themselves, can be found in Section 4.2.8 and Appendix A5 of the CEMP.

6.1.2. Unexpected Threatened Species Finds

In accordance with CoA E3 and REMM B03, in the event that potential or actual impacts to any threatened species or ecological communities not previously assessed in M12RT EIS - Appendix I - Biodiversity Assessment Report and as updated by Submissions Report Appendix E – Updated Biodiversity Assessment Report is identified during construction, all works in the immediate area will be stopped to prevent further impact.

The Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol will be implemented by the Project and all relevant agencies will be notified accordingly. A copy of the Protocol is maintained on the Planning Portal website: [Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol](#)

Works in the associated location will not recommence until approval to recommence work has been issued by the Planning Secretary in consultation with BCS and written clearance from the Transport Project Manager has been received.

6.1.3. Replacement Habitat Strategy

In accordance with section 4.11 and section 5.2.4 of Appendix 4 and 5 of the SWTC, a Replacement Habitat Strategy has been developed in consultation with the Project Ecologist to manage the removal and relocation of fauna habitat in accordance with relevant CoA and REMMs.

The Replacement Habitat Strategy (Appendix C) details habitats for protected and threatened fauna species that may be cleared to facilitate construction and will be implemented throughout the entirety of the Project to ensure impacts to native vegetation and fauna are minimised.

This Strategy includes management measures for the following:

- Removal and relocation of habitat
 - Relocation of logs
 - Transportation and placement of fauna habitat (including coarse woody debris and bushrock)
 - Stockpile of terrestrial materials for re-use
 - Aquatic Habitat relocation and stockpiling of aquatic materials for restoration
 - Re-use of hollows (i.e. attached to suitable trees in recipient sites)
- Installation of artificial hollows
- Nest boxes construction
- Tree removal and replacement
- Intertidal area restoration

Reuse of native vegetation and other habitat features, including off-site applications following consultation with relevant parties.

6.1.4. Fauna Crossing and Connectivity Strategy

In accordance with Section 5.3 of the SWTC, the Project has developed Fauna Crossing and Connectivity Strategy (Appendix B) in consultation with the Project Ecologist. This Strategy provides

measures to manage risks to fauna and address connectivity issues within the construction footprint. The Strategy focusses on arboreal crossing structures and fauna exclusion fencing in accordance with REMM B08.

6.1.5. Flora and Fauna Protection Procedure

In accordance with Section 5.2.1 of Appendix 5 of the SWTC and TfNSW G36, a Flora and Fauna Protection Procedure (Appendix D) has been developed and implemented to minimise the impacts on fauna, including threatened and protected fauna caused by the Project.

The Procedure includes:

- General fauna protection measures
- Species potentially impacted by the Project
- Procedures for vegetation clearing, including Vegetation Removal Permits as required under the EMS and pre-clearing and post-clearing requirements and assessments
- Procedures for assessing structures (bridges, culverts) that may contain native fauna
- Fauna rescue and handling procedures
- Aquatic habitat management in accordance with SWTC Appendix 5 Clause 5.2.5(a).

6.1.6. Bat Management

In accordance with Section 4.12 of Appendix 4 of the SWTC, a Bat Management Plan Bat Management Plan (Appendix F) has been developed for implementation based on the pre-construction bat habitat survey results. The Plan details procedures to be undertaken in the event microbats are discovered on the Project.

Tree-roosting microbats are managed within the Flora and Fauna Protection Procedure (Appendix D), and all threatened microbats/ flying-foxes in accordance with the Unexpected Threatened Species and Threatened Ecological Community Finds Protocol.

Pre-clearing surveys for microbat roosts will be carried out by a suitably qualified person on all buildings and structures with potential habitat that are to be demolished or refurbished. If microbats are identified roosting in these structures, individuals will be excluded from this roosting habitat.

Areas requiring demolition inspection will be identified by the Environment and Sustainability Manager, or delegate, in consultation with the Construction Manager, Area Manager or Foreperson and any specialist ecology consultants required.

Any findings from those pre-demolition inspections will inform the Sensitive Area Plans and associated Environmental Control Map(s) (Appendix A5 of the CEMP) and identify additional management measures beyond those detailed in this Plan in consultation with the Project Ecologist.

6.1.7. Weed and Pathogen Control Procedure

Weeds within the construction footprint is managed in accordance with the Weed and Pathogen Control Procedure for the Project outlined in Appendix E of this Plan. The Procedure has been prepared to provide detail on weed and pathogen management and control practices to be implemented throughout the construction phase of the Project, to minimise the threat to native fauna, remnant vegetation within the Project site and other remnant vegetation in the local area.

6.1.8. Biodiversity Offsets

Biodiversity offsets are proposed as required by CoA E4. These are documented separately in the Biodiversity Offset Strategy developed by Transport.

In accordance with CoA E7 the biodiversity offset obligations are to be fulfilled by the Proponent within 12 months of the commencement of construction. It is noted that Transport will fulfil this obligation with information provided by JHGA as required.

In accordance with CoA E8 ecosystem and species credit requirements in Table 3 and Table 4 of the Minister's Conditions of Approval may be reviewed to reflect the final construction footprint and resulting extent and type of plant community types to be cleared and the extent of threatened species habitat impacted by the construction of the CSSI. Similarly, the EPBC Act Approval, Condition 3 notes

clearing limits for federally listed flora and fauna habitat, as applied to the Project. Noting that Transport will retain the obligations under CoA E8 and EPBC Act Approval C3, JHGA will provide any necessary information to Transport to complete this task as and when requested. This may include assisting with a review of the vegetation mapping in the *M1 Pacific Motorway extension to Raymond Terrace Submissions Report - Appendix E- Revised biodiversity assessment report* June 2022 and/or completing verification surveys to confirm the extent, type and condition of threatened species and threatened ecological communities to be impacted as required by CoA E9.

Where verification surveys are to be undertaken, they will occur in consultation with BCS and under a methodology that reflects the requirements of CoA E10

In accordance with CoA E11, Transport will submit to the Planning Secretary and AG DCCEEW for information:

- A copy of the Credit Retirement Report and/or
- A receipt confirming payment to the Biodiversity Conservation Fund and/or
- Correspondence from NPWS

for the retirement of the ecosystem and species credits required by Condition E7 within one month of receiving the report and/or making the payments and/or receiving correspondence from NPWS.

In accordance with CoA E12, Transport will offset key fish habitat impacts in accordance with the Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013 update).

6.2. Flora and Fauna Management in Design

There are several CoA and REMMs that are to be managed as part of the Project detailed design preparation and review process, as identified in Section 3. These will be documented as part of the relevant Design Packages, and will be subject to a design review process, including a review on compliance with relevant Project requirements.

The Project Design Management Plan describes the approach to Environment in Design (EID). It describes the activities involved with design input, output, verification, validation, and change control practices. It sets responsibilities for defining the verification method for each package/activity and establishing dates for the sequential review of environmental risks. The environment team will work closely with the design team to coordinate appropriate technical inputs from the broader project team and relevant subject matter experts.

The design team(s) will maintain a register of EID requirements extracted from the CoA, EPBC Approval, EIS, SWTC, Transport D&C Specifications, this CEMP and associated Sub-Plans. A checklist shall be included in each design report for each individual design package which covers all relevant requirements from these documents.

6.2.1. Temporary Works Design

Design documentation for Temporary Works shall be compliant with the Project requirements and relevant codes and standards. Temporary Works will be tracked in a register and reviewed progressively as design develops. As outlined in the Design Management Plan, the Project Temporary Works Coordinator will lead and be responsible for design development of Temporary Works including review, approval, and certification regarding soil and surface water impacts and compliance with Project requirements.

7. Compliance Management

7.1. Roles and Responsibilities

The Project Team's organisational structure and overall roles and responsibilities are outlined in Section 4.3 of the CEMP. Specific roles not mentioned in the CEMP but are required for the implementation of flora and fauna management controls are detailed in Table 7-1.

Table 7-1: Roles and responsibilities specific to this Plan.

Role	Responsibilities
SQP – Ecologist	- An appropriately qualified and experienced Project Ecologist will be appointed prior to the commencement of construction - Provide advice during the development of this Flora and Fauna Management Plan and associated appendices - Where aquatic surveys are required, the Project Ecologist will engage a suitably qualified Aquatic Ecologist to undertake these works. - Carry out pre-clearing surveys undertaken in accordance with approved procedures - Handle any fauna encountered during construction and relocate native fauna captured during vegetation clearing - Advise on nature of any find including whether it should be considered “unexpected” and whether the species is listed as a threatened species or forms part of a TEC. Develop any required management plan (or equivalent) for management of unexpected find.

7.2. Training

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

- Existence and requirements of this Plan
- Requirements of the Environmental Work Method Statement (EWMS)
- Applicable and relevant legislation
- Roles and responsibilities
- Typical construction activities that may impact flora and fauna and associated environmental impacts
- No-go Zones and boundaries of clearing activities
- Procedures to be implemented in the event of an incident
- Mitigation and management measures

Targeted training in the form of toolbox talks or specific training will be provided to personnel with a key role in flora and fauna management. See Table 7-2 for details specific to this Plan.

Table 7-2: Training responsibilities relevant to this Plan

Training	Delivery
Specific species likely to be affected by the construction works and how these species can be recognised	Project Ecologist / Environment and Sustainability Manager via Toolbox talk
Mulch stockpile location and management measures	Environment and Sustainability Manager / Foreperson via Toolbox Talk
Fauna rescue requirements	Project Ecologist / Environment and Sustainability Manager via Toolbox talk
Weed control measures	Environment and Sustainability Manager / Foreperson via Toolbox Talk

Further details regarding staff induction and training are outlined in Section 4.6 of the CEMP.

7.3. Complaints Management

In accordance with CoA Part B, all community feedback, enquiries, and complaints will be managed via the Communication Strategy and Complaints Management System. Further details of this processes are outlined in Section 4.8.4 of the CEMP.

A variety of communication tools will be used throughout construction to consult and inform stakeholders and the local community of impacts, including but not limited to:

- Tailored messaging regarding increased traffic volumes on detour routes and expected delays
- Geotargeted social posts during peak periods to remind people as they prepare to move around work areas
- Meetings/briefing with MPs, local councils, local businesses, and other community organisations
- Information sessions and pop-up displays
- Functional advertising through print, radio, television, and digital channels
- Signage including VMS and other dynamic signage
- Project website updates.

The Environment and Sustainability Manager (or delegate) will complete a site inspection and record observations and weather conditions in response to any community complaints associated with flora and fauna management. Actions or rectification (if required) will be undertaken by the construction team as soon as reasonably practicable.

7.4. Monitoring and Inspection

Monitoring, inspections, and reporting requirements are outlined in Table 7-3. Additional requirements and responsibilities relating more broadly to monitoring and inspections are documented in the CEMP Section 4.10.5.

Further specific monitoring and inspections required to meet the project conditions have been outlined in the below appendices:

- Appendix D – Flora and Fauna Protection Procedure
- Appendix E – Weed and Pathogen Control Procedure
- Appendix F – Bat Management Plan
- Appendix G – Flora and Fauna Construction Monitoring Program

Table 7-3: General Monitoring, inspection and reporting requirements

Type	Frequency	Standards	Location	Reporting	Responsibility
Inspections					
Environmental site inspection	Weekly	Weekly Environmental Inspection Checklist	All sites	Project Environment Team	Environmental site inspection
ER and TfNSW Inspections	Fortnightly or as determined based on risk level	Environmental Representative Protocol (October 2018) Environmental Inspection checklist	All sites	ER Inspection Report ER Monthly Report Environmental Inspection checklist	ER Project Environment Team
Visual surveillance	Daily during activities with high environmental risk	Project EMS	All sites	Foreperson's Logbook / Site Diary	Foreperson

All environmental monitoring equipment (if required) will be maintained and calibrated according to the manufacturer's specifications, and appropriate records will be kept. Non-conformance reporting protocols are outlined in Section 7.7 of this Plan and Section 4.11 of the CEMP.

JHGA will maintain accurate and complete compliance records. It is noted that if the AG DCCEEW makes a request in writing, the approval holder must provide electronic copies of compliance records to the department within the timeframe specified in the request.

7.4.1. Flora and Fauna Construction Monitoring Program

A Flora and Fauna Construction Monitoring Program has been developed and detailed in Appendix G of this Plan to comply with CoA C12. The monitoring plan includes:

- Details of baseline data available and data to be obtained and when

- Details of all monitoring to be undertaken
- Parameters and associated targets to be monitored/achieved
- Frequency and location of monitoring
- Report and analysis of monitoring results
- details of the methods that will be used to analyse the monitoring data
- Procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts
- Consultation to be undertaken for the monitoring programs.

Monitoring within the FFCMP includes key threatened entities that may be impacted by BH2T scope, including:

- Threatened Ecological Communities – inspected by BAM plot analysis conducted bi-annually during construction
- Netted Bottlebrush (*Callistemon linearifolius*) – inspected by survey on a bi-annual basis with a spring survey during flowering season
- Wallum Froglet (*Crinia tinnula*) and Mahony's Toadlet (*Uperoleia mahonyi*) – inspected by targeted surveys for presence/ absence in line with the NSW Survey Guide for Threatened Frogs (DPIE, 2020). Surveys conducted annually between Oct – Mar

Any monitoring data (including sensitive ecological data), surveys, maps, and other spatial and metadata will be prepared in accordance with the *Guidelines for biological survey and mapped data* (Commonwealth of Australia 2018) and the *Guide to providing maps and boundary data for EPBC Act projects* (Commonwealth of Australia 2021), or as otherwise specified by the Minister in writing.

Construction Monitoring Reports (CMR) will be submitted as per the timing specified in Table 7-4. In accordance with the EPBC Act approval, the approval holder will submit each CMR to the department for information within 10 business days of that CMR being accepted by the Planning Secretary. The approval holder will also publish each CMR on the website within 15 business days of submitting it to the department. All published CMRs will remain on the website until the expiry date of the EPBC Act approval.

The FFCMP, including any amendments approved by the Planning Secretary, will be implemented for the duration of construction, one year after construction completion, and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.

7.5. Auditing

Audits (both internal and independent) will be undertaken to assess the effectiveness of environmental controls, compliance with this Plan, CoA and other relevant approvals, licenses, and guidelines. These audits will be undertaken at planned intervals to provide information on whether the Project:

- Is meeting its compliance obligations
- Conforms to this Plan
- Determines if this Plan is effectively implemented and maintained.

The approach to internal and independent audits, including audit requirements and the auditing schedule, are detailed in Section 4.10.6 of the CEMP.

7.6. Reporting

Project reporting requirements and responsibilities are documented in Section 4.10.7 of the CEMP. There are specific flora and fauna reporting requirements associated with additional survey work and monitoring as provided in Table 7-4.

Table 7-4: Reporting requirements

No.	Report	Requirement	Timing	Responsibility	Recipient
1	Pre-clearing Report	Refer TfNSW Specification G36 and G40 SWTC Appendix 4 and 5	Within 3 months of the commencement of the relevant activity	Contractor	Transport

No.	Report	Requirement	Timing	Responsibility	Recipient
2	Post-clearing report	Refer TfNSW Specification G40 SWTC Appendix 5	At completion of clearing	Contractor	Transport
3	Structures Report	SWTC Appendix 5	Following the survey of any structure	Contractor	Transport
4	Fauna Crossing and Connectivity Monitoring	SWTC Appendix 5	Continuous – fauna mortality and fence monitoring Bi-annual – Monitoring of crossing structures Annual reporting.	Transport Contractor	Transport
5	Artificial Hollow Monitoring	SWTC Appendix 4 and 5	Annual monitoring report	Transport Contractor	Transport
6	Replacement Tree Planting	NSW CoA	Quarterly for the first year and then annual for the following two years	Transport Contractor	Transport
7	Weed, Pest and Pathogen Monitoring	Refer TfNSW Specification G40	Monthly during construction and annually during operation	Transport Contractor	Transport
8	Microbat Monitoring	SWTC Appendix 4 and 5	Following roost exclusion, and relocation	Transport Contractor	Transport
9	Flora and Fauna Monitoring Report	NSW CoA, Commonwealth CoA	Following each monitoring session and collated in an annual report	Transport Contractor	Transport, Planning Secretary, AG DCCEEW
10	Six (6) Monthly Compliance Tracking Report	Compliance tracking report (G36, Clause 3.9.2) providing the following details for the preceding six (6) months: - Compliance with the requirements of the Environmental Documents, including the CoA, and the REMMs - Environmental performance for environmental issues including but not limited to air quality, incidents, and community. - Copies of environmental records and monitoring results - Record of inspections - Record of any internal audits - Evidence of any approval or permits obtained for works during the reporting period - Complaint register and complaints resolution Summary of non-compliances for the reporting period.	Commencing prior to any works being carried out on the Construction Site Six (6) monthly for the preceding six (6) months Final compliance tracking report will be submitted within twenty (20) days of completion.	Environment and Sustainability Manager (or delegate)	Transport Environmental Representative
11	Incident reporting	Environmental incident classification, notification, and reporting in accordance with the Transport Environmental Incident Classification and Reporting Procedure Refer CEMP Section 4.9.	As specified in the CEMP Section 4.9 and Transport Environmental Incident Classification and Reporting Procedure	Environment and Sustainability Manager (or delegate)	Transport Relevant Regulatory Agencies

No.	Report	Requirement	Timing	Responsibility	Recipient
12		Environmental incident notification to the Planning Secretary that causes or threatens to cause material harm as defined within the CoA. Refer CEMP Section 4.9 and CoA A39 and A40	As soon as possible and no later than 24 hours after becoming aware. Refer CEMP Section 4.9 and CoA A39 and A40.	Environment and Sustainability Manager (or delegate)	Transport DPHI

The following other documents may require additional reporting by the Contractor during construction:

- Construction Flora and Fauna Monitoring Program as required by CoA C12
- Replacement Habitat Strategy as required by TfNSW Specification G40, Clause 3.2.

7.7. Non-compliance and Non-conformance

Section 4.11 of the CEMP defines non-compliance and non-conformance and their associated reporting requirements. Generally, a non-compliance refers to a breach of the CoA or failure to implement the CEMP and CEMP sub-plans, requiring notification to the Planning Secretary, while a non-conformance is a failure to comply with environmental requirements, standards or procedure established by the Project EMS in addition to the CoA.

Environmental non-compliance or non-conformances will be communicated to the Project Environment Team. This will then be recorded in the Project database. An environmental action list will be developed and issued to the relevant the Project Team personnel for implementation and closeout. Actions will be assigned an implementation priority in a collaborative way by the Project Environment Team based on the environmental risk. Timeframes will be set to ensure any damage incurred is rectified and any chance of recurrence is eliminated as soon as practicable. Following corrective action, the Project Environment Team will close out the non-compliance/non-conformance, noting that additional obligations may be required for non-compliance following notification to the Planning Secretary.

Where a non-compliance/non-conformance is detected or monitoring indicates risks directly attributable to the Project (i.e. are influenced by factors under the direct control of the Project, e.g. unapproved impacts to flora, fauna, ecological communities or habitat associated with construction, etc.), the process will typically include:

- An analysis of the results by the Project Environment and Sustainability Manager or delegate in more detail, with the aim of determining possible causes
- A site inspection by the Project Environment and Sustainability Manager or delegate
- Advising relevant personnel of the problem
- Identifying and agreeing on actions to resolve or mitigate the risk
- Implementing actions to rectify or mitigate the risk.
- Monitor and review effectiveness of actions and/or additional measures.

A Non-compliance/Non-conformance Report may be issued by the Project Environment and Sustainability Manager if it is found to be related to construction. The nature of the non-compliance/non-conformance will also be assessed against the criteria detailed in the Project and Transport Environment Incident Procedure requirements (refer to Section 4.9 of the CEMP).

The timing for any improvement will be agreed between the relevant Area Managers/Forepersons and Project Environment and Sustainability Manager based on the level of risk (e.g. a significant risk will require immediate action).

For further information regarding environmental non-compliance and non-conformances, see Section 4.11 of the CEMP.

8. Review and Improvement

8.1. Continuous Improvement

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

The continuous improvement process will be designed to:

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

8.1.1. Adaptive Management

An adaptive management approach is to be employed in respect of the works forming part of this Plan. An adaptive management approach involves an integrated process of monitoring, reviewing and then responding to the efficacy of the methodology and management measures to identify any alterations to the design and maintenance of works that may be required to ensure the objectives of the Plan are achieved.

Where monitoring indicates that the construction works are having or could have a greater impact than approved, the Environment and Sustainability Manager in consultation with the Project Ecologist and relevant stakeholders (where required), will review the results of the monitoring program and take action as soon as reasonably practicable to prevent further impacts. This may include implementing measures such as a stop work, additional fauna fencing and delineation, additional training, changing construction methodology or redesigning certain elements of the Project.

The effectiveness of any corrective action will be determined through continued monitoring. The continued monitoring will occur either in accordance with the monitoring already included within Section 4 of the FFCMP, or as appropriate to the specific corrective action, in addition to that already specified within the FFCMP.

In some instances, corrective actions relating to specific issues may require changes to or additional management measures to those listed in the FFMP of FFCMP. Where minor amendments to the FFMP and/or FFCMP are required, the ER may approve these amendments in accordance with CoA A29. Amendments to these documents that are of a nature greater than minor will be subject to approval by the Planning Secretary and may require further government agency consultation.

8.2. FFMP Version Control

The processes described in Section 4.10 to Section 4.14 of the CEMP may result in the need to update or revise this Plan. This will occur as needed. The FFMP will also be updated where the FFCMP identifies the need for additional management measures.

Only the Environment and Sustainability Manager (or delegate) has the authority to approve changes to the requirements of this Plan. Minor amendments to the Plan may be approved by the ER in accordance with Section 4.13.2 of the CEMP. Amendments not considered minor by the ER need to be approved by the Planning Secretary.

All changes to monitoring locations or numbers, must be approved by the Planning Secretary, following endorsement by the ER under condition A29(d).

Where a revised version of this Plan is submitted to the Planning Secretary for approval, a copy of this Plan will be sent to AG DCCEE within 10 days with an explanation of the differences between the approved and revised plans. If a revised version of this Plan is approved by the Planning Secretary, the revised plan will be provided to AG DCCEE within 10 business days of the Planning Secretary's approval.

A copy of the updated Plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure, as detailed in Section 4.12 of the CEMP.

Appendix A – Consultation Responses

Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Engagement Log per CoA A8 (a), (b) and (c) and Comment Register per CoA A8 (d) and (e)

Date	Details of Engagement / Attempted Engagement
18/08/2023	Email sent by JHGA to Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) providing copy of this Plan for review. Requested feedback be provided by 8 September 2023, if possible. Offer of meeting / Teams session made.
28/08/2023	Email received from DCCEEW providing review comments on the Plan.
30/08/2023	Email sent by JHGA to DCEEW providing summary of how review comments have been addressed within the Plan.
31/08/2023	Email received from DCCEEW thanking JHGA for consideration of comments.

Comment Raised	Project Response	Where addressed	Status
Thank you for providing the department with the Flora and Fauna construction sub-plan for consultation in accordance with condition 6 of EPBC Act Approval 2018/8288. Please note these comments are specific to the sub-plan provided and do not contemplate any content within the associated plans, unless otherwise specified below. If my comments are addressed elsewhere in those plans then they may not require further consideration by the approval holder.	No comment, background information only.	-	-

Flora and Fauna Management Sub-plan:

Table 3-3 (p.20) Ref B01, dot point 1: should specifically also include identification of threatened species habitat.	The revised environmental management measures (REMMS) (B01) have been extracted directly from the Submissions Report and form part of the approved Project documents under SSI-7319 and as such REMM wording within this table cannot be changed. It is noted that REMM B01 references the <i>'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects'</i> (RTA 2011). Guide 1: Pre-clearing process of this guidelines requires that the location of any threatened flora species, threatened ecological communities and habitat are mapped. The Sensitive Area Plans included at Appendix A5 of the Construction Environmental Management Plan include fauna habitat.	Section 3.3, Table 3-3, Ref B01 Section 4.7.1 CEMP Appendix A5	No changes required. Closed.
Table 4-5 (p37): This table does not represent the current listing status of the Koala. Please update.	Table 4-5 has been updated to change the EPBC Act listing from vulnerable to endangered as per the 12 February 2022 update to the listing. The Biodiversity Conservation Act listing has also been updated to reflect the 20 May 2022 NSW Gazetted date.	Section 4.7.2, Table 4-5, Ref Koala.	Change made. Closed.

Comment Raised	Project Response	Where addressed	Status
Section 5.1 (p.45): Does not contemplate introduction of weeds and pest species from vehicle, plant and equipment movement. Similarly the earthworks and excavation have the potential to expose and mobilise contaminants or Acid Sulphate Soils (if present).	Section 5.1 has been updated to include: - Disturbance of soils (including acid sulphate soils), consequential erosion and the mobilisation of sediment and other potential contaminants into stormwater systems and the receiving environment - Vehicle movements introducing new and spreading existing weed species, pathogens, diseases, and other pests	Section 5.1	Change made. Closed.
Section 5.2 (p.46): Removal of native vegetation could be updated to specify it includes removal of habitat or potential habitat for threatened species.	Section 5.2 has been updated to include: Removal of native vegetation, including removal of habitat or potential habitat for threatened species.	Section 5.2	Change made. Closed.
Table 5-1 (p. 47):			
– Invasion and spread of weeds would also be possible if any fill is to be introduced from offsite for construction.	Table 5-1 “Invasion and spread of weeds, pathogens and disease” has been updated to include “The importation of soil material from offsite for the purposes of increasing the levels of the site may also increase the risk of invasion and spread of weeds.”	Section 5.2, Table 5-1, Ref: Invasion and spread of weeds, pathogens, and disease	Change made. Closed.
– Removal of fauna habitat should also reference the removal of hollow baring trees as they form important roosting and sheltering habitat for certain species.	Table 5-1 “Removal of fauna habitat” has been updated to include hollow baring trees and roosting.	Section 5.2, Table 5-1, Ref: Removal of fauna habitat	Change made. Closed.
– Is there any chance of groundwater being encountered and impacting hydrology that way?	Table 5-1 “Changes to hydrology” has been updated to include temporary construction dewatering where excavations occur below the water table. It is noted that this is addressed in the Groundwater Management Sub-Plan, which includes an assessment of risks to groundwater dependent ecosystems from changes to groundwater quality and levels. During design development, the Project’s stormwater management approach has eliminated the need for basins to be excavated below the groundwater table, which has significantly reduced risks to groundwater compared to that contemplated within the EIS and Submissions Report. Project dewatering is expected to be limited to small areas and short durations. The Soil and Surface Water Management Plan Soil and Surface Water Management Plan Appendix F Dewatering Management Procedure, Section 8.4 includes controls measures for dewatering near or within wetlands and waterways.	Section 5-2, Table 5-1, Ref: Changes to Hydrology Soil and Surface Water Management Plan Appendix F Dewatering Management Procedure, Section 8.4.	Change made. Closed.

Comment Raised	Project Response	Where addressed	Status
Fragmentation of habitat could be strengthened, if relevant, by consideration of the secondary impacts to movement of fauna. For example crossing of roads or cleared areas increases the risk of mortality or injury as native fauna is exposed when moving outside corridor areas.	Table 5-1 "Fragmentation of identified biodiversity links and habitat corridors" has been updated to include risks associated with fauna movement in construction and operation.	Section 5-2, Table 5-1, Ref: Fragmentation of identified biodiversity links and habitat corridors	Change made. Closed.
Table 6-1 from p.49:			
FFMM8/FFMM9: Following Pre-clearing surveys by a suitably qualified person to identify potential habitat trees has consideration been given to having a fauna spotter on site during clearing with no clearing to take place while habitat trees are occupied.	<i>'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects'</i> (RTA 2011) includes the requirements for relocation of fauna 24hrs prior to clearing commencing by a licenced wildlife carer and/or ecologist. The guidelines also states that a licenced wildlife carer and/or ecologist should be on site during habitat removal.	Section 6.1, Table 6-1, FFMM8/FFMM9	No change required, covered under existing commitments. Closed.
Unexpected finds protocol should be referred in (as a minimum) FFMM11, FFMM12, FFMM17.	The unexpected finds protocol only applies to threatened species or threatened ecological communities (TEC) that are unexpectedly encountered during construction. The Flora and Fauna Protection Procedure will be applied for all known and expected flora and fauna requiring management during construction.	Section 6.1, Table 6-1, FFMM11, FFMM12, FFMM17.	No change required. Closed.
FFMM14/15: how will trees to be retained be clearly identified?	As per FFMM11 and Appendix D – Flora and Fauna Protection Procedure Section 6.3, clearing limits will be delineated using signage and highly visible barrier tape such as flagging, bunting nightline or similarly robust and durable material with reflective stripes. This is in accordance with the <i>'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects'</i> (RTA 2011) which has also been added to the reference column of FFMM14 and FFMM15.	Section 6.1, Table 6-1, FFMM11 FFMP Appendix D – Flora and Fauna Protection Procedure Section 6.3	Change made. Closed.
FFMM17: Where clearing must occur within breeding season, what other measures will be in place to minimise impacts?	FFMM17 has been updated to highlight that clearing will be staged to reduce the risk of fauna mortality with replacement habitat installed prior to commencement of clearing.	Section 6.1, Table 6-1, FFMM17 FFMP Appendix C – Replacement Habitat Strategy Section 6.	Change made. Closed.
FFMM18: Clarify that fauna is intended to be translocated per item FFMM23. The section speaks to release sites but not specifically capture and release. If this is to occur, who is intended to undertake this relocation?	FFMM18 has been updated to cross reference FFMM23. FFMM23 has been updated to explicitly state the requirement for translocations to be undertaken by a licenced wildlife carer or ecologist.	Section 6.1, Table 6-1, FFMM18	Change made. Closed.
FFMM21: Replace the word "positions" with "positioned".	FFMM21 has been updated to replace the word "positions" with "positioned".	Section 6.1, Table 6-1, FFMM21	Change made.

Comment Raised	Project Response	Where addressed	Status
			Closed.
FFMM25: Microbats are nocturnal – please specify whether these pre-clearance surveys are to be undertaken at night to determine habitat. If not, then the limitation of daytime surveys need to be identified.	FFMM25 has been updated to include the following “Pre-clearance surveys will initially be undertaken during the day and should any potential habitat (including roosting habitat) be identified additional surveys will be undertaken at dusk.”	Section 6-1, Table 6-1, FFMM25.	Change made. Closed.
FFMM50-52: There is no indication of inspection or washdown procedures for plant, vehicles or equipment.	The inspection and washdown requirements are contained in the Appendix E Weed and Pathogen Control Procedure Section 6.4.	FFMP Appendix E Weed and Pathogen Control Procedure, Section 6.4.	No change required. Closed.
Generally this table does not contemplate impact management for contamination risk on TECs or habitat for listed fauna.	The Soil and Water Management Sub-Plan (SSWMP), Groundwater Management Sub-Plan (GMP) and Surface Water and Groundwater Quality Construction Monitoring Program (SWGQCMP) include performance outcomes for Water Quality. The SSWMP (including its Appendix I Contaminated Land Management Plan) details controls to mitigate the risks of the migration of existing contamination to ecological receptors as well as appropriate controls to mitigate risk of new contamination during construction through appropriate handling and storage of contamination and response to spills. The GMP includes controls for monitoring water levels and water quality and consulting with the Project ecologist and hydrogeologist to determine risks to groundwater dependent ecosystems (GDEs). The SWGQCMP details the surface and groundwater quality monitoring program to be implemented and includes a trigger action response plan for water quality based on site specific, ANZG (2018) and ADWG (2011) criteria. Section 1.3.1 of this Plan details the relationship between this Plan and these other Project documents. This has been updated to explicitly address contamination.	Section 1.3.1 SSWMP GMP SWGQCMP	Change made. Closed.
Section 6.1.1 (p.60): It may be useful to identify some of the criteria that will inform the Sensitive Area Plans and Environment Control Maps.	Section 4.2.8 of the Construction Environmental Management Plan details criteria for Sensitive Area Plans (SAPs) and Environmental Control Maps (ECMs). SAPs are also attached to the CEMP at Appendix A5. SAPs include the following: - Threatened flora species records (historical) - Vegetation communities - Non-native vegetation communities (historical) - Tomago Sandbeds Catchment and Drawdown Areas - Areas of Potential Contamination Concern - Sensitive receivers / land uses (noise and vibration)	CEMP Section 4.2.8	No change required. Closed.

Comment Raised	Project Response	Where addressed	Status
	- Aboriginal and Non-Aboriginal Heritage The Project GIS portal includes the following additional information based on survey and pre-clearing reports for inclusion on Environmental Control Maps: - Hollow bearing trees - Other habitat (e.g. nests, logs, decorticating bark) - Structures (buildings, bridges, large culverts) - Aquatic habitat (e.g. pools) - Mapped watercourses (aquatic habitat) - Freshwater wetlands (aquatic habitat) - Estuary cod habitat - Priority weeds (individuals and patches) - Callistemon linearifolius (Individuals and patches)		
The plan identifies implementation of no-go or exclusion zones but doesn't specify what criteria will be used to determine these zones and what the purpose of the zones is. Protection of TECs or habitat? Or Other?	In accordance with '<i>Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i>' (RTA, 2011) and exclusion zone is identified as "a designated 'no-go' area that is clearly identified and appropriately fenced to prevent damage to native vegetation and fauna habitats and prevent the distribution of pests, weeds, and disease. Exclusion zones may also be used to define approved clearing limits for a project". Exclusion zones will be determined in accordance with the Management requirements contained within '<i>Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i>' (RTA, 2011) – Guide 2 – Exclusion zones. Section 6.1.1 has been updated to highlight that exclusions / no-go zones are defined as per (RTA, 2011)	Section 6.1.1	Change made. Closed.
Appendix C – Replacement Habitat Strategy:			
Suggest it is noted that vegetation showing any sign of disease or pathogen will not be mulched, stockpiled and re-used.	Section 5.1 of FFMP Appendix C Replacement Habitat Strategy has been updated to include "However, native vegetation showing any sign of disease or pathogen will not be mulched, stockpiled, and / or re-used on site. Any diseased or pathogen effected vegetation will be removed offsite to an appropriately licenced facility."	Appendix C Replacement Habitat Strategy, Section 5.1	Change made. Closed.
Appendix E – Weed and Pathogen Control Procedure			
Section 6.3 (p.8) where soil pathogens are identified, either by testing or visual pre-clearance surveys, they should not be re-used in areas where sensitive environmental receptors	FFMP Appendix E – Weed and Pathogen Control Procedure Table 7-1 has been updated to include an additional pathogen management measure for 'Transport of site won material'.	FFMP Appendix E – Weed and Pathogen Control Procedure Table 7-1, Ref: Transport of site won material	Change made. Closed.

Comment Raised	Project Response	Where addressed	Status
such as threatened species or ecological communities are present.			
<u>Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol:</u>			
Suggest including a list or table of the Listed Threatened Species and Ecological Communities likely to be subject to the Protocol.	No comment, background information only.	-	-
Section 2.4 (p.7): Suggest inclusion of the Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (2013) in the list of documents. The link to this document if required is provided here: Significant Impact Guidelines 1.1 - Matters of National Environmental Significance - DCCEEW. This guideline specified how the Department determines what is likely to constitute a significant impact, as referred to in section 2.5 of the Unexpected Finds Protocol.	Note, the following response is provided by Transport: Section 2.2 of the protocol identifies that the protocol is applicable to all Threatened Species and Ecological Communities not previously identified as occurring within the project boundary as per the Submission Report Biodiversity Assessment. A complete list of all Threatened Species and Ecological Communities previously identified as occurring within the project boundary has not been included to avoid inconsistencies and due to the large number of them identified in the Biodiversity Assessment Report.	Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol Section 2.2.	No change made. Closed.
Section 2.5 (p.7): This section does not specify any timing for reporting following the unexpected finds. Please include reasonable timeframes in which levels of reporting is undertaken for unexpected finds of a threatened species or TEC.	Note, the following response is provided by Transport: Section 2.4 has been amended as suggested to include reference to the Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (2013).	Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol Section 2.4.	Change made. Closed.
Section 2.6 (p.7): Suggest including a statement that if significant amendments are required to the document following review, the document will be provided to relevant government agencies for consideration/approval as necessary.	Note, the following response is provided by Transport: Section 2.6 has been updated to identify that when changes to the procedure are required, the procedure would be resubmitted to the Planning Secretary in accordance with Condition E2.	Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol Section 2.6.	Change made. Closed.
- Section 3 (p.9): The pre-amble to Figure 1 states the procedure applies to threatened species but does not include threatened ecological communities. Are TECs covered in another Figure? If so, specify in this section. If not, suggest including TECs in the pre-amble to Figure 1. - Figure 1 – Suggest include timeframe for each step.	Note, the following response is provided by Transport: The pre-amble of Figure 1 has been updated to include threatened ecological communities to be consistent with the content of the figure. Figure 1 provides a summary of the procedure in a flow chart. The detailed actions are included below Figure 1. Step 1 has been updated to include a timeframe of “Immediately after encounter”.	Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol Figure 1 Preamble	Change made. Closed.

Comment Raised	Project Response	Where addressed	Status
- Detailed Steps of procedure (p.10) - Step 1 – include timing for each component. For example stop work does not have a timing and could be openly interpreted. If the intention is for immediate stop work, then the document must specify this for clarity. Establishment of a 'no-go' zone should have a timeframe associated with it. Similarly the reporting provisions in this step do not include associated timings. - Step 2 – “sought” instead of “sort” in third dot point. - Step 2 – It is suggested that active/commitment language will be used throughout for example “will” instead of “should / would”. - Step 2 – last dotpoint on page 10 identifies design changes may be necessary. It should be noted by the approval holder that design changes should be limited to within the existing footprint and approved action, otherwise further approvals are likely to be required. - Step 4 – “Low Impact Works” are not defined anywhere in this document.	Note, the following response is provided by Transport: Figure 1 provides a summary of the procedure in a flow chart. The detailed actions are included below Figure 1. Step 1 has been updated to include a timeframe of “Immediately after encounter”. A timeframes of “as soon as practical” has been added for the No-go zone, noting that works have stopped. Step 1 identified that reporting will occur in accordance with Transport Environmental Incident Procedure, which is to be adopted for all incidents and unexpected finds across the project. This procedure includes timeframes for reporting. Note, the following response is provided by Transport: “Sort” changed to “Sought” Note, the following response is provided by Transport: “Would” changed to “Will” Note, the following response is provided by Transport: Noted. Note, the following response is provided by Transport: Low impact works are defined in the NSW approval. This has been added in Section 2.5 after the first occurrence of the term ‘low impact work’ and has been added to the glossary.	Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol Figure 1 Preamble Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol Step 1 Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol Step 2 Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol Step 2 Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol Step 2 Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol Step 2 Unexpected Threatened Species and Threatened Ecological Communities Finds Protocol Glossary	Change made. Closed. Change made. Closed. Change made. Closed. No change made. Closed. Change made. Closed.



NSW Department of Primary Industries, Fisheries (DPI Fisheries) Log per CoA A8 (a), (b) and (c) and Comment Register per CoA A8 (d) and (e)

Date	Details of Engagement / Attempted Engagement
18/08/2023	Email sent by JHGA to DPI Fisheries providing copy of this Plan for review. Requested feedback be provided by 8 September 2023, if possible. Offer of meeting / Teams session made.
11/09/2023	Email received from DPI Fisheries providing review comments on the Plan.
11/09/2023	Email sent by JHGA to DPI Fisheries providing summary of how review comments have been addressed within the Plan.
21/09/2023	Email received from DPI Fisheries confirming acceptance of comment close-out.

Comment Raised	Project Response	Where addressed	Status						
Thank you for referring the M12RT – Stage 1 Black Hill to Tomago Flora and Fauna Management Sub-Plan and Construction Monitoring Program to DPI Fisheries for consultation. My only comment is in relation to section 6.1.8, which states the following “In accordance with CoA E13, Transport will make a payment to DPI Fish Conservation Trust Fund prior to the commencement of Work that impacts KFH in Hunter River and Purgatory Creek to meet the requirements of the habitat offset.” In accordance with CoA E13 (see below for reference), Transport has committed to delivering an aquatic habitat offset and are proposing to do so under a Biodiversity Stewardship Agreement at a nearby location to the impacted site. I request the wording be changed to reflect Transport’s proposal. Transport will be able to advise further information on their proposal. <table><tr><td>E13</td><td> Payment of the habitat offset requirement must be made to the DPI Fish Conservation Trust Fund prior to the commencement of Work that impacts KFH in Hunter River and Purgatory Creek. Note: The monetary offset (i.e. contribution to the Biodiversity Offset Fund for fish habitat) should be the last alternative and only be pursued if all on-ground offset opportunities have been investigated at length and determined to be unachievable. </td><td> Section 6.1.8 Biodiversity Offset Strategy </td></tr><tr><td>E14</td><td> The Proponent must submit to the Planning Secretary a receipt confirming payment to the DPI Fish Conservation Trust Fund within one month of making the payment. </td><td> Section 6.1.8 Biodiversity Offset Strategy </td></tr></table> Once the above amendment is made, I am satisfied that the Flora and Fauna Management Sub-Plan and Construction Monitoring Program adequately captures DPI Fisheries policy and guideline requirements surrounding aquatic and riparian environmental controls.	E13	Payment of the habitat offset requirement must be made to the DPI Fish Conservation Trust Fund prior to the commencement of Work that impacts KFH in Hunter River and Purgatory Creek. Note: The monetary offset (i.e. contribution to the Biodiversity Offset Fund for fish habitat) should be the last alternative and only be pursued if all on-ground offset opportunities have been investigated at length and determined to be unachievable.	Section 6.1.8 Biodiversity Offset Strategy	E14	The Proponent must submit to the Planning Secretary a receipt confirming payment to the DPI Fish Conservation Trust Fund within one month of making the payment.	Section 6.1.8 Biodiversity Offset Strategy	The last two paragraphs of Section 6.1.8 have been deleted and replaced with the following statement: “In accordance with CoA E12, Transport will offset key fish habitat impacts in accordance with the Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013 update).”	Section 6.1.8	Change made. Closed.
E13	Payment of the habitat offset requirement must be made to the DPI Fish Conservation Trust Fund prior to the commencement of Work that impacts KFH in Hunter River and Purgatory Creek. Note: The monetary offset (i.e. contribution to the Biodiversity Offset Fund for fish habitat) should be the last alternative and only be pursued if all on-ground offset opportunities have been investigated at length and determined to be unachievable.	Section 6.1.8 Biodiversity Offset Strategy							
E14	The Proponent must submit to the Planning Secretary a receipt confirming payment to the DPI Fish Conservation Trust Fund within one month of making the payment.	Section 6.1.8 Biodiversity Offset Strategy							

Water Group of the Department of Planning and Environment (DPE Water) Log per CoA A8 (a), (b) and (c) and Comment Register per CoA A8 (d) and (e)

Date	Details of Engagement / Attempted Engagement
18/08/2023	Plan submitted via Major Projects portal to DPE Water. Requested feedback be provided by 8 September 2023, if possible. Offer of meeting / Teams session made.
4/09/2023	Letter received from DPE Water confirming there are no comments on this matter.

Comment Raised	Project Response	Where addressed	Status
No comments. Refer email from DPE Water dated 4 September 2023			N/A



Biodiversity and Conservation Division of the Environment and Heritage Group of the Department of Planning and Environment (BCD) Log per CoA A8 (a), (b) and (c) and Comment Register per CoA A8 (d) and (e)

Date	Details of Engagement / Attempted Engagement
18/08/2023	Email sent by JHGA to BCD providing copy of this Plan for review. Requested feedback be provided by 8 September 2023, if possible. Offer of meeting / Teams session made.
23/08/2023	Plan submitted via Major Projects portal at request of BCD. Requested feedback be provided by 14 September 2023, if possible. Offer of meeting / Teams session made.
12/09/2023	Letter received from BCD providing comments on the Plan.
18/09/2023	Email sent by JHGA to BCD demonstrating close-out of comments and providing copy of updated Plan. Offer of meeting / Teams session made. Email sent by JHGA to BCD nominated contact forwarding previous email demonstrating close-out of comments and providing copy of updated Plan. JHGA attempted phone call to BCD nominated contact. Voicemail left, no response.
20/09/2023	JHGA attempted phone call to BCD nominated contact. Voicemail left, no response. Transport attempted phone call to BCD nominated contact. No response. Email sent by Transport to BCD nominated contact following up on JHGA request for close-out of comments. Offer of meeting / Teams session made.
21/09/2023	Email to BCD notifying that: - JHGA provided a copy of the updated Plan in response to BCD comments on 18 September 2023, - JHGA have attempted to contact BCD on several occasions to close-out comments. - JHGA have received and closed out all other stakeholder comments, - JHGA have accepted the additional monitoring recommendations made by BCD, - JHGA have received and closed out all other stakeholder comments, - JHGA intend to progress the Plan to ER endorsement and DPE approval without BCD response to the updated Plan, - Following DPE approval, if any feedback is received from BCD, JHGA would be happy to discuss this and incorporate any relevant comments.
22/09/2023	JHGA attempted phone call to BCD. Voicemail left, no response. Transport attempted phone call to BCD. No response. Follow up email from Transport to BCD requesting feedback Plan updates. Email from BCD confirming that Plan updates are under review. Email to BCD requesting timeframe for review of comment responses.
26/09/2023	JHGA attempted phone call to BCD nominated contact. Voicemail left, no response.
27/09/2023	Email and Letter received from BCD providing response to previous comment updates and providing further comment.
27/09/2023	JHGA email to BCD providing responses to further comment on the Plan.
27/09/2023	Email from BCD confirming acceptance of comment close-out.

Comment Raised	Project Response	Where addressed	Status
Initial Review Comments per 12/09/2023 Letter			
1. Certainty is required for flora and fauna management measures. Table 6-1 of the Flora and Fauna Management Sub-Plan includes mitigation measures for the vegetation clearing, protection and management procedures. Several of these measures, including FFMM17, FFMP19, FFMP20 are intended to prioritise ethical treatment and welfare of wildlife during clearing processes. The plan states that these measures will be implemented 'where possible'. This wording does not provide sufficient certainty that the measures will actually be implemented. <u>Recommendation 1</u> The phrase 'where possible' should be removed from the proposed mitigation measures, particularly where they are intended to prioritise ethical treatment and welfare of wildlife during clearing processes. These measures should have clearly defined actions and be strictly adhered to. A non-compliance procedure should be developed in consultation with BCD where measures of the Flora and Fauna Management Sub-plan cannot be met.	JHGA has removed the term 'where possible' from all management measures. The non-compliance process is included in Section 4.11 of the CEMP and Section 7.7 of this Plan. In accordance with CoA A41 the Planning Secretary must be notified via the Major Projects Website within seven days after the Proponent becomes aware of any non-compliance. The notification must identify the CSSI (including the application number and the name of the CSSI if it has one), set out the condition/s that is non-compliant, the nature of the breach, the reason for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance. DPE's <i>Compliance Policy</i> (Department of Planning and Environment, 2020) states "<i>There are a number of state and Commonwealth agencies that are coregulators, as well as advisory agencies with an interest and/or role in the regulation of state significant development and infrastructure projects. The department collaborates with these agencies on issues of mutual concern to gather information, co-ordinate compliance actions and reduce regulatory duplication.</i>" As such, JHGA understands that a non-compliance relating to flora and fauna related Conditions of Approval or the FFMP would be referred to BCD by the Planning Secretary.	Section 6.1 FFMM17 FFMM19 FFMM20 FFMM54 Section 7.7 Section 4.11 CEMP	Changes made. Closed.
2. WIRES does not service Port Stephens or Newcastle LGAs. The Flora and Fauna Management Sub-Plan and appendices make a number of references to WIRES as the organisation to be contacted when injured or orphaned wildlife are located. This includes FFMM22 of Table 6-1, and Table 8-1 of the Flora and Fauna Protection Procedure. WIRES do not service the Port Stephens or Newcastle local government areas (LGAs). <u>Recommendation 2</u> The Flora and Fauna Management Sub-Plan should be updated to include the contact details of wildlife rescue organisations that service the Port Stephens or Newcastle LGA.	The reference to 'WIRES' has been updated to read 'local wildlife rescue organisations'. Hunter Wildlife Rescue is the predominate wildlife rescue organisation that services both the Newcastle and Port Stephens LGAs. The Hunter Wildlife Rescue phone number has been included within FFMM22 in Section 6.1 and within Section 8 of the Flora and Fauna Protection Procedure.	Section 6.1 FFMM22 Appendix D, Section 8	
3. Additional information is required for the hollow augmentation methodology. Section 6.1 of Appendix C of the Flora and Fauna Management Sub-Plan details hollow augmentation methodology, however some	JHGA will engage a suitably qualified arborist to undertake hollow carving works. An AQF 3 level arborist has sufficient level of training relating to tree biology and physiology to be able to advise on and undertake these works. JHGA will	Section 6.1. Appendix C, Section 6.4	Changes made. Closed.

Comment Raised	Project Response	Where addressed	Status
additional details are required to address gaps in the methodology for carved hollows and nest boxes in Sections 6.1.1 and 6.1.4 respectively. These include: - Details on the qualifications and experience of those who will be constructing the carved hollows and evidence that they have sufficient experience do the work without causing permanent damage to the tree. - A condition that all fasteners used in nest box construction are weather resistant stainless steel or galvanised. <u>Recommendation 3</u> Sections 6.1.1 and 6.1.4 of Appendix C of the Flora and Fauna Management Sub-Plan should be updated to provide details on the qualifications and experience on those constructing the carved hollows and a condition that all fasteners used in nest box construction are weather resistant stainless steel or galvanised.	engage an arborist with previous experience in using a Hollowhog tool. The project arborist will be engaged prior to construction. JHGA will review the qualifications and relevant experience of the arborist as part of the procurement process to determine whether they have sufficient experience to undertake the works with minimal risk of causing permanent damage to trees. Section 6.1.1 of the Replacement Habitat Strategy has been updated to reflect the qualifications and experience required for the arborist to undertake hollow carving works. Section 6.4 of the Replacement Habitat Strategy has been updated to state that all fasteners used in nest box construction are to be weather resistant stainless steel or galvanised.		
4. Measurable performance criteria and clearly identified corrective measures should be established for threatened entities the require monitoring in the Flora and Fauna Construction Monitoring Program. Condition C6 (d) of the Instrument of Approval requires management plans to follow SMART principles when identifying performance criteria and triggers for implementing specific corrective measures. The information provided in Section 4 of the Flora and Fauna Construction Monitoring Program does not follow these principles and it is unclear what the performance measures and triggers for corrective actions are if the proposed works are determined to be impacting the identified threatened entities. Additionally, corrective measures in the instance that the triggers are met have not been clearly considered or identified. <u>Recommendation 4</u> Section 4 of the Flora and Fauna Construction Monitoring Program should be edited to ensure that the SMART principles are applied to performance measures and corrective actions in accordance with Condition C6 (d) of the Instrument of Approval.	The monitoring requirements for threatened entities have been updated to clarify how performance and triggers will be measured. Rows have been added to each table in Section 4 of the Flora and Fauna Construction Monitoring Program to identify 'performance measures', 'Trigger points for corrective action(s)' and 'Response' as they relate to the monitoring of each threatened entity. The updates: - Are specific to each threatened entities - Provide measurable targets, - Can be achieved through the monitoring program implemented by the Project Ecologist, - Are relevant to the threatened entity and general impacts associated with construction projects. - Are time-bound as identified by the "frequency of monitoring to be undertaken" row in each table. As such, JHGA has implemented the SMART principles through the monitoring program. The Project has an adaptive management approach to corrective actions (refer to Section 8.1.1 of the FFMP and Section 6 of the FFCMP). The exceedance of a trigger point, as identified in Section 4 of the FFCMP, may be the result of any number of specific causes. The first step in any corrective action will be a review of the monitoring results and an investigation into the cause of the exceedance. The	Section 8.1.1 Section 4 of the FFCMP	Changes made. Closed.

Comment Raised	Project Response	Where addressed	Status
	Environment and Sustainability Manager will undertake this review as stated within Section 6 of the FFCMP. Once the specific cause is identified the Project will implement issue specific corrective actions to further mitigate the risk of impact. Section 6 of the FFCMP states that these corrective actions may include implementing measures such as a stop work, additional fauna fencing and delineation, additional training, changing construction methodology or redesigning certain elements of the project. Targeted corrective actions will be explored in consultation with Transport and the Project Ecologist. Any targeted corrective action will be implemented in accordance with the SMART principles. The effectiveness of any corrective action will be determined through continued monitoring. The continued monitoring will occur either in accordance with the monitoring already included within Section 4 of the FFCMP, or as appropriate to the specific corrective action, in addition to that already specified within the FFCMP. In some instances, corrective actions relating to specific issues may require changes to or additional management measures to those listed in the FFMP. Where minor amendments to the FFMP and/or FFCMP are required, the ER may approve these amendments in accordance with CoA A29. Amendments to these documents that are of a nature greater than minor will be subject to approval by the Planning Secretary and may require further government agency consultation.		
5. Monitoring effort for Threatened Ecological Communities (TECs) should be consistent with the level of survey effort required by the Biodiversity Assessment Method (BAM). Section 4.1 of the Flora and Fauna Construction Monitoring Program indicates that monitoring survey effort for Threatened Ecological Communities (TECs) will be limited to one Biodiversity Assessment Method (BAM) plot per vegetation zone that contains a TEC. This would result in a significant underrepresentation of the condition of these TECs as eight of the 15 zones are greater than 5 hectares (ha), with the largest being 33.29 ha. Table 3 of the BAM demonstrates the minimum level of effort required to determine the vegetation integrity score of a vegetation zone. This level of effort should be applied to the monitoring program. <u>Recommendation 5</u>	The monitoring effort for TECs as described within Section 4.1 of the FFCMP has been updated to reflect the requirements listed in Table 3 of the Biodiversity Assessment Method 2020. The minimum number of BAM plots for each vegetation zone of a TEC will be calculated by a 50m buffer area around the final clearing footprint.	Section 4.1 of the FFCMP	Changes made. Closed.

Comment Raised	Project Response	Where addressed	Status
The minimum level of survey effort recommended in Table 3 of the BAM should be implemented for effective monitoring of TECs throughout construction. This will ensure that the Vegetation Integrity Score recorded through monitoring is an accurate representation of the condition of the vegetation zone over time.			
6. Monitoring of Mahony's toadlet (<i>Uperoleia mahonyi</i>) and Wallum froglet (<i>Crinia tinnula</i>) must include herpetological surveys. Section 4.3 of Appendix G of the Flora and Fauna Management Sub-Plan proposes to monitor Mahony's toadlet (<i>Uperoleia mahonyi</i>) and Wallum froglet (<i>Crinia tinnula</i>) through water quality monitoring and floristic plots. This methodology may have benefit in providing context in addition to herpetological surveys, however, it is not adequate to replace them. Both of these species are identified as species credit species under the BAM as are threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. These species undoubtedly have the potential to be impacted by variations in water quality, hydrology and vegetation composition, however there are no reliable, reputable resources that indicate what degree of change in these habitat features would impact these populations. Therefore, there is no way of establishing presence/absence of these species based on the proposed habitat features nor measurable performance criteria that could be established to determine what extent of changes would impact the populations of these species. The NSW Survey Guide for Threatened Frogs provides evidence based, best practice methodology for detecting the presence/absence of these species. This methodology can also be utilised for establishing baseline data and ongoing monitoring of reference and test sites. Additionally, Table 3-1 of Appendix G of the Flora and Fauna Management Sub-Plan identifies both the Wallum froglet (<i>Crinia tinnula</i>) and Mahony's toadlet (<i>Uperoleia mahonyi</i>) as species that require monitoring. The main document (e.g. Section 7.4.1) does not identify that Mahony's toadlet (<i>Uperoleia mahonyi</i>) requires monitoring. <u>Recommendation 6</u> The survey methodology from the NSW Survey Guide for Threatened Frogs should be used for establishing baseline data and ongoing monitoring for Mahony's toadlet (<i>Uperoleia mahonyi</i>) and Wallum froglet (<i>Crinia tinnula</i>). Surveys are to be undertaken by a suitably qualified, experienced herpetologist.	The survey methodology as described within Section 4.3 of the FFCMP has been updated to be in line with the NSW Survey Guide for Threatened Frogs. This methodology will be used for establishing baseline data and ongoing monitoring for Mahony's toadlet (<i>Uperoleia mahonyi</i>) and Wallum froglet (<i>Crinia tinnula</i>). Surveys will be undertaken by a suitably qualified, experienced herpetologist. Water sampling and floristics plots have been included as a contingency option for monitoring if weather conditions do not permit targeted surveys. Refer to Section 4.3.1 for a description of the contingency approach. Section 7.4.1 of the FFMP has been updated to include Mahony's toadlet (<i>Uperoleia mahonyi</i>).	Section 7.4.1 Section 4.3 of the FFCMP	Changes made. Closed.

Comment Raised	Project Response	Where addressed	Status
The Flora and Fauna Management Sub-Plan should be updated to include the Mahony's toadlet (<i>Uperoleia mahonyi</i>) in all discussions and details surrounding the monitoring program.			
7. Netted bottlebrush (<i>Callistemon linearifolius</i>) requires monitoring during flowering season. Table 4-2 of Appendix G of Flora and Fauna Management Sub-Plan indicates that monitoring surveys for the netted bottlebrush (<i>Callistemon linearifolius</i>) will occur biannually in spring and autumn. The ideal months for survey of this species is identified in the Threatened Biodiversity Database Collection (TBDC) is October to January. <u>Recommendation 7</u> One of the biannual monitoring surveys for netted bottlebrush (<i>Callistemon linearifolius</i>) should occur between October to January in order to ensure accurate identification and detection of new individuals at monitoring and test sites.	Clarification has been added to Section 4.2 of the FFCMP showing one sampling session to be undertaken yearly during the flowering period (October – January)	Section 4.2 of the FFCMP	Changes made. Closed.
Subsequent Review Comments per Letter received 27/09/2023			
8. WIRES has been removed as a contact agency from Table 6-1 of the Flora and Fauna Management Sub Plan and Table 8-1 of the Flora and Fauna Protection Procedure. WIRES is still referenced as the rescue agency to be contacted throughout Section 6.4.2 and 8. <u>Recommendation 8</u> The Flora and Fauna Protection Procedure should be updated to exclude references to WIRES as the rescue agency to be contacted if fauna are injured throughout the construction period.	JHGA note that this recommendation relates to BCD Recommendation 2 provided on 12/09/2023. Sections 6.4.2 and 8 of the Flora and Fauna Protection Procedure have been updated to remove reference to WIRES and to provide reference to local wildlife rescue services such as Hunter Wildlife Rescue.	Section 6.4.2 and 8 of the Flora and Fauna Protection Procedure	Changes made. Closed.
9. Monitoring effort for TEC: This is likely to be an effective strategy for monitoring during the construction phase, however baseline data is required to be established prior to the commencement of construction. It would be appropriate to establish baseline data within the current development footprint boundaries and reduce the level of ongoing monitoring based on the final clearing footprint. <u>Recommendation 9</u> Baseline data collected prior to the finalisation of the clearing footprint should be established using the current construction footprint to determine the number of monitoring plots. These can be adapted/reduced once the construction footprint is finalised.	JHGA note that this recommendation relates to BCD Recommendation 5 provided on 12/09/2023. JHGA has determined a 'working' extent of clearing as part of the detailed design and construction planning. The clearing extent will be less than the total area within the Project Boundary (referred to as the Construction Footprint within the M12RT EIS and Submissions Report). As the extent of clearing is known, the minimum number of BAM VI plots can be calculated with confidence. Based on this clarification the FFCMP has remained unchanged.	N/A	No changes made. Closed.
10. Monitoring effort for <i>Uperoleia mahonyi</i> and <i>Crinia tinnula</i>: BCD notes that for Mahony's toadlet (<i>Uperoleia mahonyi</i>) and Wallum froglet (<i>Crinia tinnula</i>), if survey effort is unsuccessful after 2 nights of survey, it	JHGA note that this recommendation relates to BCD Recommendation 6 provided on 12/09/2023.	Section 4.3 of the FFCMP	Changes made. Closed.

Comment Raised	Project Response	Where addressed	Status
can be beneficial when monitoring these species to wait a period of two weeks before conducting the last two nights of survey. <u>Recommendation 10</u> BCD recommends that the survey methodology is adapted to note that if survey effort for Mahony's toadlet (<i>Uperoleia mahonyi</i>) and Wallum froglet (<i>Crinia tinnula</i>), is unsuccessful after 2 nights of survey, survey can be postponed for a period of two weeks before conducting the last two nights of survey.	JHGA have updated Section 4.3 of the FFCMP to state "If survey effort for <i>Uperoleia mahonyi</i> and <i>Crinia tinnula</i> is unsuccessful after 2 nights of survey, the Project Ecologist may postpone the survey for a period of two weeks before conducting the last two nights of survey."		



City of Newcastle Council Log per CoA A8 (a), (b) and (c) and Comment Register per CoA A8 (d) and (e)

Date	Details of Engagement / Attempted Engagement
18/08/2023	Email sent by JHGA to City of Newcastle (CoN) providing copy of this Plan for review. Requested feedback be provided by 8 September 2023, if possible. Offer of meeting / Teams session made.
8/09/2023	Email and letter received from City of Newcastle providing comments on the Plan.
18/09/2023	Email sent by JHGA to CoN demonstrating close-out of comments and providing copy of updated Plan. Offer of meeting / Teams session made.
21/09/2023	Email received from CoN confirming acceptance of comment close-out.

Comment Raised	Project Response	Where addressed	Status
<u>Fauna Crossing and Connectivity Strategy</u>			
Arboreal rope crossing - north bound main carriageway alignment (CH280) - two new light pole installations on similar alignment may impact effectiveness of the wildlife crossing through light impacts.	The final locations of the arboreal crossing structures are subject to detailed design and will be determined in consultation with relevant stakeholders, including City of Newcastle, as part of the Design and Landscape Plan. JHGA acknowledges that the positioning of lighting can impact upon the effectiveness of arboreal crossing structures. The final position of lighting and arboreal crossing structures will be influenced by the road design. Arboreal crossing structures will be located to minimise lighting impact as part of an integrated design approach. Section 4.1 of the Fauna Crossing and Connectivity Strategy has been updated to clarify that arboreal crossing structures will be located to minimise lighting impacts. The FFMP and its appendices will be revised where updates to the design of the arboreal crossing structures require a change in management approach or management measures as described within the FFMP.	Section 4.1 of the Fauna Crossing and Connectivity Strategy	Changes made. Closed.
All arboreal crossings - request to consider additional landscaping/bush regeneration to enhance habitat to linking trees/vegetation.	Section 4.1 of the Fauna Crossing and Connectivity Strategy has been updated to clarify that, as required, revegetation will be undertaken around the crossing structures to ensure sufficient habitat connectivity for the target species.	Section 4.1 of the Fauna Crossing and Connectivity Strategy	Changes made. Closed.
Figure 5-3 (pg. 10) illustrates Fauna Crossing Structure to the north not extending across Lenaghan's Drive to adjacent bushland as per Landscape Drawing. CN requests confirmation that this will extend across all lanes of traffic at Black Hill.	The final locations and extents of the arboreal crossing structures are subject to detailed design and will be determined in consultation with relevant stakeholders, including City of Newcastle, as part of the Design and Landscape Plan. Figure 5-3 within the Fauna Crossing and Connectivity Strategy has been sourced from the M12RT Submissions Report and represents an indicative location and extent only, pending finalisation of the Design and Landscape Plan. JHGA acknowledges that the location of any arboreal crossing structure should allow for connection to suitable habitat. JHGA will consider the extension of the CH280 arboreal crossing structure across Lenaghans Drive, with consideration of other design constraints such as span length, as part of detailed design.	Section 4.1 of the Fauna Crossing and Connectivity Strategy	Changes made. Closed.

Comment Raised	Project Response	Where addressed	Status
	Section 4.1 of the Fauna Crossing and Connectivity Strategy has been updated to clarify that arboreal crossing structures will be located to provide sufficient habitat connectivity. The FFMP and its appendices will be revised where updates to the design of the arboreal crossing structures require a change in management approach or management measures as described within the FFMP.		
As requested above consideration be given to additional landscaping particularly near arboreal crossing located in the proximity of an ancillary site with measures implemented for vegetation protection and enhancement in the area surrounding mature tree stands during and post works.	The final locations and extents of the arboreal crossing structures are subject to detailed design and will be determined in consultation with relevant stakeholders, including City of Newcastle, as part of the Design and Landscape Plan. Section 4.1 of the Fauna Crossing and Connectivity Strategy has been updated to clarify that, as required, revegetation will be undertaken around the crossing structures to ensure sufficient habitat connectivity for the target species. Section 4.1 of the Fauna Crossing and Connectivity Strategy has also been updated to state that JHGA would install demarcation of retained vegetation around crossing structures on-site. The demarcation will be included within Environmental Control Maps and other plans or drawings as necessary.	Section 4.1 of the Fauna Crossing and Connectivity Strategy	Changes made. Closed.
CN supports the adaptive management approach applied to flora and fauna.	JHGA acknowledges this comment and will continue to collaborate with City of Newcastle as part of the adaptive management approach.	No change required.	Changes made. Closed.

Port Stephens Council Log per CoA A8 (a), (b) and (c) and Comment Register per CoA A8 (d) and (e)

Date	Details of Engagement / Attempted Engagement
18/08/2023	Email sent by JHGA to Port Stephens Council (PSC) providing copy of this Plan for review. Requested feedback be provided by 8 September 2023, if possible. Offer of meeting / Teams session made.
1/09/2023	Email received from PSC confirming no further comments on the Plan and previous comments were closed out.
1/09/2023	Email sent by JHGA to PSC confirming no comments were previously provided and JHGA will take that as confirmation that there are no comments on the Plan.
22/09/2023	Email received from PSC confirming no comments on the Plan.

Comment Raised	Project Response	Where addressed	Status
No comments. Refer email from PSC dated 1 and 22 September 2023.			N/A

Appendix B – Fauna Crossing and Connectivity Strategy

M1 Pacific Motorway Extension to Raymond Terrace - Stage 1 Black Hill to Raymond Terrace

Appendix B - Fauna Crossing and Connectivity Strategy

Document Number: M1RTBH2T-JHGM-6003-EV-STG-200001

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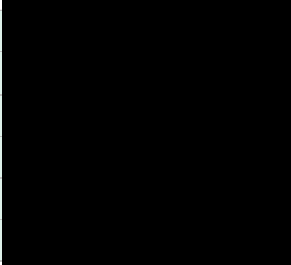
Revisions and Distribution

Revisions

Draft issues of this document are identified as Revision A, B, C, etc. Upon initial issue (generally Contract Award) this will be changed to a sequential number commencing at Revision 0. Revision numbers will continue at Revision 1, 2, etc.

Rev	Date	Prepared By [Name]	[Signature]	Reviewed By [Name]	[Signature]	Approved By [Name]	[Signature]	Remarks
A	15/05/23							Transport and ER submission
B	30/06/23							Transport and ER re-submission
C	31/07/23							Transport and ER re-submission
D	17/08/23							For external consultation
E	22/09/23							For ER Endorsement
F	29/09/23							ER Endorsement resubmission
0	08/11/23							For Construction
01	20/06/24							6 monthly review - change to distribution list and Terms and Abbreviations
02	24/10/24							Transport & ER re-submission
	24/07/25							Re-submission for ER endorsement (no changes to the Fauna Crossing & Connectivity Strategy). Minor updates to the FFMP have been ongoing since the June 2024 six-monthly review, and this re-submission encompasses the June 2025 six-monthly review.

Distribution List

Client's Representative		
Project Director		
Construction Director		
Environment and Sustainability Manager		
Environmental Representative		
Independent Certifier		

The controlled master version of this document is available for distribution as appropriate and maintained on the document management system being used on the Project, available to all Project workers. All circulated hard copies of this document are deemed to be uncontrolled.

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1. Purpose

This document provides a strategy to address habitat connectivity issues resulting from the Project, in accordance with SWTC - App 5 - Cl. 5.3. The strategy also considers fauna fencing to facilitate fauna exclusion across the Project (to reduce the risk of fauna mortality) (REMM B08).

This Plan has been prepared by Principal Ecologists [REDACTED] BSc (Zoology), Hons (Zoology), PhD (Ecology) and [REDACTED] BSc (Biology), Grad. Dip. (Bushfire Protection).

2. Scope

The Project has minimal impact on habitat connectivity at a landscape scale, however small-scale and isolated fragmentation impacts have been noted. The Project has been identified as having minimal impact on landscape connectivity for ground-dwelling fauna and, therefore, dedicated underpass crossing structures are not proposed. The focus of this strategy is on dedicated arboreal crossing structures, and incidental terrestrial and aquatic crossing structures, as well as fauna exclusion fencing.

The goals of the strategy are to:

- Reduce and minimise roadkill to maintain viable fauna populations
- Promote gene flow and provide functional crossing opportunities in a fragmented landscape
- Maintain home range movements for individuals and maintenance of landscape connectivity for existing populations for dispersal and breeding.

3. Target Species

The target species for this strategy are arboreal mammals (e.g. Squirrel Glider, Sugar Glider, Common Brushtail Possum, Common Ringtail Possum, Feathertail Glider). Incidental passage for a range of other fauna species will be supported via bridges and the new viaduct.

4. Connectivity Structures

4.1. Dedicated Arboreal Crossings

The connectivity structure types to be used were identified based on their known effectiveness for the target species (Table 4-1). These include:

- Canopy bridges: Canopy bridges connect habitat on both sides of a road by passing over it. Canopy bridges can be suspended above traffic from vertical poles or can also be used under road bridges. The canopy bridges proposed are rope bridges or ladders.
- Glider poles: Glider poles are suitable for arboreal mammals that glide between habitats, such as Sugar Glider and Squirrel Glider (recorded on the Project). Glide poles and landing points must be close enough together and high enough that glide trajectory does not intersect traffic or the ground.

Rope bridges and glide poles are the primary artificial structures appropriate for enabling gliders to cross large roads which create forest canopy gaps that are beyond their glide capacity. Canopy bridges provide for genetic connectivity, dispersal movements and home range movements of arboreal species such as possums and gliders. One advantage of rope bridges is that they can be used by non-gliding arboreal fauna, such as possums. As such, rope bridges are preferred to glider poles as they provide crossing opportunities for a greater range of species and use by several glider species has been confirmed in a highway setting. Rope bridges also provide greater flexibility as they can be designed to fit the forest gap, do not always rely on the retention of tall trees close to the highway and avoid the need for median poles, except where there are larger gaps, thereby avoiding safety issues with such poles. The proposed fauna connectivity structures and locations are shown in Table 4-1.

The crossing structure locations were proposed within the Submissions Report. As part of detailed design, options for locating the crossing structures are being explored to ensure each crossing structure will connect areas of suitable habitat. Detailed design will ensure each crossing structure is of an appropriate length to facilitate movement of the target species, in accordance with the latest data available for Project target species. The position of arboreal crossing structures will also be considered in the context of lighting, noting that proximity to streetlights or other lighting sources may reduce the effectiveness of the arboreal crossing structures.

Table 4-1: Proposed fauna connectivity measures.

Location	Target groups/species	Proposed structure	Corridor
Arboreal crossing structures			
North bound main carriageway alignment (CH280)	Arboreal mammals (Squirrel Glider, Sugar Glider, Common Brushtail Possum, Common Ringtail Possum, Feathertail Glider)	East-west rope crossing across the M1 Pacific Motorway linking large areas of Lower Hunter Spotted Gum Ironbark Forest	Regional and local
Black Hill (CH2330)		North-south rope crossing linked to existing trees, to include strategic planting of Eucalypts to improve link to existing vegetation	Local
Old Punt Road (CH850)		Glider poles linking east to west on Old Punt Road	Local
Old Punt Road (CH1100)		Glider poles linking east to west on Old Punt Road	Local

Refer to Figure 5-3 to Figure 5-6 for proposed fauna connectivity and fauna fencing.

To improve the availability of the rope bridges and glider poles to fauna species and facilitate their use, mature trees in the adjacent areas must be retained wherever possible. If required, revegetation will be undertaken around the crossing structures to ensure sufficient habitat connectivity for the target species. Vegetation in vicinity of dedicated fauna crossings must be clearly identified on-site and in clearing design drawings as being retained as part of two-phase clearing. The final location of glider structures is often determined on site with specialist ecologists to ensure best outcomes can be achieved, which includes matching the structure with adjacent vegetation that has been retained. If it is determined during construction that additional clearing is required at these locations, then separate hold points should be raised and reviewed on a case-by-case basis. In accordance with SWTC 5.3(b) rope ladder bridges will be used and rope tunnel bridges and single rope bridges will not be used. The rope ladder bridges will be secured by hulk earth anchor stays. Alternative methods that minimise clearing may be used, subject to agreement with Transport.

4.2. Incidental Fauna Crossings

Bridges typically traverse watercourses and are the preference when building a road through flood-prone areas. Bridges have the least impact on aquatic fauna habitat as they usually involve minimal disturbance to water flow and aquatic habitat. Bridges can also incorporate dry areas along banks to provide dry passage for terrestrial fauna species. Incidental fauna passages must be provided at:

- The bridge at approximate Chainage 2600 over wetlands
- The new viaduct.

The design must match preferred crossing type to waterway type in accordance with Why do Fish Need to Cross the Road, Fish Passage Requirements for Waterway Crossings (NSW Fisheries, January 2003) unless otherwise agreed with DPI (Fisheries) during design consultation. Where required, all bridges are to provide a minimum three metre wide dry passage from toe of the scour protection to the top of the bank, with natural substrate and refuge features. Moreover, the passageway beneath the bridges in the Project must be constructed with materials (e.g. rocks) that support fauna movement. Other design principles for bridges include:

- Where feasible and reasonable, the design is to avoid placing piers in permanent water channels and on stream banks, to minimise alteration to water flow and/or damage to stream bank vegetation. This is important for the identified Class 1 waterways.
- Bridges should be designed with a natural substrate at the abutment, such as soil or vegetation, where feasible and reasonable. Scattered rocks could be included.
- Bridges should be designed to allow unimpeded water flow, stream bank and riparian vegetation, preferably on both sides of the water course
- Bridges should be designed (height, carriageway separation) to allow sufficient light and moisture to encourage growth of vegetation under the structures

- The design of bridges (and culverts) is to ensure physical, hydraulic and behavioural barriers are minimised for aquatic fauna movements.

4.3. Aquatic Connectivity

The connectivity goal for aquatic fauna is to maintain access to important habitat and prevent and minimise the potential for mortality during construction works. Connectivity for aquatic fauna is provided by existing bridges and drainage culverts, although the latter do not necessarily provide connectivity during periods of low flow.

For in-stream works, directions on the use of sediment and erosion controls must be followed to avoid impacts on water quality and fish passage. For example, where it is not possible to work in the dry (out of the water), a sediment or silt screen may be required around the entire work area, but should not extend across the waterway, as it may obstruct fish passage. Silt screens should be placed to isolate the works area and be attached to the same bank upstream and downstream of the work site. Sediment or silt screens should be inspected daily and maintained to prevent the escape of suspended sediments. Sediment control devices should not be removed until the risk of sedimentation and erosion is negligible and the site has been stabilised or revegetated following construction. Screens or other guards should be carefully removed after the work is completed. Silt screens should generally only be used in still water conditions. When placed in higher flows, water either spills over the top or lifts the curtains.

The design of fauna friendly drainage structures must maximise light penetration under the bridge or arch to encourage fish passage, possibly by increasing the spacing between divided bridge decks or with the use of skylights or grates in the median strip. Both permanent and temporary waterway crossings must accommodate the needs of fauna and must comply with the requirements of the REMM and SWTC detailed in Table 4-2 and Table 4-3.

Table 4-2: Waterway and drainage requirements for fauna.

Waterway and drainage structure issue	Requirement
1. Design, location and installation of fauna friendly structures	1.1 Design of structures must comply with DPI (Fisheries) guidelines included in Appendix 8 of the Scope of Works and Technical Criteria. 1.2 DPI (Fisheries) must be consulted on the design and construction of all temporary and permanent waterway crossings and be provided with Design Documentation in accordance with Appendix 4 of the Scope of Works and Technical Criteria.
2. Bridges	2.1 Where the Contractor's Activities are undertaken in waterways and further to the requirements of section 4.7 of Appendix 4 of the Scope of Works and Technical Criteria, construction measures to minimise / avoid stream sediment impacts must be implemented. 2.2 Disturbance to stream banks and stream beds must be minimised wherever possible. 2.3 Natural light under bridges must be maximised wherever possible, to the extent consistent with urban design requirements.
3. Scour protection	3.1 Scour protection must be integrated with waterway banks/ vegetated zones to minimise waterway impacts and provide a more natural solution. 3.2 Rock size must not be so large as to impact on water flow regimes and fauna passage. 3.3 Low flow channels must be provided in scour protection to tie in with any fish passage low flow provisions in culvert/ pipe cells and where required under bridges.
4. Landscaping within approaches to waterway and drainage structures	4.1 Clearing of existing vegetation near culverts and bridges must be minimised, and root mass and seed banks must be retained where possible. 4.2 Revegetation near culverts and bridges must be commenced as soon as practicable after clearing of existing vegetation and within 3 months of completion of construction of each culvert and bridge. 4.3 The density of vegetation planting or seeding must not be less than the surrounding natural habitat. 4.4 Vegetation planted or seeded within the approaches to culverts and bridges must be endemic and representative of the surrounding natural habitat.

Table 4-3: Minimum fish passage locations and requirements.

Location	Minimum fauna connectivity structure	Key Fish Habitat Type and sensitivity (DPI, 2013)	Waterway class
Purgatory Creek, east of New England Highway	New Viaduct	N/A	Class 3 – minimal fish habitat
Purgatory Creek, downstream of flood gates at junction with Hunter River	N/A	Type 1 – highly sensitive key fish habitat	Class 1 – moderate fish habitat
Hunter River	New Viaduct	Type 1 – highly sensitive key fish habitat	Class 1 – major fish habitat
Inside bend of Hunter River within unnamed Coastal Wetland listed under the Coastal Management SEPP (east of Hunter River and north of Pacific Highway)	N/A	Type 1 – highly sensitive key fish habitat	Class 1 – major fish habitat
Unnamed tributary of Hunter River, flowing through unnamed coastal wetland (south of Old Punt Road)	Box culvert	N/A	Class 3 – moderate fish habitat
Hunter River wetland (adjacent to Hunter Region Botanic Gardens)	Box culvert	N/A	Class 3 – minimal fish habitat
Hunter River Drain, upstream of Hunter River (downstream of Hunter River wetland)	N/A	N/A	Class 3 – minimal fish habitat

5. Fauna Fencing

Fencing will be used to minimise mortality of fauna as a result of vehicle strike, and to funnel fauna towards crossing structures. The location of fauna fencing is detailed in the EIS (Chapter 9: Biodiversity) and aims to minimise the impact to existing surrounding land and maximise the land available for fauna. Fauna crossings work most effectively where they are installed in conjunction with barrier fencing as this stops animals getting on to the road and funnels them to crossing points. Fencing for the Project consists of road corridor boundary fencing and fauna fencing. To minimise fencing requirements a combined boundary/ fauna fence will be erected, where possible.

Fauna fencing will generally be located close to the main highway but will also follow on and off ramps. Fencing will curve off the highway at smaller intersections, in order to funnel any fauna away from the highway. Similarly, fencing will connect to underpasses to funnel fauna into these structures. In cut batters, fences would be located on higher tiers and set back from the edge of road. Where underpasses exit into widened medians, fencing will be used between the two underpasses to prevent fauna accessing the highway from the widened median. Glide poles, rope bridge supports and access ropes will be located outside the fauna fencing but within the construction footprint.

Design principles for fauna fencing include:

- Fencing must be in accordance with the specifications of Figure 5-1 and Figure 5-2, including smooth metal sheeting on the top portion of the fauna fence
- Fencing must be integrated with crossing structures by guiding animals towards the crossing structure and preventing access to the road. Fencing is typically constructed on both sides of the road, otherwise animals may be easily trapped on the road. In general, fencing is to extend at least 200 metres either side of the structure, although this is dependent on topography and vegetation, location of intersections or other infrastructure. Steep batters in cuttings may be used as a natural barrier.
- Clearing of endangered ecological communities must be minimised.
- Fencing should be continuous and at their ends have a 'return area' to guide animals back into habitat rather than onto the road

- Fence design should prevent animals from jumping over fences where possible. Targeted fence types should be designed depending on the threatened fauna in the area.
- The fence must prevent animals from digging underneath. Metal flaps are to be constructed at the base of fencing where the fence crosses drainage lines to ensure fauna cannot burrow under the fence at these points.
- The size of the mesh must prevent the target species from climbing through. A fence with large mesh for large animals can include fine mesh at the base to prevent small species from climbing through.
- Frog fencing:
 - Where fencing is required to be installed in suitable frog habitat, it must extend a minimum of 50m either side of the crossing structure (i.e. underpass).
 - Frog fencing is to consist of a 5mm insertion rubber clamped to a galvanised backing plate then attached to a chain wire fence. The current design standard is 400-500mm high with a 150mm wide sloped roof to discourage amphibian access. This can be attached to other fauna fencing.
 - Frog fences must be buried at least 10cm or alternatively pegged down to prevent frogs crawling underneath. Mesh size for amphibians is <4mm.
- The fence must be tied into the culvert wing walls on all drainage/connectivity structures that offer a suitable 1200mm height to create a drop down/escape structure
- Fauna fencing must not endanger wildlife (e.g. barbed wire must not be used as birds, bats and gliders become entangled and die)
- Barbed wire is to be avoided on stock fencing near crossing zones, particularly near glider crossing points
- Surveys of routes, paths, and home-ranges of fauna to be conducted before installation of fencing. Fencing should account for repetitive pathway behaviour, as many species are averse to changing paths and will try to use the same path even if it is blocked.
- Fencing requires regular inspection and maintenance. A vehicle access track adjacent to the fence will facilitate rapid inspection and repair (where no additional clearing required). Where overgrown vegetation that breaches the fence is likely, the vehicle track will also permit slashing of vegetation.
- Maintenance of fencing is critical to identify and repair breaches. Periodic inspections are likely to be required.
- Where the fauna fence is located within the road corridor, a minimum of 5m must be provided between any new fauna fence and any boundary line or boundary fence.

The Contractor must provide temporary fauna exclusion fencing at any location where existing fauna exclusion fencing is removed, or wherever future permanent fencing is proposed, and is to be replaced by new fauna fencing as part of the Project. The Contractor must not remove the temporary fauna exclusion fencing until the fauna fencing required as part of the Project is installed.

5.1. Location of Fauna Fencing

As a minimum, fauna fencing must be provided along the following lengths of the main carriageway, ramps and local roads:

- From 1km south of John Renshaw Drive/Weakleys Drive intersection to John Renshaw Drive/Weakleys Drive intersection, adjacent to the North Bound exit ramp from the Main Carriageway and the northbound Main Carriageway
- From the southern extent of the Works on Lenaghans Drive to the John Renshaw Drive/Weakleys Drive intersection including the following:
 - Adjacent to the eastern side of Lenaghans Drive
 - Adjacent to the eastern side of the southbound entry ramp from John Renshaw Drive/Weakleys Drive intersection between Lenaghans Drive and the Main Carriageway southbound
 - Adjacent to the Main Carriageway southbound, between Black Hill interchange and Bridge 2
 - Around the western abutment at Bridge 2
 - Adjacent to the Main Carriageway northbound, between Bridge 2 and Black Hill interchange

- Adjacent to the eastern side of the cycleway connection from John Renshaw Drive/Weakleys Drive intersection.
- From Old Punt Road to the southern boundary of the Hunter Regional Botanic Gardens, adjacent to Old Punt Road southbound exit ramp and the Main Carriageway southbound
- From the northern boundary of the Hunter Region Botanic Gardens to the Interface between Northern and Southern packages, adjacent to the Main Carriageway southbound.

Fauna fencing must be located to minimise clearing of vegetation and maximise available habitat.

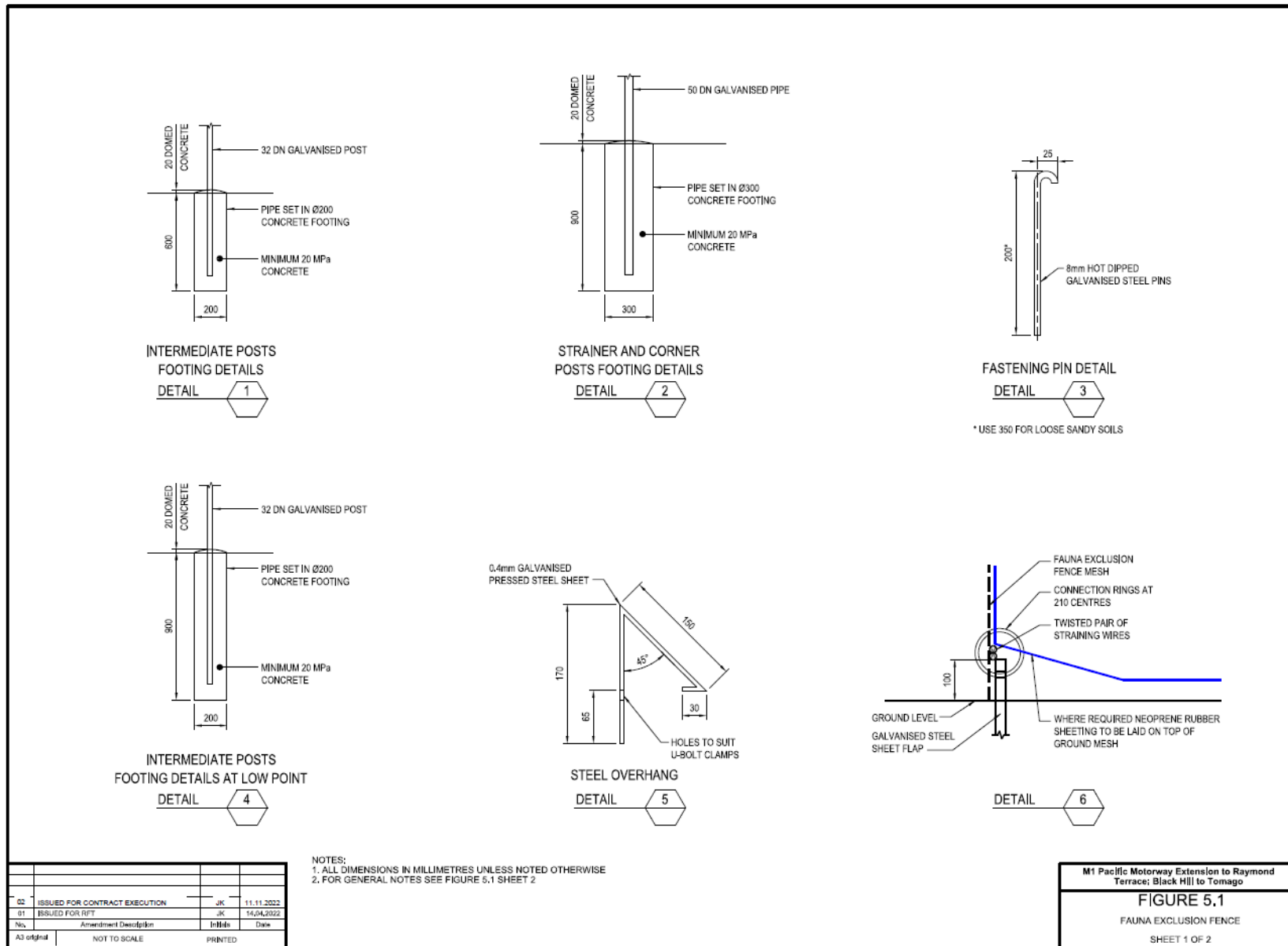


Figure 5-1: Fauna Exclusion Fence specifications (1 of 2)

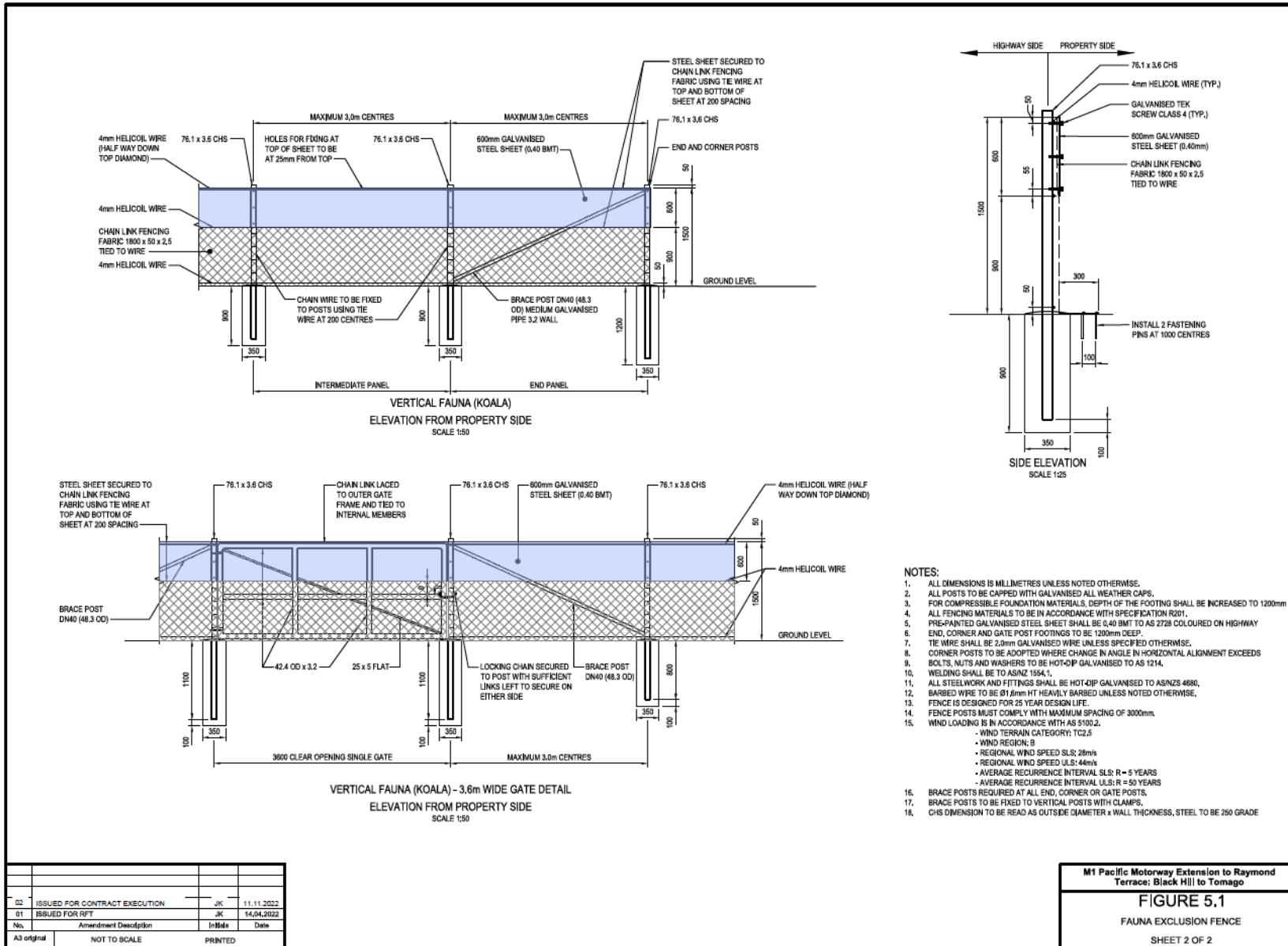


Figure 5-2: Fauna Exclusion Fence specifications (2 of 2)

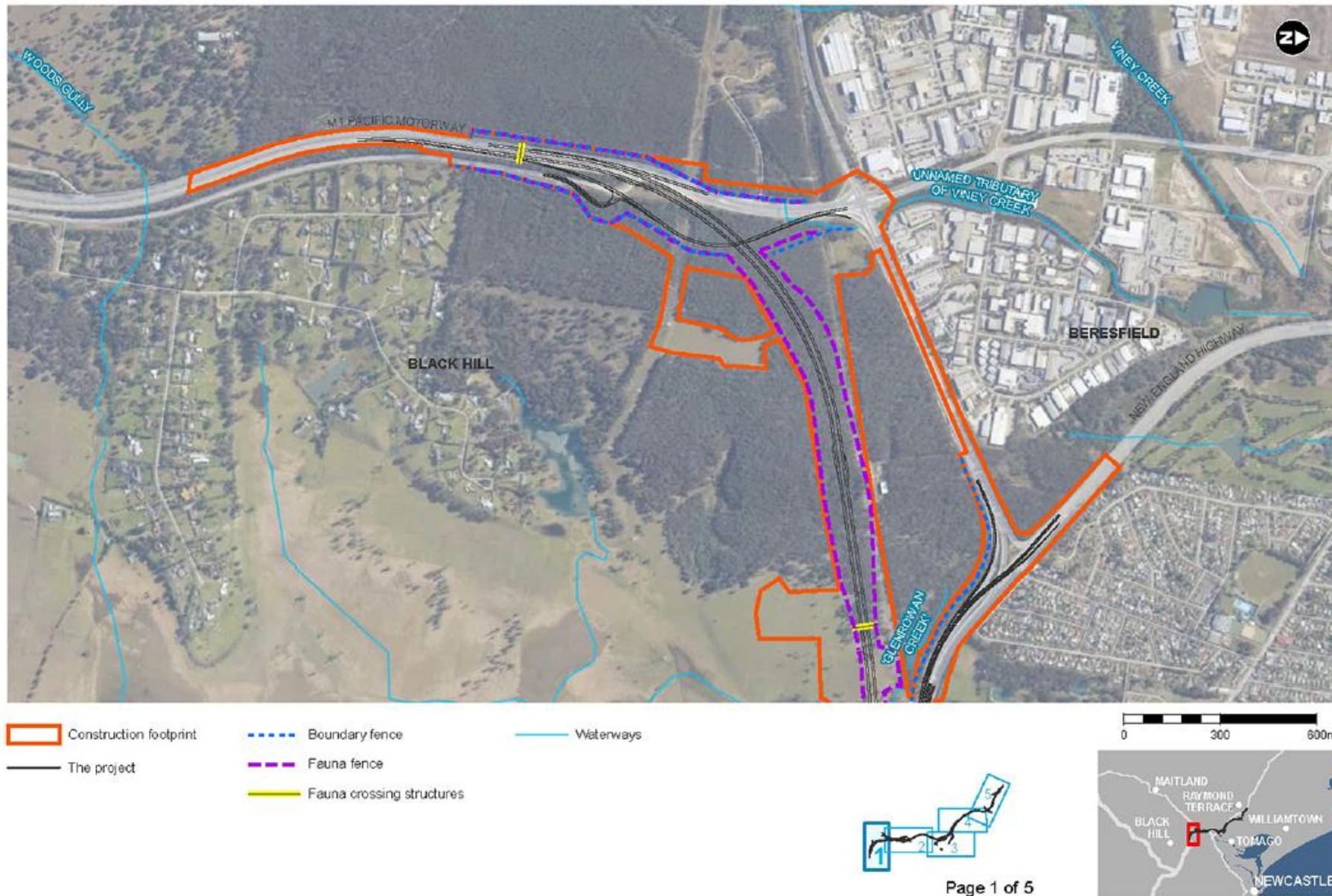


Figure 5-3 Proposed fauna connectivity and protection measures (map 1 of 4)

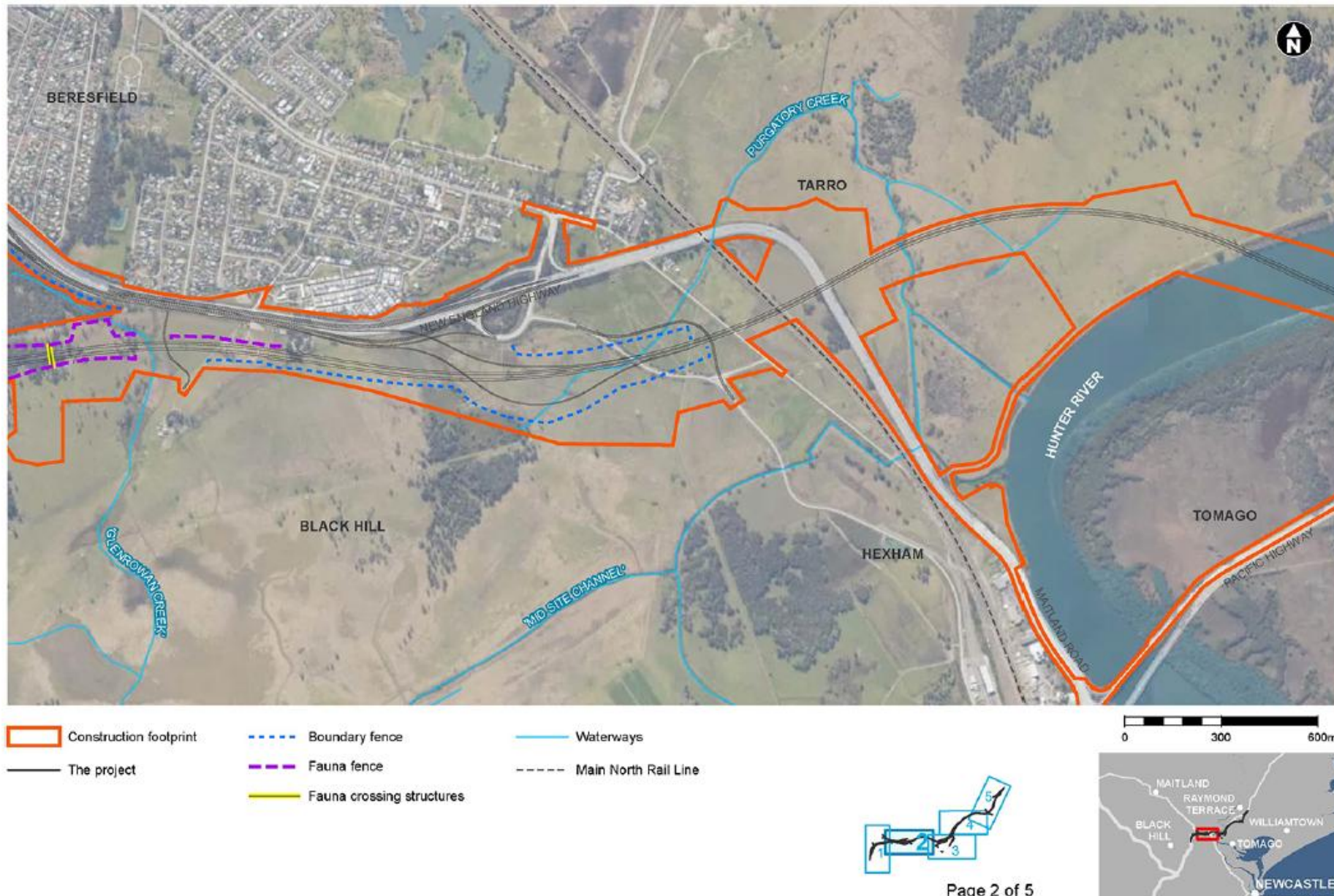


Figure 5-4 Proposed fauna connectivity and protection measures (map 2 of 4)

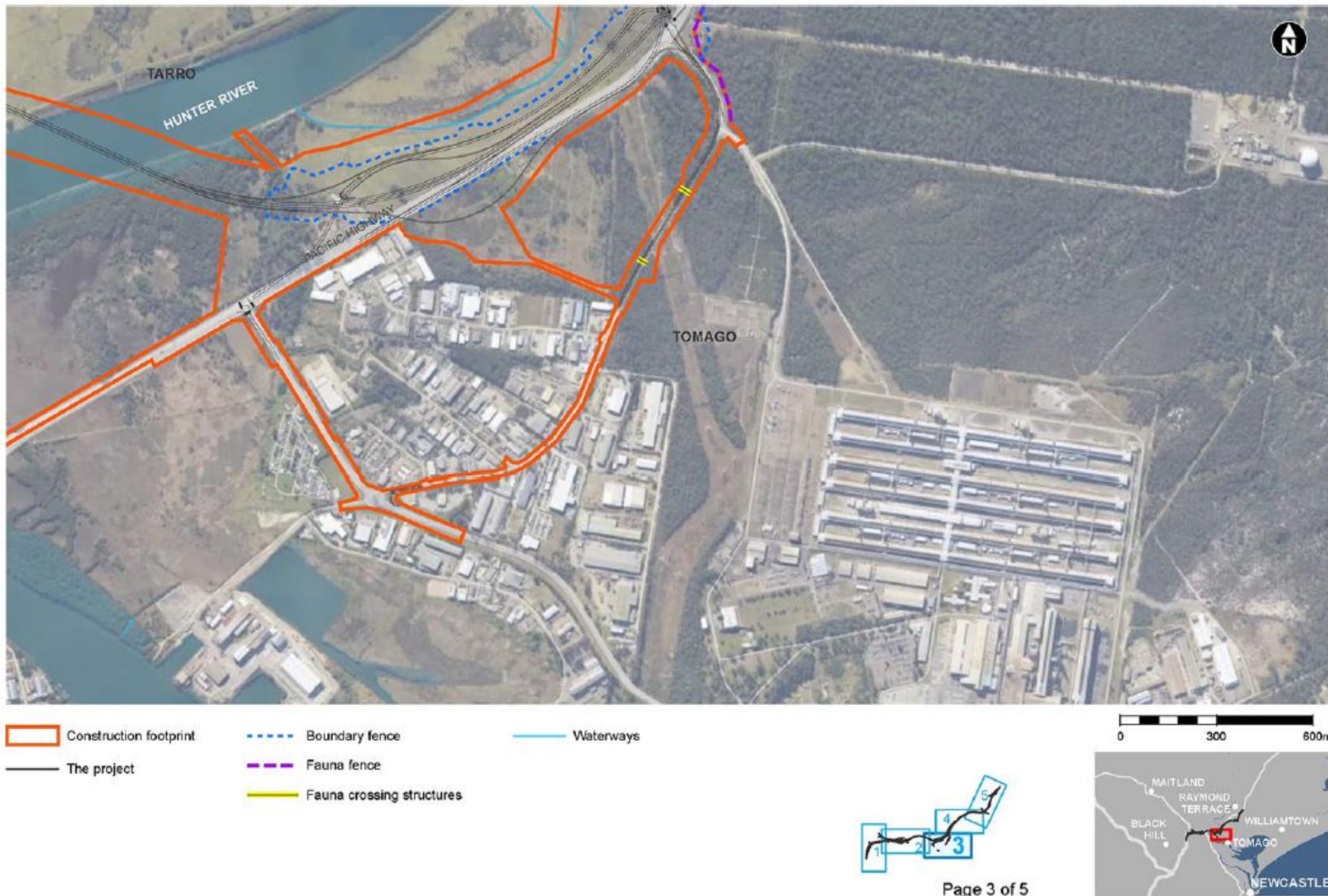


Figure 5-5 Proposed fauna connectivity and protection measures (map 3 of 4)

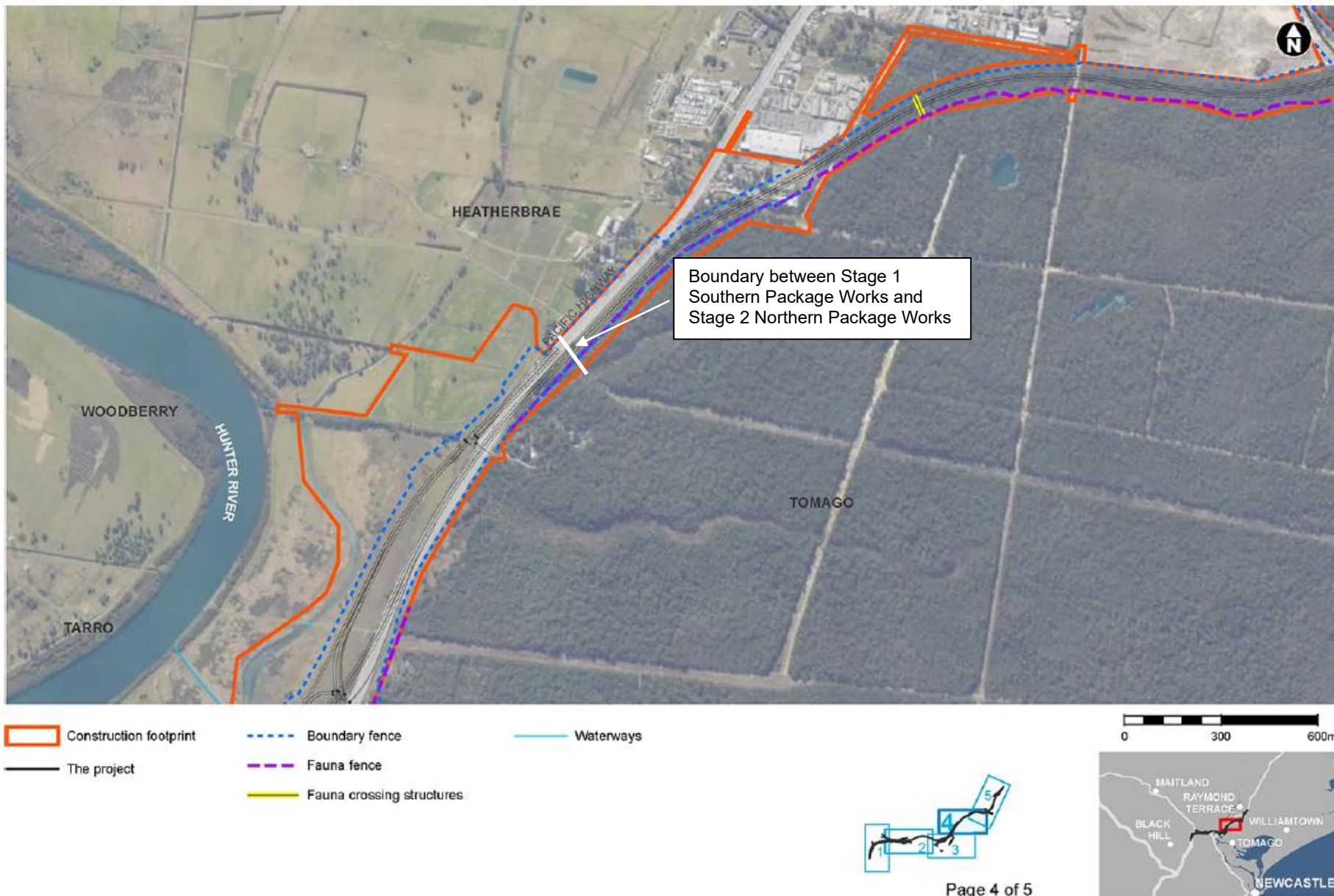


Figure 5-6 Proposed fauna connectivity and protection measures (map 4 of 4)

6. Maintenance and Monitoring

Monitoring of connectivity structures and fauna fencing consists of two components; one relates to the maintenance of the infrastructure itself, the other is to evaluate the effectiveness of the structure or fence in meeting the performance goals that have been set. Connectivity structures will require monitoring throughout the life of the Project to ensure structures are not deteriorating and are able to perform their correct function, and there are no blockages within culverts or under bridges. Maintenance of fencing is critical to identify and repair breaches.

Transport will be responsible for maintaining all connectivity structures for the life of the Project as part of regular highway maintenance. Monitoring of connectivity structures will focus on the presence of blockages and structural integrity. Monitoring of fauna mortality along the highway will be undertaken during the connectivity structure monitoring periods (Table 6-1). The condition of the crossing structure and fauna exclusion fence in the vicinity of the roadkill site would be investigated for any problems or breach and repairs. A visual inspection of all connectivity structures and fauna fencing should be undertaken following severe weather events. Monitoring goals are detailed in Table 7-1, which also provides performance measures and corrective actions. A report will be prepared following each annual inspection/ monitoring survey.

Table 6-1: Monitoring of crossing structures.

Action	Timing/ Frequency	Responsibility
Installation of temporary fencing	Prior to construction	Transport / Contractor
Commission construction of crossing structures	Prior to construction	Transport / Contractor
Installation of permanent fauna fencing	Prior to removal of temporary fencing	Transport / Contractor
Monitoring of crossings for use by target and non-target species via remote camera	Quarterly	Transport / Project Ecologist / Contractor
Monitoring for fauna mortality	Ongoing/ continuous	Transport / Project Ecologist / Contractor

7. Reporting

A brief annual report will be prepared by the contractor(s) after each monitoring program for distribution to Transport and DPHI. This will document the methods and results from each monitoring period. A final report will be prepared at the conclusion of the monitoring period. This report will incorporate all the results of the monitoring and recommend any additional measures (if deemed necessary) to facilitate the long-term survival of the key populations in the locality.

Table 7-1 Goals, mitigation measures, performance indicators and corrective actions.

Mitigation principle	Mitigation goal	Mitigation issue	Management actions	Timing/ frequency	Performance indicators	Corrective actions
Facilitate the effective crossing of wildlife	Provision of connectivity for key threatened fauna populations (provide fauna crossing structures)	Maintenance of arboreal crossing structures to allow regular movement	Connectivity structures installed. Maintenance of crossing structures as part of routine highway maintenance to replace damaged rope crossings.	Mitigation: During construction, the following activities will be undertaken: - Connectivity structures completed prior to operation - Bi-annual inspections of crossing structures Performance: During construction, the following activities will be undertaken: - Annual monitoring report.	Monitoring and maintenance activities not being undertaken. Crossing structures in poor quality.	Repair of crossing structure as soon as possible following detection of damage/ loss of function. Review location, type and design of connectivity structures installed and implement additional controls or provisional measures where appropriate and in consultation with relevant authorities.
Funnel fauna to the crossing location	Identify opportunities to enhance or increase connectivity (revegetation at crossing structures)	Maintain habitat revegetation until evidence of successful cover achieved.	Revegetation plan prepared for each section to target revegetation along areas disturbed by construction. Weed control in revegetation areas. Replacement plantings.	Performance: During construction, the following activities will be undertaken: - For the first twelve months following installation, monitoring of revegetation will be monthly. It will then go to every 6 months for years two and three. - Bi-annual monitoring will occur in spring/ summer to evaluate the success of revegetation against performance objectives.	Monitoring and maintenance activities not being undertaken. More than 10% of plants have died after year one, and more than 20% have died after three years.	Review maintenance schedule for revegetated areas within one month of trigger being identified and plant more feed and habitat trees, or groundcovers, as required. Increase monitoring period as advised by the landscape designer. Review weed control strategy if vegetation fails over three consecutive monitoring periods.

Mitigation principle	Mitigation goal	Mitigation issue	Management actions	Timing/ frequency	Performance indicators	Corrective actions
	Provision of connectivity for fauna populations (fauna fencing)	Provide fauna exclusion fencing for the life of the Project	Maintenance of fauna exclusion fencing as part of routine highway maintenance to remove debris. Monitor road kill as part of the routine road maintenance and repair broken exclusion fencing or install new fencing where required	Performance: During construction, the following activities will be undertaken: - Regular monitoring (at least fortnightly) as part of the routine highway maintenance program. - Routine (i.e. bi-annual) monitoring of permanent exclusion fencing.	Single roadkill of terrestrial/ arboreal fauna reported. Structure reported as damaged.	A maintenance check is to be performed within 5 days of any reported road kill incident. Any fence or structure found to be damaged during a maintenance check is to be repaired. Initiate repair works within 5 days of identification.

Appendix C – Replacement Habitat Strategy

M1 Motorway Extension to Raymond Terrace - Stage 1 Black Hill to Tomago

Appendix C - Replacement Habitat Strategy

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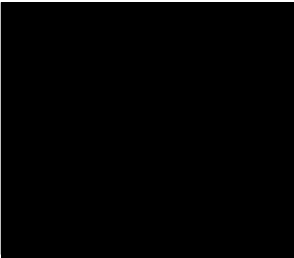
Revisions and Distribution

Revisions

Draft issues of this document are identified as Revision A, B, C, etc. Upon initial issue (generally Contract Award) this will be changed to a sequential number commencing at Revision 0. Revision numbers will continue at Revision 1, 2, etc.

Rev	Date	Prepared By [Name]	[Signature]	Reviewed By [Name]	[Signature]	Approved By [Name]	[Signature]	Remarks
A	17/05/23							Transport and ER submission
B	30/06/23							Transport and ER re-submission
C	31/07/23							Transport and ER re-submission
D	18/08/23							For External Consultation
E	22/09/23							For ER Endorsement
F	05/11/23							Table 6-4 update
0	08/11/23							For Construction
01	21/06/24							6 monthly review – update distribution list & department references
02	24/10/24							Transport and ER re-submission
	24/07/25							Re-submission for ER endorsement (no changes to the Replacement Habitat Strategy). Minor updates to the FFMP have been ongoing since the June 2024 six-monthly review, and this re-submission encompasses the June 2025 six-monthly review

Distribution List

Client's Representative		
Project Director		
Construction Director		
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1. Purpose

This Strategy provides for the management of the following in accordance with CoA E17, CoA E18, SWTC - App 4 - Cl. 4.11 and SWTC - App 5 - Cl. 5.2.4:

- Relocation of fauna habitat
- Removal and replacement of fauna habitat
- Intertidal area restoration
- Replacement tree planting.

Fauna habitat requiring relocation includes the following (CoA E17 requirement) (refer section 5 of this Strategy):

- Tree trunks (greater than 25-30cm in diameter and 2-3m in length)
- Bush rock
- Root balls and snags (aquatic habitat).

Fauna habitat requiring replacement includes the following (SWTC requirement) (refer section 6 of this Strategy):

- Hollow-bearing trees (HBTs).
- Replacement of habitat features in structures (microbats).

Intertidal area restoration includes the following (SWTC requirement) (refer section 7 of this Strategy):

- Western bank and intertidal area of the Hunter River within the construction site (Hunter River West)
- Eastern bank and intertidal area of the Hunter River within the construction site (Hunter River East).

Replacement tree planting includes the following (CoA E18 requirement) (refer section 8 of this Strategy):

- Planted native vegetation as described within the Revised Biodiversity Development Assessment Report (refer Appendix E of the Submissions Report).

This Strategy has been prepared by Principal Ecologists [REDACTED] BSc (Zoology), Hons (Zoology), PhD (Ecology) and [REDACTED] BSc (Biology), Grad. Dip. (Bushfire Protection).



2. Scope

The Project site is mainly comprised of native vegetation communities, which contain habitat for protected and threatened fauna species. Fauna habitat will be cleared to facilitate construction of the Project. This Strategy provides a multi-staged approach to the removal and relocation, replacement, and restoration of habitat features.

The goals of this Strategy are to:

- Ensure the extent of native vegetation removal is minimised and consistent with Project requirements
- Minimise impacts on native fauna, particularly threatened species, including:
 - Threatened woodland birds
 - Threatened raptors
 - Threatened arboreal mammals
 - Aquatic fauna
 - Threatened bats
 - Threatened/migratory wading birds.
- Maximise the salvage and relocation of habitat features to improve biodiversity values surrounding the Project site.
- Replace habitat (hollows) at the nominated ratios at locations nominated by Transport in accordance with Project requirements.
- Restore temporary works intertidal areas so that they reflect the condition in the surrounding offsite area in accordance with Project requirements.
- Record and undertake counts of planted native trees so that they can be replaced in accordance with CoA 18.

3. Induction and Training

All Project personnel are to be inducted on the existence of this Strategy during the Project Induction and in more detail as required in Site Inductions and regular Toolbox Talks. Records of all training, including inductions, will be maintained. Records will include the name and role of the attendee, and the name of the course.

4. Pre-clearance Survey

In accordance with SWTC - Appendix 4 - Cl. 4.11(a), the Project has conducted surveys to determine the distribution and density of hollow bearing trees (HBTs), mammal habitat and Key Fish Habitat and have prepared this Replacement Habitat Strategy in consultation with the Biodiversity and Conservation Division of Department of Environment and Heritage (DEH) as part of the Flora and Fauna Management Sub-Plan. To replace HBTs or habitat that is removed, the Pre-clearance survey must include stag watching to identify the number and type of habitat replacement required and the locations to be installed.

It is noted that counts of trees within areas mapped as planted native vegetation, as shown on Figure 3-1 (Plant Community Types, condition, and vegetation survey locations (map 1 through 5) within the Updated Biodiversity Assessment Report (refer Appendix E of the Submissions Report)), will be undertaken as part of Project pre and post clearing permitting process with a register of all planted trees including species, location, and size retained and provided to Transport. Transport will undertake replanting in accordance with the requirements of CoA E18.

4.1. Hollow-Bearing Trees

An accurate account of all HBTs, including number and size, has been determined during pre-clearing surveys. The survey included stag watches to identify fauna and inform the locations to be targeted for relocation. Where possible, HBTs not specifically identified for removal will be avoided. To assist with this, barriers or demarcation, in the form of fencing or pegging, will be used to notify construction personnel of their presence and the need for impact avoidance. This marking need only take place where there is potential that work may impact an identified HBT.

The number and size of hollows to be removed during clearing will be used to inform the number and type of artificial hollows required to be installed in the surrounding areas. This is further discussed in section 6.6 of this Strategy.

4.2. Woody Debris, Bush Rock, and Key Fish Habitat

During pre-clearing surveys, all potential fauna habitat to be impacted (e.g. woody debris, bush rock, and key fish habitat) has been identified and recorded on a GPS-enabled tablet. Information on the distribution and density of habitat will be used to inform its relocation into surrounding areas. The banks and intertidal areas of the Hunter River have been assessed during pre-clearing surveys to inform restoration measures following removal of any temporary works. The intertidal area restoration strategy is provided in Section 7 of this Strategy.

4.3. Tree Removal

An inventory of all trees that are removed for the Project, which are not offset under the Biodiversity Offset Scheme, will be recorded, and include details of the species, size, number, and location. This information (baseline data) will be used to inform the replacement replanting program, which will be completed by Transport prior to the commencement of operation unless otherwise agreed by the Planning Secretary. A Tree Replacement Strategy is provided in Section 8.

5. Relocation of Fauna Habitat

Relocation of fauna habitat, such as dead wood, dead trees, fallen logs and cleared/ felled tree trunks (especially those greater than 25cm in diameter) in adjacent vegetated areas that will not be impacted will be undertaken. Foliage, thin branches, and root balls are of less value for habitat, however, in accordance with CoA E17, consultation with local Councils and other organisations (including NPWS, Local Land Services, local Landcare groups, DPI Fisheries) regarding their use will occur prior to exploring disposal methods, such as mulching for soil restoration works. Consultation with stakeholders for implementation of CoA E17 has commenced.

Habitat items will be relocated to 'recipient sites' that form the same, or similar, vegetation community as the location of origin 'donor site' and in a manner sympathetic to the requirements of native fauna, as far as reasonably practicable. A detailed register will be kept for all salvaged habitats including type of habitat feature, target species or species group, and location of installation at recipient site.

5.1. Relocation of Logs

Woody debris is used by a suite of fauna and can be classified into sizes based on potential fauna habitat uses (refer Table 5-1 for details). The Project Ecologist will provide advice on the reuse of woody debris and bush rock within relocation sites to ensure it does not have a negative impact on the receiving environment. In existing areas of high-quality habitat there may already be enough suitable hollow or fallen logs, where adding surplus woody debris may cause a fire hazard or unnecessary disturbance. If relocation is not feasible, recycling of stems, branches, trunks, etc. of native trees greater than 25cm in diameter for use as fencing materials, firewood or other appropriate uses will occur.

Where possible, any remaining native vegetation not used as fauna habitat will be converted into mulch and stockpiled to be used during site restoration. However, native vegetation showing any sign of disease or pathogen will not be mulched, stockpiled, and / or re-used on site. Any diseased or pathogen effected vegetation will be removed offsite to an appropriately licenced facility.

Table 5-1: Classification of woody debris and possible uses (RTA, 2011).

Size	Possible Uses
Logs >500mm in diameter	Habitat improvement, such as re-snagging creeks and rivers (in consultation with DPI).
Logs >200mm in diameter	Erosion and sediment control, replacement of habitat features, habitat improvement (e.g. perching sites for woodland birds, timber piles for reptiles and frogs) or fauna furniture for use in underpasses.
Logs <100mm in diameter	Dead wood, dead trees, fallen logs and cleared tree trunks >100mm in diameter should be mulched and stockpiled.

5.2. Transportation and Placement of Fauna Habitat

The transportation and placement of fauna habitat will depend on the amount and size of selected fauna habitat to be relocated. The following information will be provided in a habitat removal and relocation report:

- Photographic identification of the fauna habitat
- Graphical representation of the proposed relocation site
- Proposed methods to relocate the habitat.

The Area Manager and/or Environment and Sustainability Manager will ensure the following best-practice methods are undertaken when relocating woody debris:

- Removal, stockpiling, transportation and relocation of woody debris will be carried out in a manner that minimises disturbance to native vegetation, including the canopy, shrubs, dead trees, fallen timber and groundcover species
- The spread of any weeds or pathogens that may be in the soil will be avoided when relocating woody debris from stockpiles
- An ecologist will be engaged to provide advice on positioning woody debris in designated relocation areas

- Vegetation will not be cleared and trees will not be felled in order to place habitat in a wooded area. If habitat cannot be easily placed in an area without clearing trees or shrubbery, an alternate recipient site will be sought.
- Topsoil disturbance will be kept to a minimum and will not be heaped up against woody debris because of the potential to provide habitat for rabbits
- Woody debris will be placed evenly across the recipient site and not piled.

5.3. Aquatic Habitat Relocation Stockpiling for Restoration

In consultation with the Project Ecologist, aquatic woody debris and root balls that have been salvaged during clearing activities will be stockpiled and where appropriate, used in the restoration of the banks and intertidal areas of the Hunter River. Aquatic restoration requirements are further detailed in section 7 of this Strategy.

5.4. Stockpiled Materials for Re-Use

Bush rock, hollows, and additional woody debris will be stockpiled for later reuse. The Area Manager and / or Environment and Sustainability Manager will ensure stockpiles are managed in accordance with RTA's Stockpile Site Management Guideline, RTA Environmental Protection (Management System) QA Specification G36 and RTA Vegetation QA Specification R178.

Where possible, hollows removed from within the site will be stockpiled prior to construction works. Once stockpiled, hollows will be left untouched. If stockpiled for over one month, an ecologist will conduct a pre-clearing survey on all stockpiles to ensure no protected fauna species have reoccupied fauna habitat within the stockpile. A suitably qualified ecologist will be present during removal, to capture and relocate any occupying fauna.



6. Replacement Artificial Hollow Strategy

The hierarchy of habitat replacement measures for the Project (SWTC – App 5 - Cl. 5.2.4(b)), from highest to lowest precedence are as follows:

- Installation of carved hollows by a Hollowhog tool or similar method which does not require use of a chainsaw
- Reuse of hollows removed during clearing operations
- Replacement of habitat features in structures in suitable areas
- Installation of nest boxes.

The total number and type of replacement hollows that are required to be installed are nominated in section 6.6. Use of nest boxes will include a range of hollow sizes (e.g. small, medium, and large) and will reflect the natural range and density of hollow sizes recorded in the clearing extent. The Project will install 70 percent of the replacement habitat at least one month prior to the removal of any vegetation, unless otherwise agreed with Transport. The remainder of replacement habitat will be installed prior to the Date for Opening Completion.

If installing 70 percent of replacement hollows, prior to clearing, cannot be achieved through installation of carved hollows alone, installation of nest boxes will be considered to supplement carved hollows given point 2 above is reliant on clearing activities.

A detailed register will be kept and continually updated on the type of hollow replacement used, size of hollow created target species for the hollow, location of relocated hollow at recipient sites and the height and aspect of installed hollow in the recipient tree or structure. Targeted threatened species for the replacement habitat relocation strategy are provided in Table 6-1.

Table 6-1. Targeted threatened species for replacement habitat.

Species Name	Common Name	Likelihood of Occurrence	Replacement Habitat Type
<i>Petaurus norfolcensis</i>	Squirrel Glider	Recorded during targeted surveys for the EIS	Small hollows (45mm)
<i>Miniopterus australis</i>	Little Bent-winged Bat	Recorded during targeted surveys for the EIS	Small hollows (<30mm) and habitat in structures
<i>Tyto novaehollandiae</i>	Masked Owl	Recorded during targeted surveys for the EIS	Large hollows (>200mm)
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	Recorded during targeted surveys for the EIS	Small hollows (<30mm)
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	Recorded during targeted surveys for the EIS	Small hollows (<30mm)
<i>Glossopsitta pusilla</i>	Little Lorikeet	Assumed present (EIS)	Small hollows (<30mm)
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	High (EIS)	Large hollows, logs
<i>Myotis macropus</i>	Southern Myotis	High (EIS)	Small hollows (<30mm) and habitat in structures
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	High (EIS)	Habitat in structures
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	Assumed present (EIS)	Large hollows (>150mm)
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Moderate (BioNet records)	Medium hollows (>70mm)
<i>Neophema pulchella</i>	Turquoise Parrot	Moderate (BioNet records)	Medium hollows (>70mm)
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Assumed present (EIS)	Small hollows (<30mm)
<i>Ninox strenua</i>	Powerful Owl	Assumed present (EIS)	Large hollows (>200mm)

6.1. Installation of Artificial Hollows

Replacement artificial hollows (e.g. carved hollows, re-used hollows, nest boxes) will be installed in surrounding vegetation at locations determined by Transport, guided by the Project Ecologist and in accordance with the principles outlined in: 'RTA Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (2011), Guideline 5: Reuse of woody debris and bushrock and Guideline 8:

Nest Boxes. Suitable habitat will be within the locality and where existing hollows are limited (specific to the size of replacement hollow). A replacement ratio of 1:1 is a general guide but may not always be possible (e.g. it is not preferable to establish an overabundance of hollows in an area, or place hollows for some species too close together). Transport, in consultation with the Project Ecologist, will nominate suitable areas for installation of replacement artificial hollows at a density appropriate for the target species Table 6-2.

Table 6-2: Recommended artificial hollow dimensions for species groups. To be used as a guide.

Target species groups/nest box type	Entrance diameter (mm)	Internal dimensions (mm)	Depth/ height of chamber (mm)	Height above ground (m)	Spacing between same type of nest box (m)	Additional comments
Microbats	30 (hole) 20 (slot)	N/A	400	3-5	50	Bottom opening; hang shade cloth or denim inside
Small birds	60	150 x 150	350	3-6	50	NA
Parrots	65	200 x 200	400	5-8	50	2-5 boxes/ colony
Cockatoo/large owls	200	300 x 400	1200	8-10	200	For cockatoos- angled spout entrance; nest box should be made with PVC around entrance
Small gliders	45	150 x 250	300	3-6	60-100	Position entrance to face tree
Large gliders	80	250 x 300	400	6-8	180-200	Will use several den sites. Position entrance to face tree
Possums	100	250 x 250	300	2-4	100	NA

6.1.1. Carved Hollows

Hollows carved using a Hollowhog tool are the preferred option for replacing lost tree hollows. The Hollowhog tool efficiently and safely creates large internal cavities through small entry holes in both living and dead wood. The Hollowhog creates a 50mm entry hole and then progressively carves a larger and larger hollow of any dimensions up to about 600mm wide and long by 600mm deep. The hollow shape can be easily adapted to the size and shape of the tree limb or trunk that it is being carved in. The entry hole size and shape can be targeted to almost any fauna species through either carving a larger entry hole or adding entry modifiers to reduce the size back down to as small as needed. Further design guidelines can be found at Hollowhog (access at <https://www.hollowhog.com.au>)

The Project Ecologist, in consultation with Transport, will identify suitable trees for installation of a carved hollow. Hollow carving will be undertaken by a AQF level 3 arborist with previous experience in using a Hollowhog. The Project will review the experience of any arborist prior to engagement for the purpose of hollow carving to determine whether the arborist has sufficient experience to undertake the works with minimal risk of causing permanent damage to trees. The hierarchy of habitat replacement measures will be followed so that all available options for installation of carved hollows are exhausted before exploring the use of salvaged hollows or nest boxes.

6.1.2. Re-use of Hollows

Natural hollows in trees removed during clearing operations can be retrieved and re-attached to suitable trees in recipient sites. This method is most suited to small and medium sized hollows that occur in limbs, owing to the relative ease of collection (cutting the limb either side of the hollow with a chainsaw). Hollows selected for re-use should be a minimum of 500mm in length.

Where possible, salvaged hollows should be capped on either end with a polyvinyl chloride (PVC) plate and should be positioned securely in the fork of a recipient tree. If this is not feasible, the salvaged hollow should be attached using the Habisure System by means of appropriately selected material to not damage the tree. Materials may include rope, wire and/ or galvanised builders strapping. The

strapping should not be tightly wrapped against the recipient tree as this will restrict the flow of water and nutrients through the cambium, particularly as the tree grows and the strapping tightens. A living tree trunk should never be punctured with galvanised or copper nails/ screws to secure an item, such as a salvaged hollow, as it is likely to harm or even kill the tree.

Hollows salvaged for relocation and installation as arboreal habitat should be filled to approximately 2 cm with natural nesting material sourced from the surrounding area and placed inside the hollow. Relocation of the hollows will be undertaken with the assistance of the Project Ecologist. Remounted hollows will be inspected annually to check the adequacy of the mountings and corrected if necessary.

6.1.3. Replacement Habitat in Structures (Microbats)

The pre-clearing surveys identified six structures that could potentially be used by microbats. There was no evidence of microbats using these structures and therefore, it is not anticipated that replacement habitat in structures will be required for the Project.

6.1.4. Nest Boxes

Once the above options for replacement habitat have been exhausted, the installation of nest boxes will be considered. Nest boxes will be sourced from a reputable manufacturer and installed under the guidance of the Project Ecologist.

Guidelines for nest box design include:

- Materials used for constructing nest boxes can be varied, though the recommendation is:
 - Exterior grade (marine glue) plywood or high-density polyethylene (longer lifespan, over 30 years)
 - Minimum thickness of 30mm to ensure adequate insulation
 - All fasteners used in nest box construction are weather resistant stainless steel or galvanised
- The lid should overhang the front and sides of the nest box by at least 25mm to prevent water damage
- A hinged lid is recommended for monitoring and maintenance purposes
- Three small holes should be drilled into the base of the nest box to assist with drainage
- Non-toxic wood shavings should be placed into possum, glider and bird nest boxes to simulate decaying hollows and provide insulation
- Rough-sawn timber or grooves cut into the face of the box allows animals to grip to the box. Grip should also be considered inside the box, either with mesh or grooves cut into the walls, to allow young to climb out of the box.
- To minimise the risk of uptake of pest species, rear openings are recommended for glider boxes
- A nest box identification number should be placed on the nest box (stamped on the side or bottom of the nest box) and on the host tree using a permanent form of tagging (aluminium tag drilled into tree at eye level).

6.2. Hollow Installation Procedure

The Project Ecologist will be on site during the installation of artificial hollows to provide advice on attaching them to trees/ structures, height, location, and aspect. Artificial hollows will be installed in trees (both rough-barked and smooth-barked eucalypts) that do not already have hollows of the same size. The preferred method of attaching artificial hollows to trees is the Habisure system (Figure 6-1), which involves:

- A length of 3.15mm plastic-coated soft fencing wire will be passed through the nest box and around the tree trunk
- Wire must be folded into at least four folds about 60mm tall and 15mm apart at the sides of the box to allow for tree growth
- Where the wire is in contact with the tree trunk or branch it must be threaded through a length of garden hose to protect the tree
- Where possible the wire around the tree will pass over a branch behind the trunk, although nest boxes can be installed directly on a straight-stemmed tree
- Details of each nest box will be recorded and include the GPS location, identification number, nest box type and diameter at breast height of the host tree.

6.3. Position of Artificial Hollows

Considerations for the placement of artificial hollows:

- Place artificial hollows at varying heights according to recommended height for the target species (Table 6-1, Table 6-2).
- Artificial hollows will be positioned on the north-west to east sector of tree trunks to avoid hot afternoon sun and the predominant aspects of severe storms (but see below regarding microbats). Artificial hollows for gliders may also be installed facing north.
- Install artificial hollows for microbats adjacent to potential flyways. If a hollow-bearing tree is a suspected *Myotis* roost, install hollows adjacent to the nearest watercourse.
- Consideration is given to installing hollows into a variety of locations to provide a number of thermoregulatory options for microbats. Boxes can be positioned within differing aspects of trees (i.e., one on southern side of a tree and another on the northern side) and into areas of differing canopy and tree density
- Recipient tree to be considered robust and in good health (i.e., healthy tree canopy and unexposed roots) and without existing hollows
- Install artificial hollows as close as possible to the location of the original hollow-bearing tree
- Install artificial hollows for gliders and possums on rough-barked trees
- Place in areas of native vegetation ideally connected to other areas of native vegetation, away from threats from roads and domestic animals.

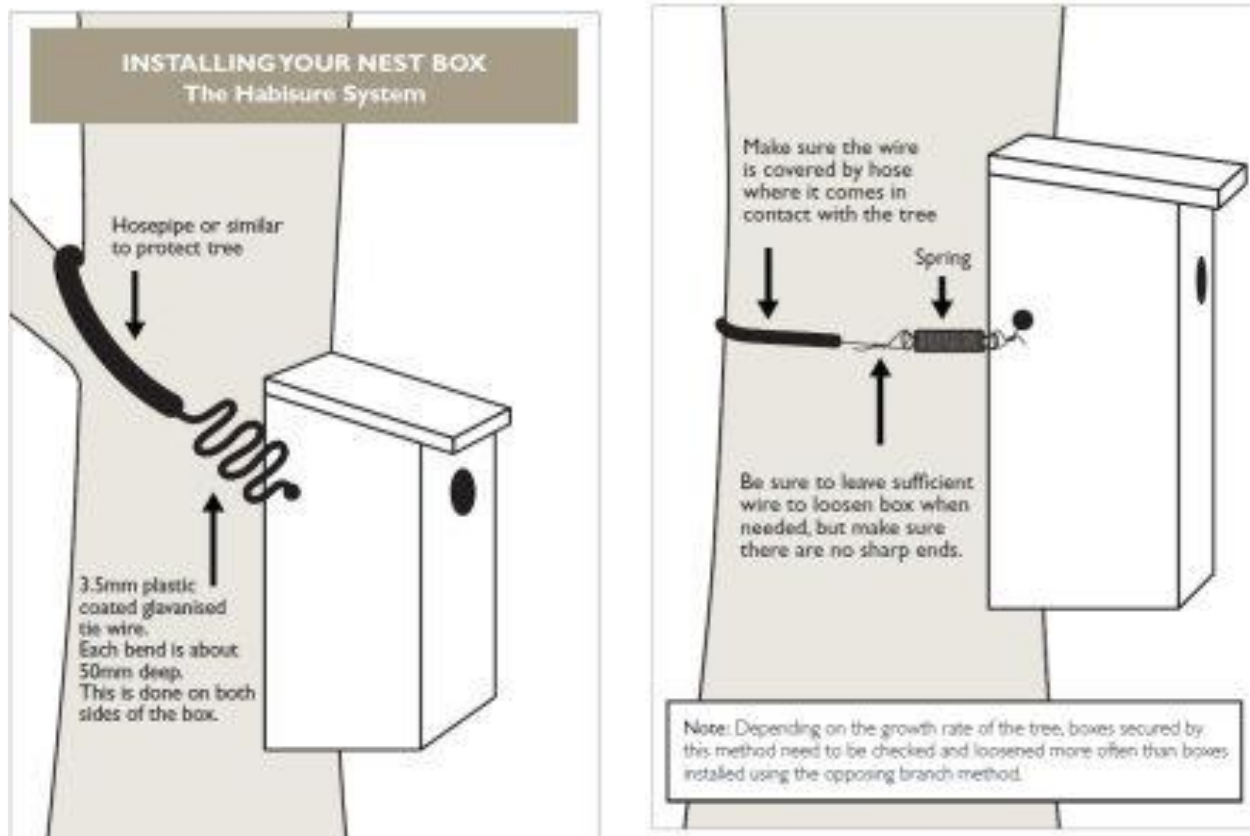


Figure 6-1: The Habisure system for attaching nest boxes to trees

6.4. Artificial Hollow Monitoring and Maintenance

Artificial hollow monitoring is divided into short term and long-term commitments. Short term monitoring is centred on the installation of artificial hollows prior to clearing and monitoring to determine their level of occupancy during the construction phase. Long term monitoring is focused on the condition of artificial hollows and provides an opportunity to evaluate the efficacy as replacement habitat (e.g. are carved hollows still functioning as suitable habitat). The schedule of monitoring and maintenance of artificial hollows is provided in Table 6-3. In summary, artificial hollows should be monitored and maintained following installation for the duration of construction. For this Strategy, artificial hollow

monitoring and maintenance will be limited to bored hollows and will not include nest boxes (should they be required).

Table 6-3: Schedule of timing and frequency of installation, maintenance and monitoring of artificial hollows.

Action	Responsibility
Short Term (pre-construction phase)	
Commission construction of artificial hollows	Project Ecologist
Artificial hollow installation (70% of total) - Collection of baseline data	Project Ecologist
Monitoring and maintenance of artificial hollows (autumn and spring)	Project Ecologist
Assessment of efficacy of artificial hollow type and target fauna occupancy	Project Ecologist
Report including recommendations	Project Ecologist
Apply recommendations	Project Ecologist
Long term (during construction phase)	
Artificial hollow installation (remaining 30%)	Project Ecologist
Monitoring and maintenance of artificial hollows (autumn and spring)	Project Ecologist
Assessment of efficacy of artificial hollow type and target fauna occupancy	Project Ecologist
Report including recommendations	Project Ecologist
Apply recommendations	Project Ecologist
Review of artificial hollow usage following monitoring to determine success and address any failures. Provide recommendations for future replacement hollow programs	Project Ecologist

Monitoring of artificial hollows will be undertaken by the Project Ecologist to record the use of artificial hollows by fauna. During each monitoring event, a visual inspection of each artificial hollow is to be conducted, either by climbing the tree (with a ladder or rope access) or from the ground with an extendable endoscope. The following information is to be collected:

- The name of the observer
- Date
- Weather conditions
- Type of artificial hollow
- Artificial hollow number and location
- Evidence of fauna activity (scats, fur, feathers, nesting material etc.)
- Species using the artificial hollows and any additional attributes if known (age, sex etc.)
- Number of individuals
- Assessment of artificial hollow condition and if any maintenance is required.

Factors to be considered as part of the maintenance schedule:

- The need to remove exotic pest species (Termites, European bees, Common Mynas)
- Condition of the hollow opening and interior
- Condition of fastenings and structural integrity
- Replacement of fallen or damaged artificial hollows (record with GPS location)
- Re-positioning of artificial hollows
- Checking each artificial hollow is not holding water
- Removing excess nesting material.

Replacement of artificial hollows will be undertaken within one month of being recorded as needing to be replaced. At construction completion, an evaluation of the performance of artificial hollows will be made in consultation with Transport and the Project Ecologist. This should include a reassessment of artificial hollow design and placement. A report on the findings and evaluation will be completed within three months of the final data collection.

6.5. Performance Indicators

The performance of the artificial hollow installation will be assessed against the following:

- Use of artificial hollows by native fauna in similar proportions (<25 percent difference) to that recorded in the hollow classes that they are replacing
- Low rates (<2 percent) of artificial hollows being used by exotic or pest fauna species.

Corrective actions that would be discussed and confirmed between the Transport and the Project Ecologist may include:

- A review of the location, type and number of artificial hollows installed
- A review of artificial hollows design and/ or placement on the tree to exclude undesirable species
- Identifying the cause of artificial hollow failure and modifying as necessary.

6.6. Hollows

Table 6-4 details the fauna habitat replacement requirements for the Project.

Table 6-4: Hollow Replacement Requirements

Habitat (Hollow) type/size	Pre-clearance total	Impact total ¹	Number to replace (1:1 ratio) ²	Location
Small	1,175	776	0	To be nominated by Transport.
Medium	432	267	197	To be nominated by Transport.
Large	58	37	37	To be nominated by Transport.
Extra Large	1	1	1	To be nominated by Transport.

Note:

1. Indicative only, actual number of hollows to be removed is to be confirmed following completion of detailed design and refinement of construction methodologies.
2. Due to the abundant presence of hollows in the EIS construction boundary and assumed similar presence in nominated habitat replacement areas, it is considered unlikely that all hollows (in particular, Small and Medium) will be replaced at a 1:1 ratio in accordance with the process outlined in Section 6.1 of this Strategy.

7. Intertidal area restoration

7.1. Project requirements

Intertidal area restoration will be undertaken as follows:

- Hunter River West must be restored after removal of any Temporary Works so that it reflects the condition in the surrounding offsite area. Revetments made of both rock and salvaged timber, and final soil levels must be developed to create Salt Marsh habitat in all areas of the Hunter River West except where it is needed for long term operational maintenance requirements as directed by the Transport.
- Hunter River East must be restored after removal of any Temporary Works so that it reflects the condition in the surrounding offsite area. Final soil levels must be developed to create Mangrove Forest in all areas of the Hunter River East except where is needed for long term operational maintenance requirements as directed by Transport. Specific requirements relating to the restoration of the mangrove habitat are detailed in sections 7.2 to 7.6 below.

7.2. Site Reinstatement

It will be necessary to remove unrequired infrastructure, and to reinstate the original topographic profile of the area or profile appropriately to create conditions conducive to salt marsh and mangrove rehabilitation. Where possible, disturbance to subsurface sediments will be avoided to minimise the exposure of potential acid sulfate soils. Reinstated gradients will be smooth and there will be no large ridges or depressions that will prevent tidal drainage. The site will be monitored over several tidal cycles to ensure that adverse erosion or sediment deposition is not taking place and that the area is relatively stable.

7.3. Hunter River Natural Recolonisation

Once physical reinstatement of the original system has occurred, natural recolonisation will commence when propagules are next released. Small physical structures (i.e. depressions, rock, and timber structures) will be installed to enhance the capture of mangrove seedlings. These will consist of small (<10 cm) banks, logs, grooves/ furrows, or net structures installed perpendicular to the prevailing tidal direction. After two years, an assessment will be made as to whether natural recolonisation has been successful or whether additional planting might be warranted.

7.4. Planting

If natural recolonisation processes are insufficient, planting should be explored to increase the density of mangroves (PCT 1747) and saltmarsh (PCT 1746). Plants can be sourced from the collection of newly released propagules or from nurseries. Planting is to focus on infilling areas that have not naturally recolonised.

7.5. Restoration Targets

The primary goal is to return the disturbed intertidal area ecosystem to as close a state as possible to that observed before disturbance. The target should be natural recolonisation/ planting such that the stem/ trunk density is the same as was present prior to disturbance. The completion criteria for restoration are:

- A stable landform has been achieved and appropriate ground levels reinstated.
- The correct species (i.e. PCT 1746 and PCT 1747) are present at densities observed prior to disturbance.

7.6. Monitoring

Monitoring will be annual except for the first year where it is important to assess the stability of the substrate following site reinstatement. Monitoring will occur every 3 months during the first year. Baseline data (plots) have been collected as part of the EIS and will be used to inform species assemblage, cover and density. Additional data to be recorded as part of the baseline monitoring will include ground levels and average canopy height. In addition, photos will be taken at permanent monitoring points prior to disturbance and incorporated into the baseline data. Subsequent monitoring will commence following the removal of infrastructure and record data on ground levels (proxy for

restoration of tidal hydrology), seedling density and height, extent of natural recruitment versus planting (if appropriate), soil stability and erosion, and photo points at permanent monitoring locations. Ongoing monitoring will occur annually for three years following infrastructure removal, or until the completion criteria are achieved. Results from monitoring sessions will be collated into an annual report.



8. Tree Replacement Strategy

Where trees are to be removed that are not already offset under the Biodiversity Offset Scheme, Transport will provide a net increase in the number of replacement trees at a ratio of 2:1 (as per CoA E18). Replacement trees must be located on public land and prioritised within and up to 500 meters from the construction footprint in consultation with the relevant authority. The replacement trees must be planted prior to the commencement of operation unless otherwise agreed by the Planning Secretary.

Tree replacement (and other vegetation planting within the Project) will occur in accordance with the details specified within the Design Landscape Plan.

Should plant loss occur during the maintenance period that impacts the capacity of the landscaping to achieve the design objectives (e.g. reduction in canopy species cover), the plants will be replaced by the same plant species and with similar growth form (i.e. a tree with an advanced juvenile tree) unless it is determined by a suitably qualified person that a different species is more suitable for that location. Any replacement plantings must use native species of local provenance from the relevant native vegetation community.

8.1. Impact Minimisation

Impact minimisation involves investigating and considering options to avoid or minimise impacts on trees, including the degree of encroachment into the root zone. The primary process for impact minimisation is the detailed design and construction processes. The Project is committed to exploring opportunities to minimise impacts to trees, in particular large trees, and trees of medium or high retention value, through both design modifications during detailed design and the construction methods used, as follows:

- Avoidance of impacts in detailed design where possible
- Minimising construction impacts and protecting trees during construction.

Impact minimisation through the development of the detailed design is being undertaken outside the scope of this report. This process will determine the actual numbers of trees to be impacted, including those requiring removal. This in turn will determine the final number of trees required to be offset by this tree replacement strategy.

8.2. Tracking the Project's Impact on Trees

Preparation of the Environmental Impact Statement (EIS) for the Project did not involve an arboricultural impact assessment. Therefore, baseline data will need to be collected from trees within and immediately adjacent to the disturbance footprint that would be potentially impacted by the Project and are not offset under the Biodiversity Offset Scheme. This includes disturbance by any physical works, construction compounds, access roads and any other areas that would be physically disturbed during construction of the Project.

The Project will retain a record of the number of trees removed and replaced including number, location, size, and species. The initial sampling session to record this data will form a baseline for monitoring.

8.3. Consultation

Recipient sites for replacement planting of trees will be identified by Transport in a process of consultation with key stakeholders including City of Newcastle, Port Stephens Council, local property owners and DPHI. Replacement tree pot size must be consistent with the relevant authority's plans/ programs/ strategies for vegetation management, street planting, or open space landscaping.

8.4. Replacement Planting Locations

There are several opportunities that will guide and inform the location of the replacement tree planting, including:

- Planting in areas of greatest need (e.g. hot areas where shading would be beneficial)
- Planting for connectivity (e.g. reduce habitat fragmentation and increase existing habitat connectivity)

- Prioritise proximity (i.e. plant within 500m of tree removal sites to ensure mitigation as close as possible to the sites of impact)
- Maintain habitat integrity (i.e. only plant tree species in the vegetation community where they naturally occur)
- Balance needs (e.g. maintain significant views, balance open space for recreation with shaded areas for amenity and thermal comfort)
- Prioritise areas of fewest constraints (e.g. avoid conflict with underground/ aboveground utilities)
- Prioritise public land ownership (e.g. Transport owned land represents the greatest opportunity by avoiding the need for additional landholder agreements).

8.5. Tree Species for Replacement Planting

Tree species for replacement tree planting should be selected through a process of document review, precedent studies, and consultation to arrive at a list species that are compatible with the objectives of the Tree Replacement Strategy and local vegetation communities.

8.6. Tree Procurement and Supply

Trees used in replacement planting must conform to the Australian Standard 2303:2015 – Tree Stock for Landscape Use.

8.7. Maintenance and Monitoring of Replacement Trees

The following maintenance activities should be carried out in respect of all trees planted:

- Manage health:
 - Making health assessments including for pest and disease infestation
 - Checking tree health after unexpected events or emergencies such as severe storms.
- Checking stakes and ties, and carrying out repair work as required
- Weed removal
- Replacement of lost, damaged, or dead trees
- Keep a register of all planted trees including species, location, installation size, inspection dates with health/ condition.
- A record of all replacement trees that have been removed, the reason why and the details of any further replacement.

Maintenance activities should be undertaken quarterly for the first year following planting and annually (spring) for two years following successful establishment (determined at 12-month mark). A brief report should be compiled annually that summarises the findings from each monitoring event and compares against both the baseline data and/ or data from previous years.



Appendix D – Flora and Fauna Protection Procedure

M1 Pacific Motorway Extension to Raymond Terrace - Stage 1 Black Hill to Tomago

Appendix D - Flora and Fauna Protection Procedure

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Revisions and Distribution

Revisions

Draft issues of this document are identified as Revision A, B, C, etc. Upon initial issue (generally Contract Award) this will be changed to a sequential number commencing at Revision 0. Revision numbers will continue at Revision 1, 2, etc.

Rev	Date	Prepared By [Name]	[Signature]	Reviewed By [Name]	[Signature]	Approved By [Name]	[Signature]	Remarks
A	10/05/23							Transport and ER submission
B	30/06/23							Transport and ER re-submission
C	31/07/23							Transport and ER re-submission
D	18/08/23							For External Consultation
E	22/09/23							For ER Endorsement
F	29/09/23							ER Endorsement resubmission and additional BCD comment
G	31/10/23							For DPE Resubmission
00	08/11/23							For Construction
01	29/01/24							Clearing boundary flagging update
02	19/02/24							Addressed ER Comments
03	20/02/24							For ER endorsement
04	21/06/24							6 monthly review - update to distribution list & department names
05	24/10/24							Transport and ER re-submission
	24/07/25							Re-submission for ER endorsement (no changes to the Procedure). Minor updates to the FFMP have been ongoing since the June 2024 six-monthly review, and this re-submission encompasses the June 2025 six-monthly review

Distribution List

Client's Representative	
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1. Purpose

A Flora and Fauna Protection Procedure (Procedure), including the aquatic protection procedure and fauna rescue and release procedure, is required for the Project in accordance with relevant Conditions of Approval, Scope of Works and Technical Criteria (SWTC) and Transport for New South Wales (Transport) D&C Specifications.

This Procedure (SWTC - App 5 - Cl. 5.2.1) has been prepared by Principal Ecologists [REDACTED] BSc (Zoology), Hons (Zoology), PhD (Ecology) and [REDACTED] BSc (Biology), Grad. Dip. (Bushfire Protection), experienced ecologists with demonstrated experience preparing management plans and explains the processes and procedures to be carried out to:

- Mitigate the risk of fauna injury during any vegetation and fauna habitat clearing operations associated with construction activities (CoA E15, SWTC - App 5 - Cl. 5.2.3, Cl. 5.2.5, Cl. 5.2.6)
- Mitigate the risk of fauna injury during general construction activities
- Minimise clearing of native vegetation (CoA E5, SWTC - App 4 - Cl. 4.16)
- Prevent impacts to threatened species and threatened ecological communities beyond what has been approved (CoA E4)
- Identify suitable methods for fauna protection (CoA E16)
- Reduce risks from vehicle impacts to fauna in newly cleared areas (SWTC - App 5 - Cl. 5.2.3)
- Prepare reports on pre-clearing surveys, clearing operations and demolition of structures (SWTC - App 5 - Cl. 5.2.7).

2. Scope

This Procedure includes site specific advice and control measures relating to vegetation and habitat to be cleared associated with construction activities. It is intended that the environmental safeguards outlined in this procedure will be incorporated into the pre-construction and construction phases of the Project. Biodiversity management and mitigation will be undertaken in accordance with the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011) and the associated management plans and procedures for the Project. Management measures for aquatic species will be developed in consultation with Department of Primary Industries (DPI) (Fisheries).

This Procedure has been submitted to the Transport Representative for review by, and addresses the requirements of, the Department of Environment and Heritage (DEH) Biodiversity Conservation Division (BCD), the Department of Primary Industries (DPI) (Fisheries) and Council prior to finalisation and subsequent implementation. Records of consultation are included in Section 1.4 and Appendix A of the Flora and Fauna Management Sub-Plan.

2.1. Requirements

This Procedure has been developed in accordance with the requirements listed in Table 2-1.

Table 2-1 Flora and Fauna Protection Requirements

Requirement	Condition requirements	Document reference
CoA E4	Impacts to threatened species and threatened ecological communities exceeding those identified as impacted in the documents listed in Condition A1 must not occur.	Section 6.1, 6.2, 6.4 and 7.1 FFMP Section 6.1 and 6.2
CoA E5	The clearing of native vegetation, in particular Koala habitat and mangroves, must be minimised with the objective of reducing impacts	Section 6.1, 6.2, 6.4 and 7.1

Requirement	Condition requirements	Document reference
	to threatened species and ecological communities and threatened species habitat.	FFMP Section 6.1 and 6.1.5
CoA E15	An inspection must be undertaken by an appropriately qualified and experienced ecologist (and diver) in the 24-hour period prior to the start of Work that may impact potential habitat for Estuary Cod (<i>Epinephelus coioides</i>) to detect for presence of the species. The inspection must be undertaken within the construction footprint and surrounding 100 metres, including in areas of mangroves.	Section 7.1 and 7.1.1 FFMP Section 6.1 (Aquatic Ecosystems), 6.1.5 and 7.4
CoA E16	Suitable methods must be used to protect Estuary Cod habitat and individuals (if detected) within the construction footprint and surrounding 100 metres at the proposed Hunter River bridge site in accordance with the Appendix E of the Submissions Report as listed in Condition A1(b) and the provisions of Fisheries Management Act 1994.	Section 7.1 FFMP Section 6.1 (Aquatic Ecosystems), 6.1.5 and 7.4
SWTC - Appendix 4 - Cl 4.16(a)	Notwithstanding or in addition to, as applicable, the requirements of condition E5 of the Planning Approval and the other Environmental Documents, the Contractor must design and construct the Project Works and Temporary Works to minimise clearing of native vegetation, in accordance with the requirements of TfNSW D&C G40 and subject to other requirements of the deed.	Section 6
SWTC - Appendix 5 - Cl 5.2.1	(a) As part of the Flora and Fauna Management Sub-Plan, the Contractor must prepare and implement a fauna protection procedure to minimise the impacts on fauna, including threatened and protected fauna, caused by the Contractor's Activities. This procedure must be developed in consultation with the Contractor's Project Ecologist. This procedure must be prepared in accordance with the RTA Biodiversity Guidelines, Protecting and Managing Biodiversity on RTA Projects (2011), Guide 9: Fauna handling.	Appendix D
	(b) The fauna protection procedure must document all species that are likely to be affected by the Contractor's Activities together with species description, locations, population sizes, likely impacts, required searches, protection and rescue procedures.	Section 4, 5, 6.3, 7.1.1, 8
	(c) The Project Ecologist must review the fauna protection procedure. The Contractor must make any changes that the Project Ecologist requires to ensure that the procedure meets the requirements of the Environmental Documents and the deed including this Appendix 5 and D&C G36.	Section 1
	(d) The fauna protection procedure must be submitted to the Principal's Representative for review by, and address the requirements of, the Department of Planning, Industry and Environment (DPIE), the Department of Primary Industries (DPI) (Fisheries) and Council prior to finalisation and subsequent implementation.	Section 2
SWTC - Appendix 5 - Cl 5.2.2	(a) The Project Ecologist, which the Contractor must employ under section 2.5.4 of the Scope of Works and Technical Criteria, must be degree qualified, suitably experienced and with expertise in fauna rescue, including care and handling of shocked and injured terrestrial fauna. The Project Ecologist must be approved by the Principal's Representative and must manage and supervise all fauna protection including rescue tasks to minimise the impacts on fauna. Wildlife rescue organisations may be used to assist in fauna rescue, but must follow the fauna protection procedure developed as part of the Flora and Fauna Management Sub-Plan.	Section 6.4.1
SWTC - Appendix 5 - Cl 5.2.3	(a) The fauna protection procedure must address the control of all clearing operations to minimise fauna injury and must include procedures to reduce risks from vehicle impacts to fauna in newly cleared areas. The fauna protection procedure must address, as a minimum, the following requirements:	This Procedure

Requirement	Condition requirements	Document reference
	(i) the contact details for the Project Ecologist must be identified and kept at a convenient location on the Construction Site and must be available to the Contractor's relevant management and supervisory personnel at all locations where clearing is being undertaken, to enable quick contact with and access to the Project Ecologist;	Section 3
	(ii) prior to undertaking clearing at any location or time, a pre-clearing assessment must be undertaken by the Project Ecologist in accordance with the RTA Biodiversity Guidelines, Protecting and Managing Biodiversity on RTA Projects (2011), Guide 1: Pre-clearing process. The assessment must identify the presence or otherwise or evidence of the presence (including fresh scats, scratches and remains of prey) or otherwise of fauna, including threatened species. The assessment must be documented and include processes and actions taken to protect or rescue any identified fauna;	Section 6.3
	(iii) all 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, must be marked at least seven days prior to the commencement of clearing in a manner which clearly identifies and demarcates the trees;	Section 6.4.2
	(iv) the Contractor must implement a two-stage approach to clearing in accordance with RTA Biodiversity Guidelines, Protecting and Managing Biodiversity on RTA Projects (2011), Guide 4: Clearing of vegetation and removal of bushrock. Non-habitat trees must be removed at least 48 hours before habitat trees are removed, unless otherwise agreed with DPIE and the Principal's Representative, to allow fauna an opportunity to move from habitat trees and allow time to concentrate rescue efforts on the trees that are most likely to be inhabited. All habitat trees which are required to be removed must be felled under the supervision of the Project Ecologist. Felled trees must be left on the ground for at least 24 hours to give any fauna trapped in the trees an opportunity to escape;	Section 6.4.2
	(v) an assessment of habitat trees and the handling of the fauna affected by the clearing activities must be undertaken by the Project Ecologist. The assessment must address all elements of the implementation, outcomes and effectiveness of the fauna protection procedure, including: A. the identification and assessment of habitat trees affected by the clearing activities, including details of the checks by the Project Ecologist on trees for fauna, nests and the like, and the implementation of the fauna protection procedure; and B. shocked and injured animal care and handling;	Section 6.4.2
	(vi) procedures must be included for the relocation of non-injured fauna from clearing areas and operations, including the identification of appropriate locations, timings and weather conditions for the relocation of non-injured fauna; and	Section 6.4.2
	(vii) procedures must be included for handling injured fauna from clearing areas and operations, including details on liaison with wildlife rescue groups, veterinary surgeons and any other appropriate organisations or individuals	Section 6.4.2
	(b) Further to section 5.2.3 (a)(iv) of this Appendix 5, procedures must be included for identifying trees for retention which are located directly adjacent to proposed fauna crossing structures and these trees must be identified in the pre-clearing report required under clause 2.4.2 of TfNSW D&C G40.	Section 6.3.1
SWTC - Appendix 5 - Cl 5.2.5	(a) The fauna protection procedure must address the control of Contractor's Work in waterways to minimise injury to aquatic fauna. It must include procedures to reduce risks to aquatic fauna from vessels and plant, including direct strike, noise and vibration. The fauna protection procedure must address, as a minimum, the following requirements:	Section 7

Requirement	Condition requirements	Document reference
	(i) observations of aquatic fauna in the vicinity of active Contractor's work within waterways and procedures for adjusting the Contractor's Work as necessary when aquatic fauna are in close proximity to areas of active Contractor's Work;	Section 7.1.1
	(ii) measures for the slow start up of all construction activities that generate underwater noise to ensure any noise-sensitive aquatic fauna are able to move away from the noise source; and	Section 7.1.1
	(iii) procedures for care and handling of shocked and injured aquatic fauna, including details on liaison with aquatic fauna rescue groups, veterinary surgeons and any other appropriate organisations or individuals.	Section 8 and 9
SWTC - Appendix 5 - CI 5.2.6	(a) The Contractor, under the guidance of the Project Ecologist, must assess and inspect all bridges, culverts and associated structures that are to be demolished or removed for the presence of native fauna, including bats that may be present in structures.	Section 6.4.4
SWTC - Appendix 5 - CI 5.2.7	(a) The Contractor must, in consultation with the Project Ecologist, prepare separate reports on each of the following activities:	
	(i) clearing operations ("Clearing Report"); and	Section 6.3.1
	(ii) the demolition of any structure, including culverts and associated structures ("Structures Report").	Section 6.4.4
	The Clearing Report specified in section 5.2.7 of this Appendix 5 may be combined with the Post-clearing Report required by clause 2.4.5 of TfNSW D&C G40.	Section 6.4.3
	(c) Each report must provide, where relevant to the report:	
	(i) details of the assessment of habitat trees and the handling of the fauna affected by the clearing activities undertaken in accordance with the requirements of section 5.2.3 of this Appendix 5;	Section 6.3.1 and 6.4.3
	(ii) details of the clearing and structures removal operations, including procedures, dates (including any overlap with breeding or hibernation periods of threatened hollow-dependent fauna species and reasons why the overlap was unavoidable), areas and information on the fauna specialist(s) present during the clearing and structures removal operations;	Section 6.4.3 and 6.4.4
	(iii) details of any live fauna that was sighted, captured, released, injured or shocked;	Section 6.4.3
G36 4.8	(c) Fauna protection procedure developed in accordance with the requirements of section 5.2 of Appendix 5 of the Scope of Works and Technical Criteria. The fauna protection procedure must minimise the impacts on fauna, including threatened, protected and aquatic fauna (such as the Koala (<i>Phascolarctos cinereus</i>), Squirrel Glider (<i>Petaurus norfolcensis</i>) and Mahony's Toadlet (<i>Uperoleia mahonyi</i>)), caused by the Contractor's Activities. Handling of injured fauna must be carried out by licensed fauna handler such as fauna ecologist or wildlife carer. If native fauna are captured during vegetation clearing, they must be released into a suitable nearby location that has been identified as such by an ecologist. Keep records of fauna captured and relocated. Report any injury or death of threatened species to the Principal. The fauna rescue and release procedure must include management measures for aquatic fauna and fish.	Section 6.4.2, 8 and 9
G40 2.4.3	Prior to clearing activities, undertake a survey of bush rocks for the identification of natural and artificial habitat features to limit injury to fauna and damage to existing flora in accordance with Guide 1 Pre-clearing Process and Guide 4 Clearing of Vegetation and Removal of Bushrock of RMS Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011).	Section 6.3

Requirement	Condition requirements	Document reference
G40 2.4.4	Clearing of hollow-bearing and habitat trees must be staged to reduce the risk of fauna mortality associated with their removal, and must, as far as practicable and unless otherwise agreed by the Project Ecologist and the Principal's Representative, occur outside the subject species main fauna breeding season. This must be undertaken in accordance with Guide 4 Clearing of Vegetation and Removal of Bushrock of RMS Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011).	Section 6.4.2

3. Induction and Training

All Project personnel are to be inducted on the existence of this Procedure during the Project Induction and in more detail as required in Site Inductions and regular Toolbox Talks. Records of all training, including inductions, will be maintained. Records will include the name and role of the attendee as well as the name of the course.

The contact details for the Project Ecologist must be identified and kept at a convenient location on the Construction Site and must be available to the Contractor's relevant management and supervisory personnel at all locations where clearing is being undertaken, to enable quick contact with and access to the Project Ecologist. Contact details for the Project Ecologist are provided in Table 3-1.

Table 3-1. Name and contact details of the Project Ecologist.

Name/ Company/ Role	Contact Details

4. General Fauna Protection Measures

Specific measures to be used prior to and during construction to protect flora and fauna, and their habitats, are detailed in this procedure. Overarching measures that need to be considered are:

- The need for artificial lighting during construction and operation will be minimised where feasible, including directing lighting away from vegetated areas where practicable
- Clearing must be carried out in a manner that prevents the mixing of topsoil with woody vegetation debris. Non-woody vegetation (groundcovers) must be incorporated into topsoils as organic nutrients for use in rehabilitation
- Before commencing clearing and grubbing all soil erosion and sedimentation controls required for this phase of construction must be installed in accordance with TfNSW Specification D&C G38. All staff must be made aware of the priority weeds and WoNS present on-site and requirements related to the listing under the *Biosecurity Act 2015* (NSW)
- Take protective measures during the operations of clearing and road construction to avoid damaging or destroying threatened flora species and trees which have been marked or otherwise identified for preservation.
Where it is known that a certain species will be displaced by clearing, comparative habitat assessments will be conducted on clearing sites and proposed release sites to ensure that habitat features are available in the released sites.
- Release sites will be identified and mapped prior to clearing and all appropriate approvals granted by landholders.
- Tree clearing would not occur within periods where ambient air temperatures exceed 35°C where possible.

- All translocations will be done in accordance with the 'Translocation operational policy' (DPIE 2019), and any appropriate licensing under the *National Parks and Wildlife Act 1974* or *Biodiversity Conservation Act 2016* will be obtained where required.

5. Species Potentially Impacted

Several threatened species and a large number of protected species have the potential to be impacted by the construction works. The taxa at risk of being impacted by removal/ clearing of different habitat features is provided in Table 5-1.

Table 5-1: Species at risk during construction activities.

Taxa	Construction activities/ habitat features that will be impacted
Terrestrial/ woodland birds	Clearing of vegetation (including hollow-bearing trees) and woody debris
Aquatic/ wading birds	Clearing of saltmarsh, wetlands and mangroves, in-stream works
Arboreal mammals (e.g. Squirrel Glider, Koala)	Clearing of vegetation (including hollow-bearing trees) and woody debris
Bats	Clearing of vegetation (including hollow-bearing trees), in-stream works near bridges
Terrestrial mammals	Clearing of vegetation (including hollow-bearing trees) and woody debris
Frogs (e.g. Mahony's Toadlet)	Clearing of riparian habitat and wetlands, removal of ephemeral ponds
Reptiles	Clearing of bush rock, vegetation and termitaria
Fish	In-stream works

6. Vegetation Clearing Procedure

The Project will limit clearing of native vegetation:

- For the Works, to within the approved Project footprint
- For Services, to the minimum clearing extents required by the relevant Authority
- For fencing, including boundary fencing to the extents required by Specification R201 and the Scope of Works and Technical Criteria.

The following safeguards are to be implemented to protect flora and fauna that occur within and surrounding the Project footprint during vegetation clearing works.

6.1. Hold Point Release

In line with Specification G40 a hold point will be raised prior to the clearing of any vegetation. The following supporting information will be provided for the release of this hold point at least seven days prior to commencement of clearing:

- Clearing and grubbing plan
- Report on the presence of weeds and unsound trees.

6.2. Vegetation Clearing Permit

A clearing permit will be prepared, which involves the following steps:

- The Survey Manager will approve the clearing pegged out is an approved string
- The Environmental team will check and ensure temporary fencing is in place
- The Environmental Advisor, Area Manager responsible for the works, Project Ecologist and clearing contractor will walk the area to be cleared, and point out habitat features, watercourses and items of note
- A toolbox meeting will be conducted for the clearing operation.

Prior to the commencement of vegetation clearing works, temporary fencing or flagging is to be installed around the vegetation to be retained to minimise the probability of accidental vegetation removal or damage. The alignment of this perimeter fence/flagging will be

completed in accordance with the Australian Standard for the Protection of Trees on Development Sites (AS4970-2009) and incorporate the relevant tree protection zones for trees to be retained.

Initial clearing flagging/survey pegs will be offset 1m from the actual clearing boundary for the initial boundary set out. Within locations of dense vegetation, mobile plant must have a GPS system installed within the machine and surveyor will be present to check boundary lines every 5m of clearing.

The fencing of high-risk areas will be constructed of, as a minimum, capped star pickets and high visibility para webbing and have appropriate signage stating that it is an environmentally sensitive area to educate construction personnel. A flagging protocol will be employed to identify clearing limits, Project boundaries and habitat trees (Table 6-1).

Ongoing site awareness will be maintained via toolbox talks on the extents of clearing and the flagging protocol. Environmental Control Maps (ECMs) would be prominently displayed to reinforce limits of construction.

Table 6-1: Fencing and signage protocol.

Flag type	Meaning
Green flagging	Project Boundary – Environmental Protection Boundary (DO NOT CROSS)
Yellow flagging	Clearing Limits. No clearing outside this flagging at any time during the Project
Red and white tape	Habitat Tree. (Do not remove without ecologist consent)
Blue flagging	No-go Zone (environmentally sensitive areas)
Pink flagging	Threatened flora

6.3. Pre-clearing Survey Procedure

In accordance with the G40 Specification Section 2.4, pre-clearing surveys will be carried out by a degree qualified, suitably experienced ecologist with expertise in fauna rescue to confirm the vegetation to be cleared as part of the Project, identify the presence and location of any habitat features (including tree hollows, bird nests, potential bat roosts, bush rock and woody debris) and identify the presence or evidence of the presence (including fresh scats, scratches and remains of prey) of fauna, including threatened species.

Limits of clearing and environmentally sensitive areas would be delineated and demarcated at least seven days prior to clearing commencing and will include the following:

- Before clearing commences, identify the approved limits of clearing and exclusion zones by clearly visible markers placed at 25m intervals on each side of the road formation and bridges as shown on the Design Documentation drawings
- For environmentally sensitive areas: "No-go" Zone fencing and signage is to be installed
- In other areas the clearing limits will be delineated using signage and highly visible barrier or tape such as flagging, bunting, nightline or other similarly robust and durable material with reflective strips periodically along its length
- Tree protection zones (TPZs) will be set up around all trees retained within and adjacent to the disturbance footprint using signage and highly visible barrier or tape such as flagging, bunting, nightline or other similarly robust and durable material with reflective strips periodically along its length and designated as "No-go" Zones
- Delineation will be installed consistently through the Project to mark boundaries and sensitive areas using signage and highly visible barrier or tape such as flagging, bunting, nightline or other similarly robust and durable material with reflective strips periodically along its length and designated as "No-go" Zones to reduce the risk of error or misinterpretation of boundaries. This may not be possible in some circumstances due to safe site access requirements.

The Project Ecologist will undertake a pre-clearing survey within the proposed clearing areas prior to the commencement of clearing. The Project Ecologist will:

- Check for the evidence of presence of threatened flora and fauna species
- Identify potential habitat for *Epinephelus coioides* (Estuary Cod)
- Check all bridges, culverts and associated structures that are to be demolished or removed for the presence of native fauna, including bats that may be present in structures
- Flag key habitat features, including (but not limited to) nests, hollow bearing trees (HBTs) or large logs and bush rock using signage and highly visible barrier or tape such as flagging, bunting, nightline or other similarly robust and durable material with reflective strips periodically along its length. As noted above in some circumstances this may not be possible due to site safe access requirements. GPS coordinates for all habitat features identified will be recorded during the pre-clearing survey.
- Record the number and size of hollows in each identified hollow-bearing tree (it is not always possible to accurately determine the number and size of hollows in a given tree and therefore, these data must be confirmed by the Project Ecologist during clearing)
- Assess and inspect all bridges, culverts and associated structures that are to be demolished or removed for the presence of native fauna, including bats that may be present in structures
- Confirm nearby habitat suitable for the release of any fauna that may be encountered during clearing works
- Identify suitable locations nearby for relocation of salvaged habitat
- Identify and demarcate all priority weeds and WoNS
- Identify trees for retention which are located directly adjacent to proposed fauna crossing structures
- Aside from hollow-bearing and habitat trees, identify and mark any suitable bridge timber trees that are to be felled, that will become the property of TfNSW. Any identified bridge timber trees must be felled by cutting off the stump, lower branches and crown from the trees and cross cutting to the lengths directed by the Principal. Bridge timber must be neatly stockpiled, as directed by the Principal
- Determine the suitability of any timber to be felled, excluding bridge timber trees selected by the Principal, as appropriate for 'Fauna Furniture' on fauna crossing structures. Retain and stockpile felled timber suitable for fauna furniture in a manner which preserves its condition and renders it suitable for reuse on the Project
- An arborist is to report on any unsound trees (not previously assessed) that should be removed if required
- A check to ensure exclusion zones have been delineated and any vegetation to be retained are clearly marked using signage and highly visible barrier or tape such as flagging, bunting, nightline or other similarly robust and durable material with reflective strips periodically along its length and designated as "No-go" Zones
- A check to ensure clearing limits and other delineation required to be installed prior to clearing, is in place
- The Project Ecologists should capture and/ or remove fauna that have the potential to be disturbed as a result of clearing activities
- Relocate identified fauna into pre-determined habitat identified for fauna release
- Inform clearing contractors of any changes to the sequence of clearing if required
- Contact a local wildlife carer or veterinarian to inform them of vegetation clearing works upcoming
- Prior to any disturbance of waterway banks, a thorough inspection by a qualified ecologist will be undertaken for aquatic fauna and frogs

- Where possible, existing trees and other vegetation should be retained within 15 metres of waterways and drainage lines until immediately before clearing commences in the area
- The supervisor, operator and environmental advisor are to walk the clearing footprint prior to commencing clearing
- The Clearing Permit Hold Point is to be approved prior to clearing commencing.

6.3.1. Pre-clearing Report

Prior to the commencement of clearing and grubbing, a Pre-clearing Report must be prepared that addresses the requirements of this Procedure and details the findings from implementing this procedure.

The Pre-clearing Report must also:

- Include a statement from the Project Ecologist that identifies the species and location of any weeds growing anywhere in the road reserve Construction Site over the length to be cleared and grubbed
- Identify all locations of threatened flora species and trees which have been marked or otherwise identified for preservation, including those in fauna crossing locations
- Lists any trees outside the limits of clearing which are unsound and likely to fall upon the Project Works Area or onto private property, as identified by the Arborist
- An analysis of the effectiveness of the clearing methods and fauna rescue procedures adopted by the Contractor
- Recommendations for future pre-clearing assessments and/ or fauna rescue procedures
- Detail locations of temporary stockpiling or windrowing areas where suitable topsoil and organic material shall be retained on site for later use onsite for site restoration purposes
- Identify any material to be retained for later use onsite as habitat during site restoration.

After submission of the Pre-clearing Report to the Principal's Representative as part of the submission for the Hold Point, the Contractor may periodically update the Pre-clearing Report at intervals of not less than 20 business days between each update and submit the updated report to the Principal's Representative, until all clearing has been completed.

6.4. Vegetation Clearing Procedure

6.4.1. Stage 1 – Non-habitat Vegetation/ Tree Removal

Clearing supervision will be carried out by a degree qualified, suitably experienced ecologist with expertise in fauna rescue. Where no areas of habitat have been identified to be cleared, clearing can be undertaken in a single-stage process, and includes the under-scrubbing of non-habitat trees, shrubs, and other vegetation. All boundary and erosion and sediment controls should be in place prior to grubbing. When vegetation, that may provide habitat for native fauna, is proposed to be removed the area will be surveyed by the Project Ecologist immediately prior to clearing, to:

- Obtain updated information on fauna and fauna habitat resources present:
 - Inspection of trees for any new nests constructed since the pre-clearing surveys
 - Inspection of hollow logs and wood debris for the presence of any sheltering fauna.
- Identify any fauna that may have moved into the Project site since the initial pre-clearing inspection
- Capture and relocate non-mobile fauna, such as reptiles and frogs and key habitat features such as active bird nests
- If not already available, record the details for all HBTs and trees containing threatened fauna and flora include GPS location, species, type of habitat feature, size of hollow and type of hollow
- Remove non-habitat vegetation first.

This allows respite between the initial disturbance and the final removal of habitat. The changed environment along with the disturbance should encourage resident fauna to individually relocate without human handling. The timing should allow resident fauna at least 24-48 hours (but no longer than 72 hours) after removal of non-habitat trees to vacate remaining habitat trees.

6.4.2. Stage 2 – Habitat Removal

- All 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, must be marked at least seven days prior to the commencement of clearing in a manner which clearly identifies and demarcates the trees.
- Clearing will be conducted sequentially and directionally towards areas of refuge, where possible, to prevent the creation of vegetation islands.
- Identified habitat (e.g. nests, bush rock, boulder fields, hollow bearing trees and large woody debris) will be left for at least 24-48 hours after removing non-habitat vegetation to allow fauna to escape.
- Nests and on-ground logs will be carefully inspected by an ecologist. Logs should be carefully rolled and inspection beneath the log undertaken.
- The Project Ecologist will be present during all removal of habitat trees to capture and relocate any encountered fauna.
- Habitat trees (trees with hollows or nests) will be knocked either manually or with machine and then carefully lowered to the ground with minimal impact and nests and hollows inspected by the Project Ecologist.
- Injured or orphaned fauna are to be taken to a local vet, or a wildlife rescue representative (e.g. Hunter Wildlife Rescue) is to be contacted as soon as possible (see Table 8-1)
- If wildlife is discovered during the clearing of habitat tree vegetation the following steps will be taken:
 - Stop all work in the vicinity of the fauna and immediately notify the site foremen (or similar)
 - Ideally the animal will relocate by itself, however, if it is injured or suspected injured contact will be made with a licensed fauna handler (or the Project Ecologist)
 - The Project Ecologist must manage and supervise all fauna protection including rescue tasks to minimise the impacts on fauna. Wildlife rescue organisations may be used to assist in fauna rescue, but must not be permitted to manage the process
 - Injured fauna will be delivered to a local vet for treatment
 - Non-injured fauna will be released into a suitable nearby location that has been identified as such by the Project Ecologist or, if juvenile, presented to an appropriate local wildlife carer (such as Hunter Wildlife Rescue)
 - Where the use of a crane and/or elevated work platform are required due to the presence of fauna within trees to be felled, the above process is to be modified as required to ensure impacts to fauna are minimised.
- Where works are undertaken when frogs are active they should be relocated to the nearest area of retained riparian habitat
- Where practical, hollows will be placed in adjacent habitat until the following day for further inspection by a Project Ecologist to verify no fauna is present. Hollow bearing trees and any other cleared vegetation regarded as valuable for relocation and habitat creation/ enrichment are to be retained
- Relocation of fauna will take into account timing and weather condition factors specific to the individual species

- Felled hollow bearing trees will be positioned so that the hollow is facing upwards, allowing any fauna to later escape
- Records are to be kept of all fauna rescue events including locations to where fauna have been relocated. Provide GPS coordinates for such events
- Stockpiling/ storage of cleared timber are to be in designated areas and outside the critical root zone of remaining trees.

6.4.3. Post-clearing Report

Post-clearing reports will be compiled by the Project Ecologist progressively during the clearing phase of the Project and submitted to the Environment and Sustainability Manager. The completed reports will include:

- The name and qualifications of the ecologist or local wildlife carer present during clearing
- Areas of vegetation cleared separated into plant community type (PCTs), including totals cleared to date against the approved clearing limits specified in Table G40.2
- Details of how any priority weeds encountered during clearing were managed;
- Trees that were retained within the clearing boundary
- Trees retained in the vicinity of proposed fauna crossing structures and provide details
- Details of fauna encountered, condition and where they were released
- An analysis of the effectiveness of the clearing methods and fauna rescue procedures adopted
- Number of hollow bearing trees removed and number and size of hollows
- Time between first and second stage clearing
- Any beneficial reuse of vegetation cleared
- Details of any retained timber, root balls or wood debris for proposed beneficial reuse
- Any dead animals located
- Photographs of rescued fauna.

It is noted that the Clearing Report specified in section 5.2.7 of SWTC Appendix 5 may be combined with the Post-clearing Report required by clause 2.4.5 of Transport D&C G40.

6.4.4. Structures Report

Structure reports will be prepared following the demolition of any structure including culverts and associated structures. The Structure reports will include:

- The name and qualifications of the ecologist or local wildlife carer present during clearing
- Details of the structure that was demolished
- Details of fauna encountered, condition and where they were released
- An analysis of the effectiveness of the clearing methods and fauna rescue procedures adopted by the Contractor
- Any dead animals located
- Photographs of rescued fauna.

6.4.5. Report Timing

Each report must be initially submitted to the Transport Representative within 3 months of the commencement of the relevant activity. After initial submission of a report, the report must be updated and resubmitted to the Transport Representative or a notice under Section 5.2.7(e) of SWTC Appendix 5 provided at intervals of not more than 3 months until:

- In the case of the Clearing Report, all clearing has been completed
- In the case of the Structures Report, all demolition has been completed.

If, during the 3-month period following submission or resubmission of a Clearing Report or a Structures Report, or submission of a notice under Section 5.2.7(e) of SWTC Appendix 5, no:

- Clearing work or demolition work that affected native fauna, as certified by the Project Ecologist, is undertaken, written notice to that effect may be provided to the Transport Representative in lieu of updating and resubmission of the relevant report.

Updated reports must include all information in previous versions of the relevant report, together with relevant information from the period to which the update applies. The final reports must be complete, stand-alone documents containing all information from previous versions of the reports.

7. Aquatic Habitat Management

The Area Manager and/or Environment and Sustainability Manager should ensure that aquatic habitats and riparian zones where works are not required are protected by exclusion zones. The following general guidance should be given to the contractor by the Area Manager and/or Environment and Sustainability Manager when establishing exclusion zones within aquatic habitats and riparian zones:

- Mark out and manage exclusion zones according to the procedure described in Section 6.3
- Exclusion fencing should not be installed in the waterway, within 3 metres of the top of the bank or in sensitive areas (e.g. saltmarsh or mangroves). Exclusion fencing should be used outside these sensitive areas
- Identify the construction footprint within the waterway on a map and include in relevant plans such as a Construction Environmental Management Plan (CEMP). The location of aquatic habitat features within or adjacent to the footprint should be clearly identified on the map (e.g. snags, aquatic vegetation, seagrass beds and gravel beds).

Management of aquatic habitats should be in accordance with Biodiversity Guide 10 – Aquatic habitats and riparian zones of the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects*. Regular monitoring of key waterways downstream of the Project discharge locations for evidence of initiation of erosion and scour would be conducted for a minimum of twelve months after construction and, if required, appropriate remediation measures would be carried out.

7.1. Clearing of Riparian and Aquatic Vegetation

In addition to the procedure described in Section 6, the Area Manager and / or Environment and Sustainability Manager should ensure that the following is considered:

- Clearing is avoided within the riparian zone during periods when flooding is likely to occur
- Works are undertaken in accordance with any permit issued under the FM Act for the harm or removal of saltmarsh, mangroves and seagrass
- Clearing does not allow vegetation/trees to fall into the waterway
- Retaining the roots and stumps of trees on the bank of a waterway in order to maintain bank stability. Cut trees off between 300 and 600 millimetres above the ground level
- Consulting with Fisheries before clearing to identify any trees proposed to be removed that could potentially be used for re-snagging of a waterway (see *Guide 5: Re-use of woody debris and bush rock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects*)
- Managing weed species in accordance with the Weed and Pathogen Control Procedure.

7.1.1. Protection of Aquatic Fauna

General fauna protection measures described in this procedure apply to aquatic species (including frogs). Specific measures to avoid impacting aquatic fauna are detailed below:

- Due to poor underwater visibility, the presence of *Epinephelus coioides* (Estuary Cod) and its habitat will be assumed during the construction phase.

- If coffer dams are to be used during construction of the crossing of the Hunter River, then any fish (and other aquatic biota) trapped in these will be relocated, during dewatering, by a suitably qualified marine ecologist.
- Care will be taken to prevent/minimise/mitigate excess sedimentation and/or turbidity arising from construction within and directly adjacent to the Hunter River.
- All construction activities including impact piling within the Hunter River will be controlled to ensure that levels do not exceed the physiological tolerances of fish with swim bladders. If this is not possible, then construction noise will be ramped up from a 'soft start' allowing noise-sensitive aquatic fauna are able to move away from the noise source
- Keep vehicles and machinery away from the banks of a waterway where possible
- Cofferdams will be used during work undertaken within or immediately adjacent to waterways where reasonable and feasible to prevent or minimise increased turbidity. In the event that coffer dams are not reasonable and feasible, silt curtains would be used.
- Refuelling of vehicles and plant, and chemical storage and decanting should not take place within 50 metres of aquatic habitats, apart from water faring vessels which will be refuelled under a boat refuelling specific EWMS. Small amounts of refuelling may occur at bridge works under an EWMS which will include the following measures as a minimum; fuel to be transported in containers of 20litres or less, a spill kit is to be located at the refuelling work front and a portable bund will be utilised during refuelling.
- Access to the waterway minimises the removal of riparian vegetation
- Access to the waterway is restricted to the minimum amount of bank length required for the construction activity
- Boats or other water craft are used in a manner so as to avoid boat wash that could cause erosion of the banks and propeller damage to seagrass beds.
- Where aquatic fauna is observed within waterways in the vicinity of Project works and there is a risk of harm to that particular species, works will cease until the fauna has moved from the area. Otherwise the Project Ecologist/suitably qualified Marine Ecologist may prescribe measures specific to that species.

7.2. Removal and Relocation of Snags

Snags are branches, trunks and whole trees that fall into rivers and streams. Fisheries defines snags greater than 3 metres in length or 300 millimetres in diameter as being key fish habitat for native fish. Snags form essential habitat for aquatic and terrestrial flora and fauna. Snags may need to be removed and/or relocated before undertaking works. Only the minimum number of snags should be disturbed. The Area Manager and/or Environment and Sustainability Manager should ensure the hierarchy below (low to high impact) is followed when snags need to be disturbed:

- Lopping – Protruding limbs are cut and allowed to sink to the river bed
- Realignment – The snag is rotated from its existing position
- Relocation – The snag is physically moved from one location in the waterway to another location. Relocation of snags should be undertaken so as to cause the least disturbance to the bed or nearby sensitive aquatic habitat
- Removal – The snag is completely pulled from the water.

The Area Manager and/or Environment and Sustainability Manager should ensure that Fisheries are consulted where snags are proposed to be lopped, realigned, relocated and/ or removed.

7.3. General Precautions and Mitigation Measures

NSW DPI may require that precautions are taken before, during and after the completion of works to mitigate possible environmental impacts. These include:

- Programming of work to ensure that it takes place during low flow periods (freshwater habitats) or during the lower half of the tidal cycle (tidal waterways)
- Directions on the use of sediment and erosion controls for in-stream works to avoid impacts on water quality and fish passage. For example, where it is not possible to work in the dry (out of the water), a sediment or silt screen may be required around the entire work area but should not extend across the waterway (as it may obstruct fish passage). Silt screens should be placed to isolate the works area and be attached to the same bank upstream and downstream of the work site. Sediment or silt screens should be inspected daily and maintained to prevent the escape of suspended sediments. Sediment control devices should not be removed until the risk of sedimentation and erosion is negligible and the site has been stabilised or revegetated following construction. Screens or other guards should be carefully removed after the work is completed. Silt screens should generally only be used in still water conditions. When placed in higher flows, water either spills over the top or lifts the curtains.
- Directions on the use of coffer dams or temporary access tracks to keep disturbance to the substrate and blockages to fish passage to a minimum. The use of temporary dam materials such as sheet piling will reduce impacts on the substrate. Coarse rock confined by gabion baskets or mattresses should be used in preference to sand or soil.
- Provisions to protect fish during the dewatering process of any coffer dams or the clearing of screens. These should include:
 - Discharging water into a bunded or screened site to allow fish to be rescued
 - Any fish caught in the dewatering process must be immediately released upstream (fish will want to continue migrating upstream) of the site
 - Pumps and screens must be of a suitable capacity and size, and pump velocities slow enough, to allow fish to escape during the dewatering process.
- Ensuring that foreshore works in estuaries are restricted to calm weather conditions. This helps prevent the suspension of fine sediment particles into the water column and ensures the silt screen is not disturbed by wave action.
- Providing direction on the stockpiling of fill or excavated materials on flood prone lands to avoid sedimentation. Particular care should be made in siting stockpiles and dumps. Preferred sites should be situated either above the highest astronomical tide or be secure from a 1 in 10 year flood and have effective sediment control measures in place to contain any runoff.
- Ensuring that only natural material is used as fill during reclamation works. Contaminated material, tyres, building and demolition rubble or acid sulfate soils (ASS) should not be used as fill in any aquatic environment.
- Directions on the use and maintenance of buffer zones around the immediate area of the proposed works to ensure that sediment is controlled off site and impacts on the surrounding ecosystem are kept to a minimum
- Ensuring that the area is rehabilitated after completion of works in accordance fisheries approved Replacement Habitat Strategy.

8. Fauna Rescue Procedure

If wildlife (including aquatic) 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 Area Manager and/ or Environment and Sustainability Manager or Environmental Advisor. The Environment and Sustainability Manager is then to notify the Project Ecologist to discuss the best course of action, e.g. if animal is injured then take to wildlife rescue organisation or closest Veterinary clinic.

2. Preferably allow fauna to leave the 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).

Table 8-1: Contact details of wildlife carers.

Agency/Business	Contact Number
Project Ecologist [REDACTED]	[REDACTED]
Hunter Wildlife Rescue	
Port Stephens Koala Hospital	

Call the appropriate rescue agency immediately and follow any advice provided by the agency. Once the rescue agency arrives at site, they are responsible for the animal. Any decisions regarding the care of the animal would be made by the rescue agency. Contact details of relevant wildlife carers can be found in Table 8-1.

In the event the Project Ecologist or local wildlife rescue cannot be contacted, the injured animal will be delivered to the closest nearby vet as soon as practically possible.

3. Where necessary, to minimise stress to native fauna and/or remove the risk of further injury before the appropriate rescue agency arrives onsite, the Environmental Advisor shall:
 - a. Cover the animal with a towel or blanket and place in a cardboard box and/or hessian bag. Appropriate temporary housing for fauna is species dependent. Gliders, possums, bats, snakes, lizards and frogs can be held individually in a calico bag until release in adjacent habitat. Nestling birds and eggs are best placed in a covered cardboard box equipped with soft cloth.
 - b. Place small animals in a cotton bag, tied at the top
 - c. Rescued fauna must be protected from exposure to heat and removed from the areas undergoing clearing activities to minimise exposure to noise. Keep the animal in a quiet, warm, ventilated and dark place. A designated site would be decided upon in advance of any construction work.
 - d. Aquatic fauna to be placed in a plastic aquaria or plastic bag with sufficient amount of water sourced from point of collection. Frogs would be transported without water or debris in recognition of the risk of transporting disease and the minimal transport time. Any frog handling would be undertaken in accordance with the Hygiene Protocol for the Control of Disease in Frogs (DECC 2008).
 - e. Some animals require particular handling (e.g. venomous reptiles, raptors) and should only be handled by appropriately qualified personnel.
 - f. If handling bats, the handler must be vaccinated against the Australian Bat Lyssavirus (ABLV), which is a form of rabies.
 - g. Equipment for fauna rescue (hessian sack, calico bags, gloves and transport boxes) will be kept in designated locations for emergency use by site staff if required. The fauna specialist will carry a fauna rescue kit in a site vehicle, and an additional kit would be located in the site office.
4. If the animal cannot be handled, excluder personnel from the vicinity, record the exact location of the animal and contact the rescue agency
5. If the fauna species is identified as a threatened species that is not a species identified in the FFMP, the Environment and Sustainability Manager must:
 - a. Immediately cease all work likely to affect the threatened species
 - b. If the fauna is injured, call the rescue agency and notify Project Ecologist
 - c. Implement the Unexpected Threatened Species Find procedure in Appendix B
 - d. If the fauna is to be released, the Project Ecologist must identify suitable fauna release locations within or near the Project site.

6. All relevant Project documentation would be updated to display the new findings and subsequent management measures where required. This would include such documents as Flora and Fauna Management Plan (and associated documents) and Sensitive Area Plans (Appendix A5 of the CEMP).

9. Fauna Handling Procedure

This Procedure will be implemented only if intervention is necessary (i.e. where fauna is injured or otherwise unable to leave the site without intervention, or to minimise stress to native fauna and/ or remove the risk of further injury. The Project Ecologist will implement the following procedures:

1. Cover larger animals (including their head) with a towel or blanket and, if feasible, place in a cardboard box or cloth/hessian bag
2. Place smaller animals (mammals, birds, reptiles) separately in a cotton bag, tied at the top.
3. Place frogs/tadpoles separately in a single use zip lock plastic bag with a small amount of water and/or the litter /vegetation in which they were found
4. Fish and other aquatic life (i.e. turtles) place in plastic aquaria or plastic container with sufficient water
5. For terrestrial fauna keep the animal in a quiet, warm, ventilated and dark place away from noisy quarrying activities
6. For aquatic fauna species ensure sufficient amount of water and ensure adequate dissolved oxygen
7. Gloves will be worn when handling mammals to protect against scratches and bites
8. The Hygiene Protocol for the control of disease in frogs (DECCW, 2009) must be followed for all frog handling to prevent pathogen spread amongst individuals and between catchments:
 - a. Single use, non-latex, non-powdered (i.e. nitrile) disposable gloves to be worn when handling individuals if gloves are not available, then avoid touching the frog with bare hands by using implements to transfer to a container
 - b. Healthy frogs are to be placed in separate single-use plastic bags which should be partially inflated and include a small amount of leaf litter or clean (i.e. washed in a 0.1% concentration of a benzalkonium chloride based disinfectant solution such as F10SC at 1:250 dilution and not re-used) damp cloth bag containing a small amount of leaf litter
 - c. Sick or injured individuals would be euthanized immediately, unless there is a high probability of recovery, in which case treatment would be as for healthy frogs
 - d. Handling equipment, hands and boots to be cleaned of all soil and sprayed with a 0.1% concentration of a benzalkonium chloride based disinfectant solution (i.e. F10SC at 1:250 dilution) or a Chlorhexidine based product (e.g. Halamid©) and rinsed when moving between waterbodies
 - e. Frogs and tadpoles are not to be moved between catchments, and
 - f. Dead frogs would be handled only using single-use gloves and buried in situ to avoid movement of pathogens.
9. Snake handling must be as follows:
 - a. Handling of snakes must only be undertaken by a qualified ecologist or wildlife carer with experience in snake handling, and
 - b. No contact handling techniques (i.e. use a snake hook and bag in opposed to manually handling the snake) are recommended.
10. All handling of bats must be as follows:
 - a. Bats must only be handled by a qualified ecologist or wildlife carer experienced in bat handling and vaccinated against the Australian Bat Lyssavirus (ABLV)

- b. Gloves must be worn when handling bats, and
- c. Larger bats would be wrapped in a large towel and handled with wearing elbow length puncture proof gloves.

Estuary Cod will be managed in accordance with Section 7.1 and 7.1.1 of this procedure in consultation with the Marine Ecologist / Project Ecologist.

Appendix E – Weed and Pathogen Control Procedure

M1 Pacific Motorway Extension to Raymond Terrace – Stage 1 – Black Hill to Tomago

Appendix E - Weed and Pathogen Control Procedure

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Revisions and Distribution

Revisions

Draft issues of this document are identified as Revision A, B, C, etc. Upon initial issue (generally Contract Award) this will be changed to a sequential number commencing at Revision 0. Revision numbers will continue at Revision 1, 2, etc.

Rev	Date	Prepared By [Name]	[Signature]	Reviewed By [Name]	[Signature]	Approved By [Name]	[Signature]	Remarks
A	17/05/23							Transport and ER submission
B	30/06/23							Transport and ER re-submission
C	31/07/23							Transport and ER re-submission
D	18/08/23							For External Consultation
E	22/09/23							For ER Endorsement
0	08/11/23							For Construction
01	21/06/24							6 monthly review – update of distribution list
02	24/10/24							Transport & ER re-submission
	24/07/25							Re-submission for ER endorsement (no changes to the Weed & Pathogen Control Procedure). Minor updates to the FFMP have been ongoing since the June 2024 six-monthly review, and this re-submission encompasses the June 2025 six-monthly review.

Distribution List

Client's Representative	
Project Director	
Construction Director	
Environment and Sustainability Manager	
Environmental Representative	
Independent Certifier	

The controlled master version of this document is available for distribution as appropriate and maintained on the document management system being used on the Project, available to all Project workers. All circulated hard copies of this document are deemed to be uncontrolled.

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1. Purpose

This Weed and Pathogen Control Procedure (Procedure) details the weed and pathogen management and control practices to be implemented throughout the construction phase of the Project, to minimise the threat to native fauna, remnant vegetation within the Project site and other remnant vegetation in the local area.

2. Scope

The Project footprint is mainly comprised of native vegetation communities in varying condition states, although there are areas which are highly modified and dominated by exotic vegetation. Vegetation, including weeds and exotics, will be cleared to facilitate construction of the Project. Therefore, this procedure focuses on weed control prior to vegetation clearance, weed and pathogen management during clearing, and progressive weed control throughout the construction phase.

Weed and pathogen management within the Project site will be developed in consultation with the Project Ecologist to ensure the most appropriate methods are developed.

The flow chart Figure 2-1 outlines the weed management process.

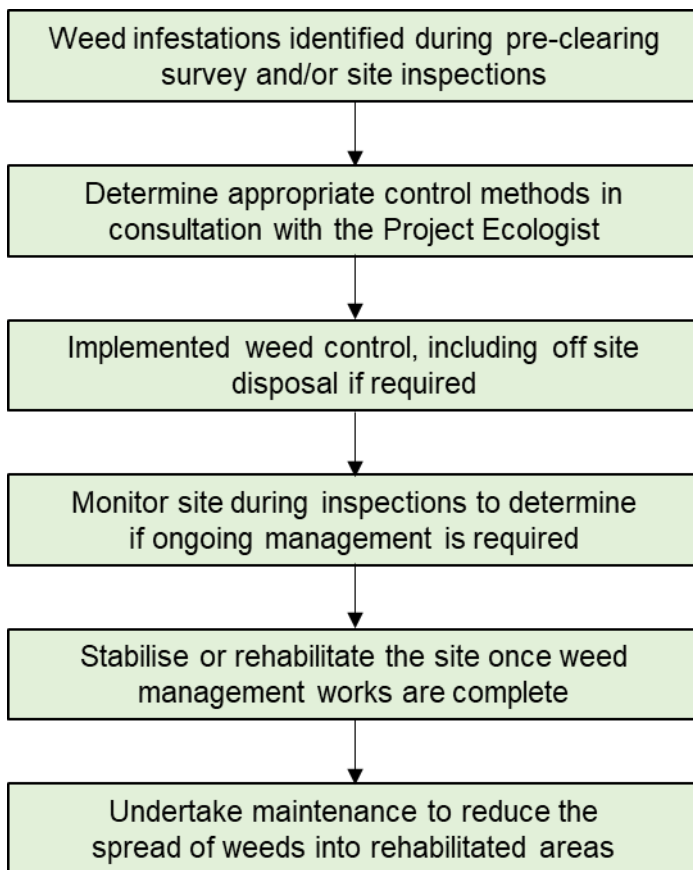


Figure 2-1: Weed management process

3. Induction and Training

All Project personnel are to be inducted on the existence of this Procedure during the Project Induction and in more detail as required in Site Inductions and regular Toolbox Talks. All personnel managing and using pesticides will receive appropriate training prior to commencing work. Records of all training, including inductions, will be maintained. Records will include the name and role of the attendee as well as the name of the course.

4. General Procedure

Priority weeds and weeds of national significance (WoNS) will be treated to satisfy the requirements of the general biosecurity duty whereby the potential spread of exotic species present within the Project

site will be prevented, and the presence of weeds in the construction footprint and adjoining areas will be reduced. Weed occurrence and extent will be mapped during pre-clearance surveys and regular inspections, with infestations to be treated on an ongoing basis.

General weed management procedures to be undertaken include:

- Pre-clearing surveys undertaken by the Project Ecologist will identify weeds requiring specific management, such as large infestations and/ or WoNS, prior to and during vegetation clearing.
- Weeds of national significance and priority weeds will be identified and mapped within a pre-clearing report, which will also outline appropriate control methods for specific areas and weed species. No specific treatment is proposed for other weed species that do not pose a threat to areas of remnant native vegetation.
- Public notification of pesticide use must be in accordance with Specification G36 Annexure G36/H.
- Weed control will ideally be undertaken where possible prior to the development of seed, which generally occurs during the summer period. Where this is not possible, seeds should be removed from plants wherever practicable, and contained prior to disposal.
- Control methods include hand removal, herbicide application, and mechanical removal. Weeds requiring hand or mechanical removal, including contaminated topsoil, will require disposal by encapsulation (deep burying) or to an approved green waste management facility
- When pesticides are to be used adjacent to, or across the road from a 'sensitive place':
 - Carry out mechanical means of pest control (such as mowing or slashing) where feasible; or
 - Carry out hand-held application of pesticides where mechanical means of pest control are not feasible.
- Only pesticides registered for use near water may be used near water
- Avoid applying pesticides:
 - On hot days when plants are stressed
 - After the seed has set
 - Within 24 hours of rain or when rain is imminent
 - When winds will cause drift of pesticides into non-target areas.
- Any machinery arriving to site will be inspected to ensure they are free of soil or vegetative matter. Machinery involved in weed management activities will be thoroughly cleaned to remove any plant material or soil, prior to the commencement of construction.
- The Project site will be continually monitored for weed invasion during weekly site inspections, and any other inspections or audits undertaken as part of CEMP requirements. The presence of weed infestations will be reported as part of the inspection process and include actions to be undertaken to manage these infestations.
- Following weed removal, any exposed areas will be stabilised and/ or rehabilitated to reduce erosion and minimise the potential for further weed invasion. Prior to the removal of contaminated topsoil from site, assessment of whether it can be used on-site (encapsulation) must be explored.
- Monitoring of biosecurity matters is to be undertaken and evaluated against performance targets, to ensure the management measures in this plan are implemented and performance criteria are satisfied. The monitoring program will commence prior to clearing commencing and continue for the operation period i.e. pre, during and post construction. Details of the monitoring program are included in Section 9.

5. Weeds

5.1. Weeds of National Significance and Priority Weeds

Numerous weeds were recorded throughout the Project site and include environmental weeds and weeds with formal control measures.

During field surveys, 300 species of plant were recorded. Of these, 238 were native and 62 were introduced species. Of the 62 introduced species recorded within the Project site, 11 species are listed under the NSW *Biosecurity Act 2015* as priority weeds for the Hunter region (DPI 2023) of which five

(5) are also listed as WoNS (Australian Weeds Committee, 2018). The weeds listed as WoNS are outlined below in Table 5-1.

There are several other weeds present within the Project site. Active management of these species is not required under the *Biosecurity Act 2015* however, their extent of occurrence and incidences of new infestations will be recorded as part of the Project weed monitoring program.

Table 5-1: Weeds of national significance and priority weeds for the Hunter region recorded onsite

Scientific Name	Common Name	Duty under <i>Biosecurity Act 2015</i>	Weed Status	Photo
<i>Ageratina adenophora</i>	Crofton Weed	Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread of the plant from their land. A person should not buy, sell, move, carry or release the plant into the environment. Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value.	Priority weed	
<i>Alternanthera philoxeroides</i>	Alligator Weed	Must not be imported into the state, sold, bartered, exchanged or offered for sale. Entire Hunter Local Land Services region: A person must not, import into the State or sell. Land managers should mitigate spread of the plant from their land. Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value.	WoNS, priority weed	

Scientific Name	Common Name	Duty under <i>Biosecurity Act 2015</i>	Weed Status	Photo
<i>Asparagus aethiopicus</i>	Ground Asparagus	Must not be imported into the state, sold, bartered, exchanged or offered for sale. Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread of the plant from their land. A person should not buy, sell, move, carry or release the plant into the environment. Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value.	WoNS, priority weed	
<i>Baccharis halimifolia</i>	Groundsel Bush	Notify local control authority if found. Land managers should eradicate the plant from the land and keep the land free of the plant. A person should not deal with the plant, where dealings include but are not limited to buying, selling, growing, moving, carrying or releasing the plant.	Priority weed	

Scientific Name	Common Name	Duty under <i>Biosecurity Act 2015</i>	Weed Status	Photo
<i>Cestrum parqui</i>	Green Cestrum	Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread of the plant from their land. A person should not buy, sell, move, carry or release the plant into the environment. Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value.	Priority weed	
<i>Cortaderia selloana</i>	Pampas Grass	Entire Hunter Local Land Services region: Land managers should mitigate the risk of the plant being introduced to their land. Exclusion zone: Notify local control authority if found. Land managers should eradicate the plant from the land and keep the land free of the plant. A person should not deal with the plant, where dealings include but are not limited to buying, selling, growing, moving, carrying or releasing the plant. Core infestation: Land managers should mitigate spread of the plant from their land. A person should not buy, sell, move, carry or release the plant into the environment. Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value.	Priority weed	

Scientific Name	Common Name	Duty under <i>Biosecurity Act 2015</i>	Weed Status	Photo
<i>Eragrostis curvula</i>	African Lovegrass	Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread of the plant from their land. A person should not buy, sell, move, carry or release the plant into the environment. Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value.	Priority weed	
<i>Juncus acutus</i>	Spiny Rush	Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread of the plant from their land. A person should not buy, sell, move, carry or release the plant into the environment. Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value.	Priority weed	

Scientific Name	Common Name	Duty under <i>Biosecurity Act 2015</i>	Weed Status	Photo
<i>Lantana camara</i>	Lantana	Must not be imported into the state, sold, bartered, exchanged or offered for sale. Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread of the plant from their land. A person should not buy, sell, move, carry or release the plant into the environment. Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value.	WoNS, priority weed	
<i>Olea europaea</i>	African Olive	Entire Hunter Local Land Services region: Land managers should mitigate the risk of the plant being introduced to their land. Exclusion zone: Notify local control authority if found. Land managers should eradicate the plant from the land and keep the land free of the plant. A person should not deal with the plant, where dealings include but are not limited to buying, selling, growing, moving, carrying or releasing the plant. Core infestation: Land managers should mitigate spread of the plant from their land. A person should not buy, sell, move, carry or release the plant into the environment. Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value.	Priority weed	

Black Hill to Tomago

Scientific Name	Common Name	Duty under <i>Biosecurity Act 2015</i>	Weed Status	Photo
<i>Rubus fruticosus agg.</i>	Blackberry	Must not be imported into the state, sold, bartered, exchanged or offered for sale. Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread of the plant from their land. A person should not buy, sell, move, carry or release the plant into the environment. Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value.	WoNS, priority weed	
<i>Senecio madagascariensis</i>	Fireweed	Must not be imported into the state, sold, bartered, exchanged or offered for sale.	WoNS, priority weed	

Scientific Name	Common Name	Duty under <i>Biosecurity Act 2015</i>	Weed Status	Photo
<i>Solanum sisymbriifolium</i>	Sticky nightshade	<i>Land managers should eradicate the plant from the land and keep the land free of the plant. A person should not deal with the plant, where dealings include but are not limited to buying, selling, growing, moving, carrying or releasing the plant.</i>	WoNS, priority weed	 

6. Control of Weeds

6.1. Mechanical Control of Weeds

Mechanical control methods for weed management onsite include:

- Strategic use of seasonal slashing for select weed species in association with chemical application (slashing in spring, followed by chemical application to reduce seeding opportunities). Specific mechanical control of Groundsel Bush and Sticky Nightshade are provided in Attachment 1.
- Carry out mechanical means of control (such as mowing or slashing) where feasible in proximity to waterways and aquatic environments, such as the Hunter River
- Clearing and grubbing.

Weeds requiring hand or mechanical removal, including contaminated topsoil, will require disposal by encapsulation (deep burying) or disposal to an approved waste management facility. Machinery involved in weed management activities will be thoroughly cleaned to remove any plant material or soil, prior to the commencement of construction.

6.2. Chemical Control of Weeds

Chemical methods of weed control will be used during site rehabilitation in response to weed monitoring outcomes and recommendations.

- Timing of chemical application will vary depending on the lifecycle and periods of active growth for each weed species
- Herbicide application will be administered by authorised personnel only, with ChemCert Accreditation AQF 3 (in accordance with Workcover requirements)
- Priority weeds will be treated using species specific recommendations and herbicide dosages, as prescribed by the Department of Primary Industries (DPI). Specific chemical control of Groundsel Bush and Sticky Nightshade are provided in Attachment 1.
- Only pesticides registered for use near water may be used near any waterways.

6.3. Stockpiling and Disposal

To reduce the risk of weed, infested materials contaminating unaffected areas the following recommendations should be adhered to:

- Weed infested materials will not be stockpiled near native vegetation wherever possible during topsoil stripping operations
- Weed material and weed contaminated topsoil will be stockpiled during the clearing and grubbing program. The stockpiles will be regularly monitored by the Environment Team and treated for weeds prior to being used in site rehabilitation or landscaping works
- All classified weed material will be handled and disposed of lawfully
- All imported material is obtained from a source that is validated as weed and plant pathogen free.

6.4. Vehicle, Plant and Equipment Hygiene

All vehicles, plant and equipment must be thoroughly cleaned to remove all soil and plant material, and complete a state Weed Hygiene Declaration form prior to being allowed to enter site. Plant and equipment will be checked and cleaned before leaving the worksite that contains priority weeds.

The weed inspection is a two-stage inspection process, specifically:

- Plant, vehicles and equipment are to be inspected by the subcontractor prior to coming to site
- Plant, vehicles and equipment are to be inspected by the site representative when machinery is onsite.

Inspections will ensure that no soil and/ or organic matter that may contain weed reproductive material are present in or on areas that are accessible during regular cleaning and maintenance work.

Designated inspection areas will be at the site entrance to prevent the spread of weeds.

Project activities within the Hunter River including the movement and use of the instream floating barge platforms and other vessels required for dredging presents the highest risk to aquatic biosecurity due to

the potential for biofouling organisms on the external surfaces of vessels and/ or within the vessel's ballast water to be introduced into the river by vessels. Pest species and pathogens will be managed in accordance Guide 2: Exclusion zones of the 'Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects' (NSW RTA 2011), the Commonwealth *Biosecurity Act 2015*, NSW *Biosecurity Act 2015* and where relevant, the Australian Ballast Water Management Requirements.

6.5. Weed Impacted Topsoil

Weed control prior to clearing and topsoil recovery will help reduce the weed seed content within the topsoil, particularly if regard has been made for the timing of weed species germination. Even if pre-recovery weed control is conducted, weed seed will remain within the topsoil and may germinate while the topsoil is stockpiled. Stockpiled topsoil can also accumulate a weed seed bank which will be spread when the stockpile is eventually utilised. Several rounds of weed control may be necessary to adequately control the new growth of weed species (from the weed seeds existing in the soil) and reduce the competition on site for the planting or seeding.

Prior to the offsite disposal of weed impacted topsoil (from aquatic or terrestrial areas), the Contractor must identify opportunities for the onsite re-use of weed impacted topsoil and discuss opportunities with the Principal for beneficial re-use onsite.

7. Pathogens

No evidence of frog Chytrid fungus, *Phytophthora cinnamomi* or other plant pathogens have been recorded within the Project site.

Management measures for pathogens can be split into three broad categories as follows:

- Planning or awareness measures
- Exclusion measures
- Containment measures.

Pathogen management measures have been developed in accordance with the Roads and Maritime Services Biodiversity Guidelines – Guide 7 (RTA, 2011), and incorporate best practice measures for reducing the transport of potentially harmful pathogens throughout the construction footprint and associated surrounding landscape.

7.1. Pathogen Management

Pre-clearing surveys will assess the Project site to determine the likely presence of pathogens. To assist management of potential pathogen spread (Table 7-1), the Project Ecologist will assign a risk level to areas within the construction footprint based on the following criteria:

- High Risk – Myrtle rust identified on host plants OR, extensive evidence of tree dieback potentially attributed to *Phytophthora*
- Medium Risk – Small instances of tree dieback (more than three trees in close proximity) potentially affected by *Phytophthora* OR, small drainage lines within potential impact area containing suitable frog (vector) habitat
- Low Risk – No tree dieback evident, AND no evidence of myrtle rust on host plants AND low potential for surface water to persist and maintain frog (vector) habitat.

Table 7-1: Pathogen management measures

Activity	Pathogen Management	Responsibility
Construction scheduling and works programs	Plan works to commence in low risk areas and move to medium risk areas and last in high risk areas.	Environment and Sustainability Manager
Vehicles and machinery hygiene	Vehicles and machinery should arrive onsite free of sources of potential contaminants including vegetative material and mud. Appropriate wash down facilities should be provided. Dust suppression operations to consider the sourcing of suitable water resources where introduction of Chytrid is possible. Any machinery used during instream works should be verified as clean and free of potential weeds and pathogens to avoid biosecurity risk.	Environment and Sustainability Manager

Activity	Pathogen Management	Responsibility
Access restrictions	Access to medium and high risk zones where pathogens listed above are identified should be restricted with the specific control measures implemented for the disposal of material or hygiene in these zones. Medium and high risk pathogen zones, are to be marked on relevant plans, with wash down facilities provided to prevent potential pathogens spreading beyond the area.	Environment and Sustainability Manager
Transport of new material	Use a certified supply of plants that is disease-free. Soil and fill is to be sourced from suppliers that can provide certification that the material is free of disease. Where works are undertaken in the vicinity (within 100 m) of waterways, the use of water externally sourced should be minimised or be potable water.	Environment and Sustainability Manager
Identification and Testing	Instances of myrtle rust on host plants identified during construction are to be verified by an ecologist or the environment manager. If medium or high risk areas are identified in the pathogen risk zones AND cannot be avoided during construction, testing of soils or plant material is to be undertaken to confirm the presence or absence of Phytophthora. If a medium to high risk zone is identified for Chytrid and the management measures identified herein cannot be practically achieved, then samples of water and/or testing of common frog is to be undertaken by ecologists with samples sent to a National Associated of Testing Authorities accredited laboratory.	Environmental Representative/ Ecologist
Transport of site won material	Where soil pathogens are identified, either by testing or visual pre-clearance surveys, they should not be re-used in areas where sensitive environmental receptors such as threatened species or ecological communities are present.	Environment and Sustainability Manager Construction Manager
Disposal of material	In medium to high risk areas, plant material should be stockpiled separately and in the contaminated area before being burned onsite. Do not dispose of water outside of the catchment from which it was obtained.	Environment and Sustainability Manager

8. Pest Species

Guidance from the Department of Primary Industries on Varroa mites (*Varroa jacobsoni* and *V. destructor*) must be applied when relocating or managing bees and/ or beehives of honeybees.

The construction footprint is currently habitat for a range of pest species including *Oryctolagus cuniculus* (European Rabbit), *Felis catus* (feral cat), *Vulpes vulpes* (Red Fox), and *Gambusia holbrooki* (Plague Minnow). It is not expected that the Project will increase the spread of these species.

NSW DPI has issued an Emergency Order, that places restrictions on the movement of Fire Ant (*Solenopsis invicta*) carrier materials including organic mulch, soil, and anything with soil on it, hay and baled material, potted plants, turf, agriculture, or earth moving machinery, mining or quarry materials, sand and gravel being moved into NSW from the fire ant infested area of QLD. To mitigate the risk of Fire Ant spread in NSW, all carrier materials either grown, packed, or sourced in a known Fire Ant infested area of QLD, and transported to NSW must meet the conditions of the NSW DPI Biosecurity (Fire Ant) Control Order 2023 and NSW DPI Biosecurity (Fire Ant) Emergency Order 2023 which include, but are not limited to an interstate Biosecurity Certificate.

9. Monitoring and Inspections

Monitoring of the weed and pathogen management measures are to be evaluated against performance targets, required to ensure the measures outlined in this plan are implemented and that performance criteria are satisfied as far as possible.

An adaptive management approach is to be employed in respect of the works forming part of this weed and pathogen management plan. An adaptive management approach involves an integrated process of monitoring, reviewing and then responding to the health and condition of the measures as well as the status of the noxious weed species to identify any alterations to the design and maintenance of works that may be required to ensure the objectives of the weed and pathogen plan are achieved.

9.1. Baseline Monitoring

Identification of weed presence within the Project site and a 25m buffer zone will be undertaken prior to clearing commencing, which will also identify any at-risk areas of pathogens. All weed infestations on-

site will be demarcated (where possible) and mapped and presented in a baseline monitoring report. Evidence of pest fauna species will be recorded prior to clearing commencing.

9.2. Ongoing Monitoring

During the construction phase, monthly Environment Team inspections will include the review of weeds species in the Project area and within 25m of the Project boundary. If a new declared species is identified, the extent of the infestation will be determined immediately and appropriate controls put in place as soon as practicable. The potential sources will be investigated and if possible, mitigation measures to avoid further infestations will be put in place. If required, quarantine measures will be put in place to stop the spread of the infestation.

In the operation phase, weed monitoring will be undertaken on an annual basis during the summer/spring period. The following will be included as a minimum in weed and pathogen management reporting:

- Location of weeds and degree of infestation
- Locations and approximate areas where weed management was carried out
- Treatment methods applied in each area

Species targeted.

Monitoring of pest fauna species will be undertaken concurrently and include assessing evidence of presence.

9.3. Performance Indicators

Indicators of success of the weed and pathogen management procedure include:

- No new weed and pathogen infestations within the Project site and in adjacent bushland as a result of the Project
- A reduction in the area of priority weed and pathogen infestations within the Project site
- Control of weed infestation during rehabilitation of sites
- No new infestations of pest fauna.

Attachment 1 – Groundsel Bush and Sticky Nightshade Targeted Plan**Groundsel Bush (*Baccharis halimifolia*)****1. Description**

Groundsel Bush is native to North America and West Indies. It is a densely-branched perennial shrub usually 1.5–3 m tall, but can grow to up to 7 m. There are separate male and female plants. When in full flower, the female plants are easily identified by their fluffy white appearance. A more detailed description of the separate parts of the plant is provided below.

Leaves

- dull or pale green, up to 7 cm long and 4 cm wide (upper leaves smaller), diamond or oval shaped, coarsely toothed on the upper half (leave higher up the stem are less toothed or have smooth edges), waxy and hairless, alternate along the stem.

Flowers

- abundant, enclosed at the base by green bracts, are in branched clusters at the end of the stems, present from December–May, male and female flowers are on different plants.

Male flowers

- cream or yellowish, 3 mm wide, in globular heads.

Female flowers

- white and fluffy, 3-5 mm wide, mature later than the male flowers.

Seeds

- straw-coloured or brown with 8-10 ribs, light and easily blown by the wind, topped with a tuft of white hairs up to 12 mm long (pappus), shed in April–May.

Stems

- multi-branched with lengthwise ribs, green when young, brown and woody when mature.

Roots

It has a deep branching taproot and fibrous lateral roots.

2. Distribution

In New South Wales Groundsel Bush grows in coastal areas from the Queensland border to the South East region. Plants have also been found in the Central West, North West and Northern Tablelands.

Groundsel Bush has been identified at various locations within the Project. The Environment Team updates mapping on a regular basis following inspections. Please contact the Environment Team for the latest mapping prior to weed control works.

3. Life cycle

- Seeds germinate when there is good moisture available, mostly during late winter and in spring. New plants can reach one metre in height by autumn.
- Plants do not flower until the autumn of the second year.
- Male plants start flowering about two weeks before female plants but continue to flower until after the female plants have finished flowering.
- Flowers mature and seeds drop between April and May, depending on seasonal conditions.
- Groundsel bush can resprout from roots left in the ground.

4. Impacts

Groundsel bush is an environmental and agricultural weed that can form dense thickets. It outcompetes native plants, reduces the amount of shelter and food for native animals, reduces pasture productivity, impedes stock movement, is poisonous to animals, causes allergies in people, invades pine plantations reducing productivity.

The pollen from groundsel bush can cause allergies in some people.

Groundsel bush is thought to be poisonous to cattle, though it seldom causes poisoning because animals rarely eat enough of the plant.

5. Control

Control activities for management during construction are listed below. Successful weed control requires follow up after the initial efforts. Control measures are to be undertaken at least every three (3) months during construction.

Physical control

- By hand
 - Young plants are easy to dig out as they have a shallow root system. Remove all the roots to prevent regrowth.
- By machine
 - Excavation, along the four (4) meter road corridor or within approved clearing boundaries, can be an effective first step for very large groundsel bushes.
- Slashing and mulching
 - Slashing, along the four (4) meter road corridor or within approved clearing boundaries, can suppress flowering which reduces seed production. Frequent, regular slashing will eventually kill groundsel bush. Groundsel bush sometimes grows in association with native blady grass and bracken fern. Regular slashing of the three species together encourages more vigorous pasture growth which can outcompete groundsel bush seedlings. Slashing can form part of a long-term program of eradication that also includes spraying and pasture improvement.
 - Do not slash plants with seeds as this will spread the seeds.
- Reafforestation – to be undertaken as part of the permanent landscaping program
 - Replanting areas with local native trees can help to control groundsel bush by restricting the amount of light available for groundsel bush to grow. Depending on the reafforestation location and species selected, physical removal of plants, slashing between planted rows or chemical control of groundsel bush may be required as part of an ongoing management program or until the trees become established and shade out the ground layer.

Chemical control

Herbicides can be effective in managing groundsel bush. Follow-up treatments may be needed.

- Spraying
 - Spray actively growing plants. Ensure that all of the foliage is covered with the herbicide mix. The type of herbicide and rates vary depending on the size of the plants. See details below and labels.
- Splatter guns
 - Splatter guns can be used for dense infestations of weeds that are difficult to reach. The specialised nozzle produces large droplets that allow plants up to 10 m away to be sprayed with limited chance of spray drift. Spray small amounts of concentrated herbicide onto the weeds. It is not necessary to cover all of the foliage.
- Cut stump method
 - Gel herbicide: Cut stems horizontally preferably no higher than 10 cm above the ground. Apply a 3–5 mm layer of gel for stems less than 20 mm and 5 mm layer on stems above 20 mm

Herbicide options

The below table lists the herbicides and the conditions for use on the Project to control Groundsel Bush. In addition to the information provided in the table users must always read the label and any permit, before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or not made in this information. To view permits or product labels go to the Australian Pesticides and Veterinary Medicines Authority website www.apvma.gov.au

Herbicide	Rate	Application	Withholding period	Herbicide group	Conditions for use on Project
2,4-D 300 g/L (Affray 300®)	100 mL in 10 L of water	Knapsack spray for non-crop and pastures. Thorough even coverage of the plant is necessary.	Do not graze or cut for stock food for 7 days after application.	4 (previously group I), Disruptors of plant cell growth (Auxin mimics)	For use within the active construction zones only. Do not use on boundary areas within Black Hill, Tarro or Tomago where there is a risk of interaction with livestock as Project is unable to guarantee livestock withholding period.
2,4-D 300 g/L + Picloram 75 g/L (Tordon® 75-D)	650 mL per 100 L of water	Spray actively growing plants, thoroughly covering all of the foliage.	Do not graze or cut crops (except sugar cane 8 weeks) or pastures for stock food for 7 days after application.	4 (previously group I), Disruptors of plant cell growth (Auxin mimics)	For use within the active construction zones only. Do not use on boundary areas within Black Hill, Tarro or Tomago where there is a risk of interaction with livestock as Project is unable to guarantee livestock withholding period.
2,4-D amine 625 g/L (Various products)	320 mL per 100 L of water	Spray actively growing bushes. Thorough coverage.	7 days withholding for grazing	4 (previously group I), Disruptors of plant cell growth (Auxin mimics)	For use within the active construction zones only. Do not use on boundary areas within Black Hill, Tarro or Tomago where there is a risk of interaction with livestock as Project is unable to guarantee livestock withholding period.
Clopyralid 600 g/L (Lontrel® Advanced)	165 - 250 mL per 100 L of water	Handgun application for active growth, lower rate on seedlings,	7 days to 10 weeks see label for details.	4 (previously group I), Disruptors of plant cell	For use within the active construction zones only. Do not use on boundary areas within Black Hill, Tarro or Tomago where there is a risk of

Herbicide	Rate	Application	Withholding period	Herbicide group	Conditions for use on Project
		higher rate on bushes over 2 m high.		growth (Auxin mimics)	interaction with livestock as Project is unable to guarantee livestock withholding period.
Glyphosate 360 g/L (Various products)	700 mL to 1.0 L per 100 L of water	Spray actively growing bushes to wet all foliage. Use higher rate on plants over 2 m tall. Do not apply during winter or summer drought stress.	Nil	9 (previously group M), Inhibition of 5-enolpyruvyl shikimate-3 phosphate synthase (EPSP inhibition)	Can be used throughout the Project alignment as livestock withholding time is NIL.
Glyphosate 360 g/L (Various products)	1 part per 9 parts water	Gas gun / Splatter gun application. Apply 2 x 2 mL doses per 0.5 m of bush height	Nil	9 (previously group M), Inhibition of 5-enolpyruvyl shikimate-3 phosphate synthase (EPSP inhibition)	Can be used throughout the Project alignment as livestock withholding time is NIL.
Picloram 100 g/L + Triclopyr 300 g/L + Aminopyralid 8 g/L (Grazon® Extra)	250 or 350 mL in 100 L of water	Spray all the foliage to the point of runoff. In spring and summer use the lower rate for plants 1-1.5 m tall and higher rate for plants over 1.5 m. In autumn use the higher rate for all plants	Where product is used to control woody weeds in pastures there is a restriction of 12 weeks for use of treated pastures for making hay and silage; using hay or other plant material for compost, mulch or mushroom substrate; or using animal waste from animals grazing on treated pastures for compost, mulching, or spreading on pasture/crops	4 (previously group I), Disruptors of plant cell growth (Auxin mimics)	For use within the active construction zones only. Do not use on boundary areas within Black Hill, Tarro or Tomago where there is a risk of interaction with livestock as Project is unable to guarantee livestock withholding period.
Picloram 44.7 g/L + Aminopyralid 4.47 g/L (Vigilant II®)	Undiluted	Cut stump. Apply a 3–5 mm layer of gel for stems less than 20 mm. Apply 5 mm layer on stems above 20 mm.	Nil	4 (previously group I), Disruptors of plant cell growth (Auxin mimics)	Can be used throughout the Project alignment as livestock withholding time is NIL.
Triclopyr 300 g/L + Picloram 100	250 or 350 mL	Spray all the foliage to the point of runoff.	Nil	4 (previously group I), Disruptors of	Can be used throughout the Project alignment as livestock withholding time is NIL.

Herbicide	Rate	Application	Withholding period	Herbicide group	Conditions for use on Project
g/L (Various products)	per 100 L of water	In spring and summer use the lower rate for plants 1-1.5 m tall and higher rate for plants over 1.5 m. In autumn use the higher rate for all plants		plant cell growth (Auxin mimics)	
Triclopyr 600 g/L (Garlon® 600)	160 mL per 100 L of water	Spray seedlings 1 to 2 m tall.	Not required when used as directed. If use is off-label check permit.	4 (previously group I), Disruptors of plant cell growth (Auxin mimics)	Can be used throughout the Project alignment as livestock withholding time is NIL.
Triclopyr 600 g/L (Garlon® 600)	320 mL per 100 L of water	Spray plants 2 - 3 m tall	Not required when used as directed. If use is off-label check permit	4 (previously group I), Disruptors of plant cell growth (Auxin mimics)	Can be used throughout the Project alignment as livestock withholding time is NIL.

6. Monitoring

Monitoring of weeds is to be undertaken monthly as per Section 9.2 of the Weed and Pathogen Control Procedure. Updated maps of weed locations will be produced should new locations of weeds be identified during the inspections.

Sticky Nightshade (*Baccharis halimifolia*)**1. Description**

Sticky nightshade is native to South America. It is an erect plant to 1.5 m high. Most of the plant is hairy and covered in very sharp prickles. It is an annual or short-lived perennial. Multiple, severe frosts may kill the above ground parts of the plant but it will reshoot from rhizomes in spring. It can flower within 5 weeks of germination or regrowth from rhizomes. Flowering is usually during spring and summer.

Leaves

- sticky
- green to yellowish on both sides
- 5–14 cm long and 4–10 cm wide
- deeply lobed, with variable numbers and shapes of lobes
- hairy and prickly on both sides
- on stalks up to 4 cm long.

Prickles

- yellow to red and sometimes brown on older prickles
- 1–10 mm long
- on stems, leaves (top and bottom), leaf stalks and at the base of flowers.

Flowers

- white or pale bluish-purple
- star shaped with 5 petals that curve backwards and bright yellow anthers in the centre
- 35–50 mm in diameter
- in groups of 4–12
- present spring to summer

Fruit

- round berries
- bright red when ripe
- 15–20 mm diameter.

Stems

- erect
- green to purplish brown in colour.

Roots

- are extensive
- produce horizontal underground stems known as rhizomes.

2. Distribution

In New South Wales sticky nightshade is mostly found in Western Sydney and the Central Tablelands. Isolated infestations have also been found in the Central West, South East, Hunter, North Coast and North West regions.

3. Life cycle

- An annual or short-lived perennial.
- Multiple, severe frosts may kill the above ground parts of the plant but it will reshoot from rhizomes in spring.
- It can flower within 5 weeks of germination or regrowth from rhizomes.
- Flowering is usually during spring and summer.

4. Impacts

Sticky nightshade is an invasive plant that outcompetes native plants, crops and pastures. It has sharp prickles which can injure people, pets, livestock and native animals and can make harvesting difficult (for example in vineyards).

Sticky nightshade contains steroidal glycoalkaloids toxins. It is suspected to have caused cattle deaths in the Greater Sydney Region.

5. Control

Control activities for management during construction are listed below. Successful weed control requires follow up after the initial efforts. Control measures are to be undertaken at least every three (3) months during construction.

Physical control

- **Early detection**
 - Check for plants regularly because sticky nightshade can flower within 5 weeks from sprouting.
- **Manual**
 - Chip or dig out small plants and remove all of the roots. Wear appropriate protective clothing, boots and gloves to avoid injury from the prickles. Avoid slashing as it can spread the weed. Slashing does not control it because the berries can grow close to the ground below the slash height.

Chemical

- **Spraying**
 - Spray plants according to the labels and permit for effective control. Thoroughly spray all leaves and stems and spray the plant from all sides if possible. Spraying will kill the plant but not the viable seeds. Remove the fruit from each plant and dispose of appropriately to avoid adding to the seed bank in the soil.

Herbicide options

The below table lists the herbicides and the conditions for use on the Project to control Groundsel Bush. In addition to the information provided in the table users must always read the label and any permit, before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or not made in this information. To view permits or product labels go to the Australian Pesticides and Veterinary Medicines Authority website www.apvma.gov.au

Herbicide	Rate	Application	Withholding period	Herbicide group	Conditions for use on Project
Glyphosate 360 g/L with Metsulfuron-methyl 600 g/kg (Various products)	A mix of 2 L glyphosate 360 herbicide plus 10 g of metsulfuron-methyl herbicide per 100 L of water + Uptake Spray Oil or an equivalent wetter must be used at a rate of 500 mL/100 L.	Spray actively growing plants, ensure all of the foliage is covered. For use in riparian areas. See permit (12942) for further critical comments.	Nil	Herbicide group: 9 (previously group M), Inhibition of 5-enolpyruvyl shikimate-3 phosphate synthase (EPSP inhibition)	Can be used throughout the Project alignment, subject to permit restrictions, as livestock withholding time is NIL.
Picloram 100 g/L + Triclopyr 300 g/L + Aminopyralid 8 g/L (Grazon® Extra)	350 to 500 mL per 100 L of water + Uptake Spray Oil or an equivalent wetter must be used at a rate of 500 mL/100 L.	Spray actively growing plants, ensure all of the foliage is covered. Only for urban bushlands. Do not use within 5 m of a waterway. Apply a maximum of 2 times per year at a minimal interval of 60 days. See permit (12942) for further critical comments.	Where product is used to control woody weeds in pastures there is a restriction of 12 weeks for use of treated pastures for making hay and silage; using hay or other plant material for compost, mulch or mushroom substrate; or using animal waste from animals grazing on treated pastures for compost, mulching, or spreading on pasture/crops.	Herbicide group: 4 (previously group I), Disruptors of plant cell growth (Auxin mimics)	For use within the active construction zones only. Do not use on boundary areas within Black Hill, Tarro or Tomago where there is a risk of interaction with livestock as Project is unable to guarantee withholding period.
Triclopyr 300 g/L + Picloram 100 g/L with Metsulfuron-methyl 600 g/kg (Various products)	A mix of 350 to 500 mL herbicide containing Triclopyr and Picloram plus 10g of herbicide containing metsulfuron-methyl per 100 L of water + Uptake Spray Oil or an equivalent wetter must be used at a rate of 500 mL/100 L.	Spray actively growing plants, ensure all of the foliage is covered. For urban bushlands and forests. Do not use within 5 m of a waterway. See permit (12942) for further critical comments.	Nil	4 (previously group I), Disruptors of plant cell growth (Auxin mimics)	Can be used throughout the Project alignment, subject to permit restrictions, as livestock withholding time is NIL.

Herbicide	Rate	Application	Withholding period	Herbicide group	Conditions for use on Project
Aminocyclopyrachlor 240 g/L (Method® 240 SL)	500 mL per 100 L of water	Spot spray with handgun, hand-held or backpack sprayer. Thoroughly and uniformly wet target weed. Avoid spraying to point of run off.	Nil for domestic grazing. See label for livestock export conditions.	4 (previously group I), Disruptors of plant cell growth (Auxin mimics)	All users are required to take an online stewardship training to be able to use this herbicide. For use within the active construction zones only. Do not use on boundary areas within Black Hill, Tarro or Tomago where there is a risk of interaction with livestock as Project is not privy to any export arrangements of livestock operations surrounding the Project.
Picloram 100 g/L + Triclopyr 300 g/L + Aminopyralid 8 g/L (Grazon® Extra)	350 mL per 100 L of water + Uptake Spraying Oil or an equivalent wetter at a rate of 500 mL/100 L	Spray flowering plants up to 1 m tall. Follow the label as per the instructions for tropical soda apple.	Where product is used to control woody weeds in pastures there is a restriction of 12 weeks for use of treated pastures for making hay and silage; using hay or other plant material for compost, mulch or mushroom substrate; or using animal waste from animals grazing on treated pastures for compost, mulching, or spreading on pasture/crops.	4 (previously group I), Disruptors of plant cell growth (Auxin mimics)	For use within the active construction zones only. Do not use on boundary areas within Black Hill, Tarro or Tomago where there is a risk of interaction with livestock as Project is unable to guarantee withholding period.

6. Monitoring

Monitoring of weeds is to be undertaken monthly as per Section 9.2 of the Weed and Pathogen Control Procedure. Updated maps of weed locations will be produced should new locations of weeds be identified during the inspections.

Appendix F – Bat Management Plan

M1 Pacific Motorway Extension to Raymond Terrace - Stage 1 Black Hill to Tomago

Appendix F - Bat Management Plan

Document Number: M1RTBH2T-JHGM-6003-EV-PLN-200018

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Revisions and Distribution

Revisions

Draft issues of this document are identified as Revision A, B, C, etc. Upon initial issue (generally Contract Award) this will be changed to a sequential number commencing at Revision 0. Revision numbers will continue at Revision 1, 2, etc.

Rev	Date	Prepared By [Name]	[Signature]	Reviewed By [Name]	[Signature]	Approved By [Name]	[Signature]	Remarks
A	15/05/23							Transport and ER submission
B	30/06/23							Transport and ER re-submission
C	27/07/23							Transport and ER re-submission
D	17/08/23							For external consultation
E	22/09/23							For ER Endorsement
0	08/11/23							For Construction
01	21/06/24							6 monthly review - update of distribution list
02	24/10/24							Transport & ER re-submission
	24/07/25							Re-submission for ER endorsement (no changes to the Bat Management Plan). Minor updates to the FFMP have been ongoing since the June 2024 six-monthly review, and this re-submission encompasses the June 2025 six-monthly review

Distribution List

Client's Representative		
Project Director		
Construction Director		
Environment and Sustainability Manager		
Environmental Representative		
Independent Certifier		

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1. Purpose

This Bat Management Plan (BMP) is required for the Project in accordance with SWTC - Appendix 4 - Clause 4.12.

This Plan has been prepared by Principal Ecologists [REDACTED] BSc (Zoology), Hons (Zoology), PhD (Ecology) and [REDACTED] BSc (Biology), Grad. Dip. (Bushfire Protection), experienced ecologists with demonstrated experience preparing bat management plans and implementing bat management for projects throughout NSW.

This Plan explains the actions to be taken in the event microbats are discovered on the Project site that require handling, rescue or translocation during vegetation and structure clearance and ongoing construction activities.

2. Scope

This BMP is applicable to all protected cave-roosting microbat species, should they be identified within the Project site. This Plan has been prepared in accordance with the TfNSW Microbat Management Guidelines: A guide for undertaking works in culverts, bridges, and other structures.

Tree-roosting microbats are to be managed in accordance with the Flora and Fauna Protection Procedure (FFMP Appendix E), and all threatened microbats/flying-foxes in accordance with the Unexpected Threatened Species Finds Protocol (Appendix B).

Table 2-1: Location of Microbat Procedures.

Subject Species	Process
Grey-headed Flying-fox	Unexpected Threatened Species Finds Protocol (FFMP Appendix B)
Tree-roosting Microbats	Flora and Fauna Protection Procedure (FFMP Appendix E) Section 6 of this Plan
Cave-roosting Microbats	Section 6 of this Plan
Unexpected Bat Finds During Clearing	Section 7 of this Plan

3. Consultation

In accordance with the requirements of SWTC 4.12(c), JHGA will consult with TfNSW, EESG and DPIE in relation to this BMP.

As this BMP forms an Appendix of the FFMP, any consultation records will be captured within Appendix A – Consultation Responses of the FFMP.

4. Objectives

The objectives of this BMP are to:

- Identify potential roost locations within the Project site and the species known (and likely) to utilise each roost
- Outline a procedure to install compensatory habitat prior to the exclusion of microbats from roosts to be removed
- Outline a procedure for excluding microbats from roosts in culverts and hollow-bearing trees.
- Provide information regarding staged habitat removal
- Outline the methodology for a pre-demolition inspection of roost habitat
- Outline a monitoring strategy to ensure that microbats within the area are not adversely impacted by the project activities
- Outline the monitoring requirements for the replacement habitat.

The Project Ecologist referred to throughout this BMP must be a qualified fauna specialist with a minimum of three years' experience in managing and monitoring 'cave' roosting bats, holding current animal ethics approval and appropriate animal handling permits with approval to translocate threatened bat species. Importantly, the project ecologist must also be vaccinated against Australian Bat Lyssa Virus (ABLV) if there is a need to directly handle bats.

5. Induction and Training

All Project personnel and subcontractors will be made aware of the actions to be taken in the event that microbats are discovered on the Project. This training will occur on site during the Project induction and as required in toolbox talks. Records of all training, including inductions, will be maintained. Records will include the name and role of the attendee as well as the name of the course.

6. Confirmed Microbat Roosts

The following management strategies are to be implemented, in the following order:

- Stage 1 (prior to identification of bat roosts):
 - Pre-clearing surveys
 - Roost exclusion.
- Stage 2 (following confirmation of a bat roosts):
 - Installation of compensatory habitat
 - Relocation
 - Monitoring.

6.1. Stage 1 Procedures (prior to identification of bat roosts)

6.1.1. Pre-clearing Surveys

Prior to the demolition of any structures or the removal of any vegetation a diurnal pre-clearing survey is to be undertaken for microbats. A list of potential microbat roosting habitat is provided in Table 6-1. Diurnal surveys will consist of:

- Visual examination using a torch or extendable inspection camera (endoscope) of cavities in structures and hollows for roosting microbats
- Visual inspection of the structure for evidence of microbat usage (scat)
- Ultrasonic detection using Echo-meter, or similar hand-held device.

The full Pre-clearing Survey procedure is detailed within the Flora and Fauna Protection Procedure (FFMP Appendix F). Immediately prior (24 hours) to construction works at a structure, a diurnal pre-clearing survey is required to determine whether the structure is free of microbats.

Table 6-1: Microbat habitat within structures.

Potential habitat feature to inspect	Southern Myotis	Bent-winged Bats
CONCRETE STRUCTURES		
Grab holes in culverts and bridge decking and girders	X	X
Expansion joints in concrete plank and Super-T bridges	X	X
Parapet of Super-T girders on bridges	X	X
Semi-open concrete abutments	X	X
Under concrete bridge piles	X	X
Scuppers on bridges and culverts	X	X
Join seals between reinforced concrete box culverts and BEBO arches	X	X
Aggregate/roughened sections of concrete and exposed steel reinforcement in culverts and stormwater drains	X	X
Roughened exposed areas and uneven surfaces including closure pours and the space between concrete girders and diaphragms under bridges	X	X
Purpose-built microbat habitat	X	X
Fairy Martin, Welcome Swallow and Paper/Mud Wasp nests under bridges or in culverts	X	X
Cavities below pile caps in bridges	X	X
Bridges and wharves with protected concrete joins between decking, girders and/or headstock	X	X

Potential habitat feature to inspect	Southern Myotis	Bent-winged Bats
TIMBER STRUCTURES		
Timber jetties and wharves with cavities from rotting timber or design features. Habitat not exposed to rain or direct sunlight	X	
Bridges – including the timber decking, split stringers, secondary stringers, cross girders, truss and support beams	X	X

Individual microbats are typically not clearly visible, but evidence of microbat activity may include:

- audible sounds of bat calls 'squeaking'
- bat scats/guano
- roosting bats concealed within the structure e.g. between culvert joins, lift holes or cracks
- discolouration or staining from urine
- presence of parasitic bat flies (Nycteribiid and Streblid)
- musty animal smells.

If there is no evidence of microbat activity and thorough inspection was possible, then no further consideration of microbats is recommended.

6.1.2. Roost Exclusion

Where evidence of microbat activity within a structure is identified, roost exclusion is essential prior to demolition of the structures to prevent uptake of bats in the time between survey and demolition.

Roost exclusion is to be undertaken in a manner agreed upon by Transport and the Project Ecologist, however, must only be undertaken if the habitat is unoccupied. Roost exclusion can be achieved by excluding microhabitats (e.g. expansion joints, hollows etc) by using a physical barrier (expanding foam and plywood), or by excluding the entire structure using a barrier (e.g. Bat Curtains, as shown in Figure 6-1).



Figure 6-1 An example of 'Bat Curtains' used to exclude a culvert from Microbat entry

6.2. Stage 2 Procedures (following confirmation of a bat roost)

In the event that microbats are identified within structures or hollows, the following procedures are to be implemented. As the ecology and behaviours between microbat species vary, these best-practice procedures will be subject to review prior to any implementation.

6.2.1. Timing

The timing of these procedures (i.e. habitat exclusion and habitat relocation) must be carried out outside of winter torpor and the breeding period for Southern Myotis (*Myotis macropus*) should this species be identified (Figure 6-2).

		J	F	M	A	M	J	J	A	S	O	N	D
When do seasonal restrictions apply?	Myotis	Breeding period				Seasonal restrictions do not apply					Breeding period		
	Bent-winged Bats	Seasonal restrictions do not apply											

Figure 6-2. Timing restrictions for microbats.

Any restrictions to timing, are to be advised by the Project Ecologist and agreed to by Transport. If any threatened species are identified the Unexpected Threatened Species Finds Procedure outlined in Appendix B of the FFMP will be followed.

6.2.2. Installation of Compensatory Habitat

Permanent habitat will be included in new structures. This will occur on a case-by-case basis in consultation with the Project Ecologist, design team, and construction team. Where further compensatory habitat is required, nest boxes will be utilised. The use of nest boxes has proven a

successful tool in bat management. Retrofitting of bat boxes on bridges and culverts is increasingly becoming standard environmental management for the construction and maintenance of road infrastructure in Australia.

For cave-roosting microbats, 'cave-style' nest boxes, as shown in Figure 6-3, can provide suitable alternative roost sites and an opportunity to allow the resettlement of bats from structures that are to be removed during the Project. Cave-style nest boxes will be temporarily installed (three months prior to decommissioning) within the roost to encourage the resettlement of bats. The intention is to provide alternative roosting habitat for microbats using the structures prior to them entering the winter torpor period. Microbats are expected to familiarise with and use the new habitat once installed, and this will then provide a familiar, alternative roosting site for the microbats as the habitat within the structure is progressively excluded. The intent of this process is to ensure a relatively stress-free transition from their original roost sites.

The type and number of cave-style nest boxes to be installed will be advised by the Project Ecologist, determined by the size of the roost identified during pre-clearing surveys and the subject species.

Following nest box installation, roost exclusion is to be undertaken in the following order:

1. Completion of a diurnal pre-clearing inspection
2. Any unoccupied roost microhabitat is to be excluded on the same day with expandable foam or equivalent
3. Occupied roosts will be identified and the species present and approximate number of individuals recorded. If bats cannot be determined to be absent, roosts will be treated as occupied.
4. Occupied roosts are to be fitted with one-way valves on the same day and reinspected with an endoscope 90 minutes after nightfall to assess whether bats have left the roost. If still present, the roost will be left to be re-checked the following morning and, if still present, 90 minutes after the next nightfall.
5. Once the roost has been determined to be vacated, the valve and roost will be excluded to prevent re-entry of the bats. Returning bats are expected to utilise cave-style nest boxes in absence of their original roost.
6. This process will be repeated each night until all roosts been excluded.

Roost exclusion must not be undertaken during the breeding period, periods of heavy rainfall (>10 mm in 24 hours) or on nights where the temperature will fall below 10 degrees Celsius.



Figure 6-3 Example of a four-chamber, cave-style microbat box installed under a structure

6.2.3. Relocation of Roosts

The nest boxes temporarily installed in structures will be relocated underneath the closest, suitable alternative roosting site. This relocation will be undertaken outside the known breeding and torpor period for the occupying species.

If relocation needs to be considered outside of these preferred times, the removal will be undertaken only after consultation and agreement between the Transport and a bat expert and take into consideration the current bat activity and potential of the roost to contain juvenile bats.

Relocation of the nest boxes will be staged over several days in accordance with the following procedure:

1. The nest boxes to be relocated are to be inspected 3 hours after sunrise to determine if any bats are present
2. If a box is found to be inhabited on the day, the entrance will be sealed by securing canvas over the entrance so that the bats cannot leave during the translocation
3. The box will be unbolted from the structure and carried immediately to the structure with minimal physical disturbance
4. The box will be bolted into a pre-selected location on the new structure
5. The box will be left undisturbed until dusk, at which point the canvas cover will be removed to allow the bats to leave the box
6. Boxes will be observed for an hour after the canvas has been removed to record if bats leave the box
7. All boxes will be checked twice a day (once during the day and once at dusk) for one week after translocation, then weekly for three weeks to ascertain if bats are continuing to use them and in what numbers.

Site considerations for bat box placement during relocation are:

- >1.5 m above ground
- Culvert or bridge unlikely to fill to capacity during a 1:20 rainfall event.

6.2.4. Monitoring

Monitoring associated with this BMP is divided into short-term and long-term commitments:

- Short-term monitoring is centred on both the roost exclusion and relocation activities, when the presence of microbats in existing roost sites and the nest boxes are monitored to determine their level of use when works are being undertaken
- Long-term monitoring is to be undertaken over a period of 2-years and to provide an opportunity to evaluate the management measures outlined in this BMP.

Monitoring of microbat nest boxes will be undertaken to determine species presence/absence, an estimate or count of numbers and breeding activity. Inspections will consist of diurnal visual observations using a head torch or endoscope attached to an extendable pole.

Data collected will include:

- The name of the observer
- Date and time of inspection
- Weather conditions
- Roost type and identification number
- Assessment of nest box condition (e.g. structural integrity, evidence of rot or termite activity, condition of fastenings etc.)
- Evidence of microbat activity or numbers of individuals including dusk exist surveys at the same time using an ultrasonic bat detector to confirm species and also to get a better understanding of numbers based on fly-out
- Observations of any identified natural alternative roost sites would also be recorded.

7. Unexpected Microbat Finds During Clearing (Fauna Rescue Procedure)

If a microbat is found during clearing works, the Project Ecologist will undertake relocation of the microbat in accordance with the fauna handling procedures in the RTA Biodiversity Guidelines (2011). The microbat is to be transferred to a small cloth bag after capturing. Details of the microbat would be recorded, including species, sex, weight, forearm length, location where rescued, and relocation site or species fate. The cloth bag is to be hung in a quiet, cool, and dark place until nocturnal release (1-hour after dusk).

The preferred relocation site would be identified by the Project Ecologist and depending on seasonal requirements and number of microbats, will involve:

- Dusk or nocturnal release in suitable habitat, or
- Relocation to installed supplementary roost structures (bat boxes).

The relocation site must be in proximity to the capture site. If microbats cannot be safely retrieved from within a felled tree, the following process will be implemented:

- Hollows are to be blocked using soft cloth bags to prevent bats from leaving during the day in absence of Project Ecologist
- The felled tree is to be left in-situ without further disturbance
- One hour after dark, the cloth bags will be removed from the hollows allowing microbats to self-relocate overnight
- The felled tree will be reinspected the following day using an endoscope and hand-held ultrasonic detector to ensure that all microbats have self-relocated
- If bats continue to remain in the tree, if possible they will be extracted by a suitably trained and vaccinated ecologist by catching them with a gloved hand and transferred to the alternate roost location,

If an injured microbat is found during construction works, the Project Ecologist or environmental representative will contact the nearest animal rescue agency/ wildlife care group or vet and transfer the microbat for treatment.

Appendix G – Flora and Fauna Construction Monitoring Program

M1 Pacific Motorway Extension to Raymond Terrace – Stage 1 Black Hill to Tomago

Appendix G - Flora and Fauna Construction Monitoring Program

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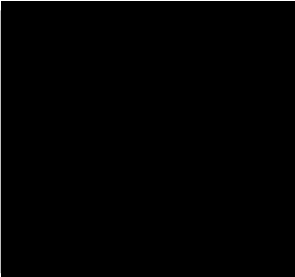
Revisions and Distribution

Revisions

Draft issues of this document are identified as Revision A, B, C, etc. Upon initial issue (generally Contract Award) this will be changed to a sequential number commencing at Revision 0. Revision numbers will continue at Revision 1, 2, etc.

Rev	Date	Prepared By [Name]	[Signature]	Reviewed By [Name]	[Signature]	Approved By [Name]	[Signature]	Remarks
A	15/05/23							Transport and ER submission
B	30/06/23							Transport and ER re-submission
C	31/07/23							Transport and ER re-submission
D	18/08/23							For external consultation
E	22/09/23							For ER Endorsement
F	29/09/23							ER Endorsement resubmission and additional BCD comment
G	31/10/23							For DPE Resubmission
0	08/11/23							For Construction
1	21/06/24							6 monthly review – update to distribution list & department names
2	24/10/24							Internal review - Update to monitoring locations figures
3	6/11/24							Internal review – response to comments
4	6/12/24							For ER review
5	29/01/25							Internal review – Update following TfNSW, ecologist & ER comments
6	26/05/25							Internal review – close out of TfNSW, ER & Ecologist comments including addition of new conservative trigger for frog monitoring and resubmission for TfNSW review & response to comments
7	18/07/25							Submission for ER Endorsement
	24/07/25							Re-submission for ER endorsement following confirmation of satisfactory closure of outstanding comments by the ER.

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1. Purpose

This Flora and Fauna Construction Monitoring Program (FFCMP or Monitoring Program) forms part of the Flora and Fauna Management Plan (FFMP) for the M1 Pacific Motorway Extension to Raymond Terrace (M12RT) Black Hill to Tomago (BH2T, or the Project) as required by NSW CoA C12(d) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval C7.

The FFCMP has been prepared to address the requirements of the NSW Conditions of Approval (CoA), measures listed in the M12RT Environmental Impact Statement (EIS) as amended by the Submissions Report (known as the Revised Environmental Management Measures (REMMs)), EPBC Act Approval Conditions, the Scope of Works, and Technical Criteria (SWTC) and all applicable guidelines and legislation. Section 2 provides a summary of relevant NSW CoA and EPBC Act Approval Conditions and how they will be addressed within this Monitoring Program.

The Program describes the monitoring requirements for all *Biodiversity Conservation Act 2016* (BC Act) and EPBC Act listed entities, including Matters of National Environmental Significance (protected matters), identified for the Project.

2. Scope

The scope of this Monitoring Program is to describe the monitoring requirements for threatened entities identified within the EIS and Submissions Report that may experience uncertain impacts (i.e. impacts that could not be quantified as part of the EIS and Submissions Report) associated with the Project. All direct and indirect impacts to threatened entities associated with the Project have been assessed and will be offset (in accordance with CoA E7).

For any entity that requires monitoring, the Monitoring Program must be consistent with goals and objectives, mitigation measures and monitoring requirements of the Commonwealth approved conservation advice and any Recovery Plans for all Matters of Environmental Significance (i.e. protected matters) (CoA C12). Moreover, conditions from the Australian Government Department of Climate Change, Energy, the Environment and Water (AG DCCEEW) require the environmental performance outcomes detailed in the M12RT – Environmental Impact Statement (EIS) to be achieved (for protected matters). A cross reference is included in Table 2-1 to indicate where the relevant condition is addressed in this Monitoring Program.

Table 2-1: Compliance requirements relevant to this Monitoring Program

Condition	Condition requirements	Document reference
CoA A29	For the duration of the Work until the completion of construction, or as agreed with the Planning Secretary, the approved ER must: a) receive and respond to communication from the Planning Secretary in relation to the environmental performance of the CSSI; b) consider and inform the Planning Secretary on matters specified in the terms of this approval; c) consider and recommend to the Proponent any improvements that may be made to work practices to avoid or minimise adverse impact to the environment and to the community; d) review documents identified in Conditions A9, A17, C1, C5 and C12 and any other documents that are identified by the Planning Secretary, to ensure they are consistent with requirements in or under this approval and if so: I. make a written statement to this effect before submission of such documents to the Planning Secretary (if those documents are required to be approved by the Planning Secretary); or II. make a written statement to this effect before the implementation of such documents (if those documents are required to be submitted to the Planning Secretary / Department for information or are not required to be submitted to the Planning Secretary/Department); Note: The written statement must be made via the Major Projects Portal.	FFMP This Program

Condition	Condition requirements	Document reference						
	e) regularly monitor the implementation of the documents listed in Conditions A9, A17, C1, C5 and C12 to ensure implementation is being carried out in accordance with the document and the terms of this approval; f) as may be requested by the Planning Secretary, help plan or attend audits of the development commissioned by the Department including scoping audits, programming audits, briefings and site visits, but not independent environmental audits required under Condition A34 of this approval; g) as may be requested by the Planning Secretary, assist in the resolution of community complaints; h) review the appropriateness of any activities reliant on the definition of Low Impact Work; i) consider or assess the impacts of minor ancillary facilities as required by Condition A20; j) consider any minor amendments to be made to the Ancillary Facility Site Establishment Management Plan, CEMP, CEMP Sub-plans and Construction Monitoring Programs that do not increase impacts to nearby sensitive land use(s) or that comprise updating or are of an administrative nature, and are consistent with the terms of this approval and the Ancillary Facility Site Establishment Management Plan, CEMP, CEMP Sub-plans and Construction Monitoring Programs approved by the Planning Secretary and, if satisfied such amendment is necessary, approve the amendment. This does not include any modifications to the terms of this approval; and k) prepare and submit to the Planning Secretary and other relevant regulatory agencies (where requested by those agencies), for information, an Environmental Representative Monthly Report providing the information set out in the Environmental Representative Protocol under the heading "Environmental Representative Monthly Reports." The Environmental Representative Monthly Report must be submitted within seven days following the end of each month for the duration of the ER's engagement for the CSSI, or as otherwise agreed by the Planning Secretary.							
CoA C12	The following Construction Monitoring Programs (CMPs) must be prepared in consultation with the relevant government agencies and councils(s) identified for each to compare actual performance of construction for the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP. <table border="1"> <tr> <th></th><th>Required Construction Monitoring Programs</th><th>Relevant government agencies and councils to be consulted for each Construction Monitoring Program</th></tr> <tr> <td>(d)</td><td>Fauna and Flora</td><td>BCD, DCCEEW and relevant council(s)</td></tr> </table> Note: The Flora and Fauna Monitoring Program must be consistent with goals and objectives, mitigation measures and monitoring requirements of the Commonwealth approved conservation advice and any Recovery Plans for all Matters of Environmental Significance.		Required Construction Monitoring Programs	Relevant government agencies and councils to be consulted for each Construction Monitoring Program	(d)	Fauna and Flora	BCD, DCCEEW and relevant council(s)	Section 2.3 of this plan and Section 1.4 and Appendix A of the FFMP
	Required Construction Monitoring Programs	Relevant government agencies and councils to be consulted for each Construction Monitoring Program						
(d)	Fauna and Flora	BCD, DCCEEW and relevant council(s)						
CoA C13	Each CMP must provide:							
	a) details of baseline data available	Section 2.1 and 4						
	b) details of baseline data to be obtained and when	Section 2.2 and 4						
	c) details of all monitoring of the project to be undertaken	Section 4 and 5						
	d) the parameters of the project to be monitored	Section 4.1, 4.2 and 4.3						
	e) the frequency of monitoring to be undertaken	Section 4.1, 4.2 and 4.3						
	f) the location of monitoring	Section 4.1, 4.2 and 4.3						
	g) the reporting of monitoring results and analysis of results against relevant criteria	Section 4.1, 4.2, 4.3 and 7						
	h) details of the methods that will be used to analyse the monitoring data	Section 4.1, 4.2 and 4.3						

Condition	Condition requirements	Document reference
	i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts	Section 4.1, 4.2 and 4.3
	j) a consideration of SMART principles, and	Section 2.4
	k) any consultation to be undertaken in relation to the monitoring programs.	Section 2.3
CoA C15	The CMP must be endorsed by the ER. The endorsed CMP must be submitted to the Planning Secretary for approval no later than one month before the commencement of construction, or where construction is staged, no later than one month before the commencement of each stage.	FFMP Section 1.4 and 7.4.1
CoA C16	Construction must not commence until the relevant CMPs have been approved by the Planning Secretary and all relevant baseline data for the specific construction activity has been collected.	FFMP Section 1.4 and 7.4.1
CoA C17	The CMPs, as approved, including any minor amendments approved by the ER, must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.	FFMP Section 1.4 and 7.4.1
CoA C18	The results of the CMPs must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant CMP. The Construction Monitoring Report(s) must include an analysis of the results including, but not limited to, exceedances of relevant criteria/targets/goals, reasons for any exceedances, trends in the data, and maximum, minimum and average data results for all monitored parameters. The report must also detail any management and mitigation measures that were implemented to address exceedances during the reporting period. Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	Section 4 and 7 FFMP Section 7.4.1 and 7.6
EPBC Condition 7	The approval holder must prepare, in consultation with the department, a Fauna and Flora Construction Monitoring Program (FFCMP) to ensure the environmental performance outcomes in Condition A1 of the NSW Approval or the CEMP Flora and Fauna sub-plan will be achieved for protected matters.	This Program
EPBC Condition 8	The approval holder must: a) ensure the FFCMP is consistent with Commonwealth approved conservation advices and made or adopted recovery plans for relevant protected matters b) ensure the FFCMP meets the requirements of Condition C13 of the NSW Approval, and c) comply with Conditions C16 and C17 of the NSW Approval as they relate to the submission and implementation of the FFCMP.	Sections 2 and 4 FFMP Section 1.4
EPBC Condition 9	The approval holder must submit each Construction Monitoring Report (CMR), as required by Condition C18 of the NSW Approval, to the department for information within 10 business days of that CMR being accepted by the Planning Secretary.	Section 7
EPBC Condition 10	Unless otherwise agreed to in writing by the Minister, the approval holder must publish each CMR on the website within 15 business days of submitting it to the department. All published CMRs must remain on the website until the expiry date of this approval	FFMP Section 7.4.1
EPBC Condition 20	The approval holder must maintain accurate and complete compliance records.	FFMP Section 7.4
EPBC Condition 21	If the department makes a request in writing, the approval holder must provide electronic copies of compliance records to the department within the timeframe specified in the request.	FFMP Section 7.4
EPBC Condition 22	The approval holder must ensure that any monitoring data (including sensitive ecological data), surveys, maps, and other spatial and metadata required under the conditions of this approval are prepared in accordance with the <i>Guidelines for biological survey and mapped data</i> (Commonwealth of Australia 2018), or as otherwise specified by the Minister in writing.	FFMP Section 7.4.1

Condition	Condition requirements	Document reference
EPBC Condition 23	The approval holder must ensure that any monitoring data (including sensitive ecological data), surveys, maps, and other spatial and metadata required under the conditions of this approval are prepared in accordance with the <i>Guide to providing maps and boundary data for EPBC Act projects</i> (Commonwealth of Australia 2021), or as otherwise specified by the Minister in writing.	FFMP Section 7.4.1
EPBC Condition 24	The approval holder must submit all monitoring data (including sensitive ecological data), surveys, maps, other spatial and metadata and all species occurrence record data (sightings and evidence of presence) electronically to the department within 12 months of this approval or in accordance with the requirements of the CEMP Flora and Fauna sub-plan and FFCMP.	FFMP Section 7.4.1

2.1. Existing Baseline Data

Baseline data relating to Threatened ecological communities, threatened flora species and threatened fauna species is captured within the *M12RT Submissions Report Appendix E Revised Biodiversity Assessment Report* and is based on field surveys undertaken during the planning approval assessment phase.

The Submissions Report describes various sources of data used to inform field surveys to gather baseline data on the presence of flora and fauna on the Project site. This included mapping (where applicable) of:

- Coastal Wetlands (Resilience and Hazards SEPP)
- Hunter Estuary Wetlands Ramsar site
- Floodplain wetland
- Hunter River and Tributaries
- Key Fish Habitat
- Existing BioBanking Sites
- Regional Vegetation Mapping (LHCCREMS)
- NSW BioNet Vegetation Classification database
- The federal Bureau of Meteorology's Atlas of Groundwater Dependent Ecosystems
- Soil Landscapes of the Newcastle 1:100,000 Sheet Map
- Available regional vegetation mapping and previous biodiversity studies (refer to RTS – Appendix E for full list)
- BioNet Atlas of NSW Wildlife
- BioNet Threatened Biodiversity Data Collection
- NSW Department of Primary Industries (DPI) Fisheries Spatial Data Portal
- The federal Department of Environment's Protected Matters Search Tool (PMST)
- Area of Outstanding Biodiversity Value register
- Port Stephens Council Comprehensive Koala Plan of Management
- Other local threatened fauna species studies (refer to RTS – Appendix E for full list).

Based on the information gathered from the above sources, targeted flora and fauna surveys occurred to inform the EIS.

In relation to field surveys for vegetation mapping the *M12RT Submissions Report Appendix E Revised Biodiversity Assessment Report* states “*identification and mapping of vegetation communities in the construction footprint was conducted over several dedicated field surveys between 2014 and 2020. These surveys captured the initial project design, and subsequent alteration and / or additions to the construction footprint as it occurred, as well as ensuring that plant community type mapping was current and consistent with any updates to the NSW BioNet Vegetation Classification Database which occurred during this time.*”

The surveys identified a number of Plant Community Types (PCT), including those associated with Threatened Ecological Communities. A number of PCTs were also identified as being part of Groundwater Dependent Ecosystems. Identified PCT's are listed within Table 3-2 of the *M12RT Submissions Report Appendix E Revised Biodiversity Assessment Report*.

Threatened flora were also included in field surveys. The *M12RT Submissions Report Appendix E Revised Biodiversity Assessment Report* states “The lengthy duration of the biodiversity assessment provided an opportunity to plan and implement comprehensive and targeted threatened flora surveys across multiple years, seasons and conditions. This resulted in a thorough survey program that targeted all candidate species during the optimum survey time for each species consistent with the advice in the species profile component of the Threatened Species Profile Database (TSPD), which was the relevant profile database at the time of the assessment and preceded advice included in the later Threatened Biodiversity Data Collection (TBDC)... systematic approach was adopted by firstly identifying the potential habitat for each target species, including review of associated PCTs and suitable soil types, then completing searches of these habitats using parallel walked transects at suitable distance apart targeted at the different plant growth forms and ensuring coverage of all areas of the construction footprint that are expected to be subject to direct impact. The project was first surveyed for threatened plants in 2015 through to early 2016. After a pause in the project, a second targeted flora survey was repeated in 2018 aimed at building on the survey data collected previously in 2015 to 2016, by targeting any gaps in the survey (season and location), as well as revisiting previously recorded threatened species to investigate any change in the population size and distribution. A further round of surveys were completed in 2020 which specifically targeted small areas that presented as result of design refinements and were considered potential habitat for particular species.”

Threatened flora species identified are listed in Section 4.2.3 of the *M12RT Submissions Report Appendix E Revised Biodiversity Assessment Report*.

In relation to threatened fauna, due to the variety of candidate species targeted, a range of detection methods were used over a large number of occurrences between 2016 and 2018 (including unattended approaches such as traps and recordings). A summary of surveys completed can be found within Table 4-7 of the *M12RT Submissions Report Appendix E Revised Biodiversity Assessment Report*.

Threatened fauna species identified are listed in Section 4.2.3 of the *M12RT Submissions Report Appendix E Revised Biodiversity Assessment Report*.

Baseline data for each of the nominated species has been sourced from the EIS and Submissions Report for the Project, as part of the habitat verification and weed mapping surveys undertaken in May 2023 or will be collected once detailed design is finalised. All baseline data will be collected prior to the relevant specific construction activity in accordance with C16 (i.e. clearing). Baseline data is summarised in Table 2-2.

Table 2-2: Targeted threatened species and baseline data

Scientific Name	Common Name	Baseline Data
<i>Persicaria elatior</i>	Tall Knotweed	Baseline data is being utilised from the EIS and Submissions Report. Baseline data from the EIS and Submissions Report identified three <i>Persicaria elatior</i> plants at the edge of an ephemeral shallow tributary in the floodplain on the south side of the Hunter River, within the construction footprint.
<i>Callistemon linearifolius</i>	Netted Bottle Brush	Baseline data is being utilised from the EIS and Submissions Report and is being supplemented by confirmation of the <i>Callistemon linearifolius</i> presence during surveys being carried out in August 2023. One hundred and fifty-two individuals were identified inside the BH2T construction footprint during the EIS and Submissions Report. As part of pre-clearing surveys in August 2023 an additional patch was encountered with 105 individuals. These additional individuals are subject to an application to amend the species credit requirement, in accordance with CoA E8. As a result, 257 individuals are present within the impact site (264 individuals including Heatherbrae bypass).
<i>Crinia tinnula</i>	Wallum Froglet	Baseline data is being utilised from the EIS and Submissions Report. This includes two paired locations where froglets have been recorded calling in the past 5 years, one paired location being present within the BH2T footprint. Baseline data reflects the presence of this species. Additional data will be collected via presence/absence surveys following flooding rains or alternate habitat methodology in the absence of flooding rains.

Scientific Name	Common Name	Baseline Data
<i>Uperoleia mahonyi</i>	Mahonys Toadlet	Baseline data is being utilised from the EIS and Submissions Report. This includes two paired locations that provide potential habitat. Mahony's Toadlet was not recorded within the construction footprint. Additional data will be collected via presence/absence surveys following flooding rains or alternate habitat methodology in the absence of flooding rains.

2.2. Additional Baseline Data

In accordance with the requirements of the SWTC Appendix 4 4, JHGA conducted survey prior to clearing of vegetation to determine the distribution and density of hollow bearing trees, mammal habitat and Key Fish Habitat and prepare a Replacement Habitat Plan. Survey included stag watching to identify the number and type of habitat replacement required and the locations to be installed.

Additional information from this survey that is considered as new baseline data (i.e. not previously included within the Submissions Report) has been factored into this Monitoring Program (e.g. wider distribution of a TEC or threatened species than found within the Submissions Report). It is noted that unexpected finds will also be managed under the Unexpected Threatened Species Find Protocol.

2.3. Consultation

In accordance with the requirements of CoA A8 and C12(d), JHGA will consult with the Biodiversity, Conservation and Science Group (BCS), Australian Government Department of Climate Change, Energy, the Environment and Water (AG DCCEEW), Newcastle City Council and Port Stephens Council in relation to this Monitoring Program. This consultation is documented within Section 1.4 and Appendix A of this FFMP.

In accordance with CoA C4 and C15, this FFMP and the associated FFCMP was endorsed by the Environmental Representative (ER) on 3 October 2023 prior to submission to the Planning Secretary for approval no later than one month before the commencement of construction. In accordance with CoA C10 and C16, the CEMP and relevant CEMP Sub-Plans and Monitoring Programs were approved by the Planning Secretary on 13 November 2023, the commencement of construction occurred on 13 November 2023.

2.4. SMART Principles

In accordance with the requirements of CoA C13(j) the Fauna and Flora Construction Monitoring Program is to be developed with consideration of SMART principles.

Section 4 of this Program achieves this as follows:

- Specific – the FFCMP for the Project includes specific baseline data, sampling locations, as well as trigger values relating to specific species/TECs at specific construction sites
- Measurable – parameters requiring monitoring and reporting are all measurable as per Section 4
- Actionable – the methodology for the collection and analysis of data is provided as per Section 4
- Realistic – the FFCMP is achievable and not overly onerous – it has been tailored to specific species/TEC related to the BH2T scope as per Section 4
- Timely – specific timeframes for the completion of tasks are provided.

3. Threatened Entities Impacted by the Project

A review of all threatened entities that were identified in the EIS as being impacted by the Project, and their monitoring requirements, is provided below in Table 3-1. For threatened species, the table describes the necessity of species-specific monitoring based on whether:

- The species was recorded or assumed present
- The species is known to occur in habitat adjacent to the construction boundary
- The species is mobile or sedentary, and

- Habitat constraints for the species are likely to experience uncertain impacts associated with the Project.

Potential uncertain impacts associated with edge effects (i.e. introduction of weeds and pathogens into surrounding areas) are likely to be relevant at a broad scale for all threatened entities (not just species-specific) and are monitored as part of the Weed and Pathogen Control Procedure (Appendix E).

Table 3-1 Threatened entities and monitoring requirements

Threatened Entity	BC Act Status	EPBC Act Status	Project Related Impact	Specific Monitoring Required (Y / N)	Justification for Monitoring Requirement
Ecological Communities					
Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions	-	V	Removal of 0.57ha	Y	These threatened ecological communities (TEC's) have been recorded within the construction footprint (directly impacted) as well as the surrounding areas. There is the possibility that adjacent areas of these TEC's could be impacted by uncertain impacts such as changes in hydrology, soil contamination, increase in exposure to dust and prevailing winds, shading from structures or an increase in pest species. Therefore, a procedure has been prepared to monitor nearby areas of these TEC's that have the potential to experience uncertain impacts.
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregion	E	-	Removal of 0.7ha	Y	
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Removal of 65.74ha	Y	
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	E	-	Removal of 0.51ha	Y	
Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	E	-	Removal of 37.89ha	Y	
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Removal of 8.57ha	Y	
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Removal of 5.26ha	Y	

Threatened Entity	BC Act Status	EPBC Act Status	Project Related Impact	Specific Monitoring Required (Y / N)	Justification for Monitoring Requirement
Flora					
Netted Bottlebrush (<i>Callistemon linearifolius</i>)	V	-	159 plants directly impacted. Potential indirect impacts.	Y	Populations of this species occur to the west and south of the construction footprint that could be at risk from uncertain impacts through edge effects. Owing to the uncertainty of Project related impacts to these populations surrounding the construction footprint, a monitoring procedure has been prepared.
Sand Doubletail (<i>Diuris arenaria</i>)	V	-	No individuals impacted.	N	No individuals of this species were identified within the construction footprint. The nearest records for this species occur >200m north of the construction footprint and are unlikely to experience any uncertain impacts, such as through edge effects owing to their location in an already disturbed environment.
Small-flower Grevillea (<i>Grevillea parviflora</i> subsp. <i>parviflora</i>)	V	V	No individuals impacted.	N	No individuals of this species were identified within the construction footprint. The nearest records for this species occur >600m east of the construction footprint and are unlikely to experience any uncertain impacts, such as through edge effects owing to their location in an already disturbed environment.
Tall Knotweed (<i>Persicaria elatior</i>)	V	V	Three plants directly impacted. Potential indirect impacts.	N	This species was only recorded from within the construction footprint. The EIS Submissions Report - Appendix E described the three individuals recorded were likely representing a small, isolated population that have dispersed from nearby large areas of swamp forest and wetlands to the east. It is unlikely that the Project would result in uncertain impacts on these large areas of potential habitat.
Fauna					
Australasian Bittern (<i>Botaurus poiciloptilus</i>)	E	E	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Australian Painted Snipe (<i>Rostratula australis</i>)	E	E	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Black Bittern (<i>Ixobrychus flavicollis</i>)	V	-	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Black-chinned Honeyeater (eastern subspecies) (<i>Melithreptus gularis</i> subsp. <i>gularis</i>)	V	-	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Brown Treecreeper (eastern subspecies)	V	-	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality

Black Hill to Tomago

Threatened Entity	BC Act Status	EPBC Act Status	Project Related Impact	Specific Monitoring Required (Y / N)	Justification for Monitoring Requirement
<i>(Climacteris picumnus subsp. victoriae)</i>					habitat in the locality that will not experience uncertain impacts associated with the Project. Hollows in standing dead or live trees and tree stumps are essential for nesting. Therefore, species specific monitoring is not proposed.
Corben's Longeared Bat (<i>Nyctophilus corbeni</i>)	V	V	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Diamond Firetail (<i>Stagonopleura guttata</i>)	V	-	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Eastern False Pipistrelle (<i>Falsistrellus tasmaniensis</i>)	V	-	Confirmed habitat.	N	This species was recorded within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Eastern Coastal Free-tailed Bat (<i>Micronomus norfolkensis</i>)	V	-	Confirmed habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Glossy Black- Cockatoo (<i>Calyptorhynchus lathami</i>)	V	V	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Greater Broad-nosed Bat (<i>Scoteanax rueppellii</i>)	V	-	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Grey-crowned Babbler (<i>Pomatostomus temporalis temporalis</i>)	V	-	Confirmed habitat.	N	This species was recorded within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)	V	V	Potential foraging habitat.	N	This species was recorded within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. The Project will not impact breeding habitat for this species. Therefore, species specific monitoring is not proposed.
Hooded Robin (south-eastern form)	V	-	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality

Black Hill to Tomago

Threatened Entity	BC Act Status	EPBC Act Status	Project Related Impact	Specific Monitoring Required (Y / N)	Justification for Monitoring Requirement
<i>(Melanodryas cucullata subsp. cucullata)</i>					habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Koala (<i>Phascolarctos cinereus</i>)	V	V	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. Moreover, the most suitable habitat for Koalas was identified outside of the Project, north of Tomago. This species is mobile and is likely to utilise the large extent of higher quality habitat north of Tomago that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Little Bent-winged Bat (<i>Miniopterus australis</i>)	V	-	No roosting/ breeding sites identified.	N	This species was recorded within the construction footprint however, no habitat constraints will be impacted. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Little Eagle (<i>Hieraaetus morphnoides</i>)	V	-	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Little Lorikeet (<i>Glossopsitta pusilla</i>)	V	-	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Mahony's Toadlet (<i>Uperoleia mahonyi</i>)	E	-	Potential habitat.	Y	This species was not recorded (assumed present) within the construction footprint. It is possible that the Project would result in uncertain impacts to this species given its low mobility. Owing to the uncertainty of Project related impacts to aquatic habitats surrounding the construction footprint that are assumed to support this species, a monitoring procedure has been prepared that focusses on impacts to potential habitat.
Masked Owl (<i>Tyto novaehollandiae</i>)	V	-	Potential habitat.	N	This species was recorded near the construction footprint. It is possible that the Project would indirectly impact on surrounding potential habitat for this species through a reduction in available roosting sites (e.g. tree hollows). Replacement hollows will be installed as part of the Replacement Habitat Strategy, which includes monitoring actions relevant to this species (i.e. monitoring replacement hollows for functionality and absence of pest species).
Powerful Owl (<i>Ninox strenua</i>)	V	-	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Regent Honeyeater (<i>Anthochaera phrygia</i>)	CE	CE	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality

Threatened Entity	BC Act Status	EPBC Act Status	Project Related Impact	Specific Monitoring Required (Y / N)	Justification for Monitoring Requirement
					habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Scarlet Robin (<i>Petroica boodang</i>)	V	-	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Speckled Warbler (<i>Chthonicola sagittata</i>)	V	-	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Spotted Harrier (<i>Circus assimilis</i>)	V	-	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Spotted-tailed Quoll (<i>Dasyurus maculatus</i>)	V	E	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Square-tailed Kite (<i>Lophoictinia isura</i>)	V	-	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Squirrel Glider (<i>Petaurus norfolcensis</i>)	V	-	Confirmed habitat.	N	This species was recorded within the construction footprint. It is possible that the Project would indirectly impact on surrounding potential habitat for this species through a reduction in available roosting sites (e.g. tree hollows). Replacement hollows will be installed as part of the Replacement Habitat Strategy, which includes monitoring actions relevant to this species (i.e. monitoring replacement hollows for functionality and absence of pest species).
Swift Parrot (<i>Lathamus discolor</i>)	E	CE	Potential foraging habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Moreover, the Project will not impact breeding habitat for this species. Therefore, species specific monitoring is not proposed.
Varied Sittella (<i>Daphoenositta chrysoptera</i>)	V	-	Confirmed habitat.	N	This species was recorded within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Wallum Froglet (<i>Crinia tinnula</i>)	V	-	Confirmed habitat.	Y	This species was recorded within the construction footprint. It is possible that the Project would result in uncertain impacts to this species given its low mobility.

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Threatened Entity	BC Act Status	EPBC Act Status	Project Related Impact	Specific Monitoring Required (Y / N)	Justification for Monitoring Requirement
					Owing to the uncertainty of Project related impacts to aquatic habitats surrounding the construction footprint that are known to support this species, a monitoring procedure has been prepared that focusses on impacts to potential habitat.
White-bellied Sea-Eagle (<i>Haliaeetus leucogaster</i>)	V	M	Potential foraging habitat. No large stick nests identified.	N	This species was recorded within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
White-fronted Chat (<i>Epthianura albifrons</i>)	V	-	Confirmed habitat.	N	This species was recorded within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.
Yellow-bellied Glider (<i>Petaurus australis</i>)	V	V	Potential habitat.	N	This species was not recorded (assumed present) within the construction footprint. This species is highly mobile and is likely to utilise the large extent of higher quality habitat in the locality that will not experience uncertain impacts associated with the Project. Therefore, species specific monitoring is not proposed.

4. Monitoring Procedure for Threatened Entities

4.1. Threatened Ecological Communities

The aim of monitoring the TEC's surrounding the construction footprint is to identify whether any direct or indirect impacts have occurred that are a result of the Project.

Monitoring will consist of the establishment of:

- One (1) BAM Vegetation Integrity (VI) plot in vegetation representative of each impacted TEC (see Table 4-1). This VI plot will act as the 'control' and must be located between 200m and 1km from the construction boundary.
- Minimum number of BAM VI plots in each vegetation zone of a TEC. The area used to determine the minimum number of BAM VI plots in each vegetation zone of a TEC will be calculated by a 50m buffer around the final extent of clearing. These plots will act as the 'experimental' plots and are to be located within the 50m buffer to provide inference of Project related impacts. Final locations of the experimental plots will depend on the final extent of clearing.

Monitoring the condition of the vegetation through establishment of BAM plots will enable changes in vegetation condition (a proxy for ecological function) to be assessed through time. Relevant results from any nearby weed monitoring (see FFMP Appendix E) are to be incorporated into the monitoring report to support any conclusions drawn about the condition of the TEC adjacent to the construction boundary. Table 4-1 details the monitoring procedure in accordance with CoA C13.

Indicative locations are defined as areas of first preference for monitoring, subject to access land conditions pending safety and land owner access requirements. If these locations are not accessible, then alternative locations will be monitored as close as practicable to the original location in consultation with the Project Ecologist and approved by the ER.

Table 4-1. Monitoring details for threatened ecological communities.

Monitoring Activity	Description
Details of baseline data available	See Table 2-2: Targeted threatened species and baseline data
Details of baseline data to be obtained and when	Relevant baseline data must be obtained prior to commencement of the specific construction activity as per CoA C16 (i.e. clearing). Baseline data consists of sampling both control sites (in appropriate TEC and 200m – 1km from construction boundary), and experimental sites (in each vegetation zone of an impacted TEC and within the 50m buffer). Each plot will be 20m x 50m, with data collected following BAM 2020. Other data to be collected at each site includes evidence of dieback, disturbance, pest and pathogens, and any other general observations relevant to condition of the plants. Plots established in both control and experimental sites are to be permanent monitoring sites for the duration of the monitoring program.
The frequency of monitoring to be undertaken	Bi-annually during construction (spring and autumn).
The location of monitoring	Indicative locations provided in <i>Figure 4-1</i> , <i>Figure 4-2</i> and <i>Table 4-6</i>
Performance measure	VI score and composition and structure of environmental weeds
The reporting of monitoring results and analysis of results against relevant criteria	BAM plot data are to be entered into the BAM-Calculator to determine a Vegetation Integrity (VI) Score. Scores obtained during each sampling session are to be compared against baseline levels of both control and experimental sites. Any decrease in score observed at the experimental sites must not be more than 20% different to any decrease observed at the control site. Scores are also to be compared between successive monitoring sessions. Comparisons between other information collected (e.g. evidence of dieback, stress, disturbance, pest and pathogens, and any other general observations relevant to condition of the plants) are to be made. The overall composition and structure of environmental weeds within each experimental plot should not increase more than 20% from changes observed at the control site. Results of data analysis are to be included in a monitoring report prepared following each monitoring event.
Details of the methods that will be used to analyse the monitoring data	Plot data are to be collected in accordance with the BAM 2020. Evidence of environmental weeds (composition and structure) is to be collected as part of the BAM plot. Qualitative data that should also be collected during each sampling session include evidence of dieback, stress, herbivore damage, disturbance and any other general observations that might justify reasons for changes in TEC condition.

Monitoring Activity	Description
	Changes in VI scores and environmental weeds are to be directly compared between successive monitoring sessions based on percentage change. The changes observed for each experimental plot are to then be directly compared against the change in VI score and environmental weed assemblage at the control site.
Trigger point for corrective actions	Project-related cause of VI decline >20%, or >20% increase in composition and structure of environmental weeds, compared to baseline levels.
Procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts	Unless otherwise explained by non-Project associated impacts (e.g. extreme climate events, bushfires etc.), corrective actions will be required should the triggers be met. Depending on the likely cause of the decline in VI or increase in other metrics such as dieback, stress or disturbance, the Project Ecologist will determine the best course of action in consultation with TfNSW (see section 6). If the trigger for environmental weeds is met, a review of weed control efforts is to be undertaken with consideration given to targeted control of environmental weeds.
Response	VI score within 20% of baseline levels within 12 months. Composition and structure of environmental weeds within 20% of baseline levels within 6 months.

4.2. Netted Bottlebrush (*Callistemon linearifolius*)

The aim for monitoring populations of *Callistemon linearifolius* outside of the construction boundary is to identify whether any direct or indirect impacts have occurred as a result of the Project.

Monitoring will consist of:

- Surveying all areas of suitable habitat within 15m of the construction footprint (or final clearing footprint) for a population count (the 'experimental' site), and
- Establishment of a control site in retained vegetation >50m from the final clearing footprint.

Relevant results from any nearby weed monitoring (see Appendix E) are to be incorporated into the monitoring report to support general habitat monitoring for this species. Table 4-2 details the monitoring procedure in accordance with CoA C13.

Table 4-2. Monitoring details for *Callistemon linearifolius*.

Monitoring Activity	Description
Details of baseline data available	One hundred and fifty-two individuals were identified inside the BH2T construction footprint during the EIS and Submissions Report. As part of pre-clearing surveys in August 2023 an additional patch was encountered with 105 individuals. These additional individuals are subject to an application to amend the species credit requirement in accordance with CoA E8. As a result, 257 individuals are present within the impact site (264 individuals including Heatherbrae bypass).
Details of baseline data to be obtained and when	Baseline data must be obtained prior to commencement of vegetation clearing. Baseline data will consist of a full count of all individuals (including flagging with pink tape and recording on a GPS), as well as data on size, health status, evidence of disturbance, weed encroachment and recruitment will be collected. Baseline monitoring will be undertaken by parallel traverses in potential habitat up to 15m from the construction footprint (experimental sites) and at a control site >50m from the final clearing footprint. The control site is not based on size (e.g. 20m x 20m plot) but rather on 'patch' given this species may be scattered in the landscape. The patch should contain a minimum of five individuals. The collection of baseline data allows for the establishment of experimental and control sites (See Figure 4-3).
The frequency of monitoring to be undertaken	Bi-annually during construction (spring and autumn), with at least one sampling session undertaken during the flowering period for this species (Oct. – Jan.). Monitoring sessions following the baseline monitoring will focus on areas with known occurrences of the species.
The location of monitoring	Indicative locations provided in Figure 4-3 and Table 4-6
Performance measure	Count
The reporting of monitoring results and analysis of results against relevant criteria	All individuals recorded in each sampling round is to be compared against baseline data. Relevant information should be taken on individuals that are observed to be in declining health or are deceased, including possible reasons for the observations. Evidence of disturbance and weed encroachment should be noted, as well as any recruitment. The population must not decline by more than 10% as a result of uncertain impacts associated with the Project.

Monitoring Activity	Description
	Changes in population metrics is to be compared to the control site to assess any impacts to the species that may be occurring at a landscape scale (e.g. drought, flood or fire) and therefore not a result of the Project. Results of data analysis are to be included in a monitoring report prepared following each monitoring event.
Details of the methods that will be used to analyse the monitoring data	Data from each sampling session (number of plants, health status, recruitment etc.) will be compared against baseline levels. Conclusions should be drawn at the individual level as well as between the experimental and control sites.
Trigger point for corrective actions	Project-related cause of population decline >10% from baseline Experimental verse control plots will be compared as evidence of Project related causes.
Procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts	Unless otherwise explained by non-Project associated impacts (e.g. extreme climate events, bushfires etc.), corrective actions will be required should the total population within the 15m buffer area decline by more than 10%. Depending on the cause of the decline, the Project Ecologist will determine the best course of action in consultation with TfNSW (see section 6). Corrective actions should be targeted but can include re-sampling, and control of weeds, pathogens and pests, consideration of propagation and planting programs.
Response	No further decrease in the total population measured 12 months after corrective actions initiated.

4.3. Wallum Froglet (*Crinia tinnula*) and Mahony's Toadlet (*Uperoleia mahonyi*)

Presence / absence monitoring for *Crinia tinnula* and *Uperoleia mahonyi* will be undertaken, under suitable conditions and where access permits, to identify whether any uncertain indirect impacts have occurred as a result of the Project. The survey methodology described in NSW Survey Guide for Threatened Frogs (DPIE, 2020) will be employed to obtain baseline, and ongoing, monitoring data. Surveys are to be undertaken by a suitably qualified, experienced herpetologist. A summary of the survey effort and methods for *Crinia tinnula* and *Uperoleia mahonyi* is provided below in Table 4-3.

Table 4-3. Survey effort and method for *Crinia tinnula* and *Uperoleia mahonyi* (DPIE, 2020).

Site	500m transect of suitable breeding habitat		
Survey method	Survey period	Total effort for a 500m transect	Number of repeat surveys
Wallum Froglet (<i>Crinia tinnula</i>)			
Aural-visual surveys	All year after flooding rains	480 mins	4
Acoustic recorder	All year after flooding rains	154 recorder days	1 x 14 days
Mahony's Toadlet (<i>Uperoleia mahonyi</i>)			
Aural-visual surveys	Oct. – Mar.	480 mins	4

Surveys will be triggered for the Wallum Froglet following flooding rains. Conservatively surveys would occur following >10mm rain event for the 4 aural-visual surveys. Mahony's Toadlet monitoring will occur following these rains and when waterbodies at identified monitoring sites are 70% full (DPIE, 2020)

In-line with the NSW Survey Guide for Threatened Frogs (DPIE, 2020), monitoring will consist of aural-visual surveys along 2 x 250m transects that run through (or if too deep, then around) available breeding habitat. Where there is insufficient habitat to accommodate a 250m transect a pro-rata effort is to be applied with all available habitat being searched. Results from the BAR indicate there is breeding habitat for these species within the swamp forest wetland to the north (frog monitoring site 1) and south (frog monitoring site 2) of the Hunter Region Botanic Gardens shown in Figure 4-4. One survey night will cover a minimum 60-minute period at each site (total 120 minutes), to be repeated a minimum of four times. If survey effort for *Uperoleia mahonyi* and *Crinia tinnula* is unsuccessful after 2 nights of survey, the Project Ecologist may postpone the survey for a period of two weeks before conducting the last two nights of survey. Methodology for aural-visual surveys must follow section 2.9.1 of the NSW Survey Guide for Threatened Frogs. For *Uperoleia mahonyi*, calling individuals must be captured to confirm identity as calls are difficult to distinguished from other more common *Uperoleia* spp. Table 4-4 details the monitoring procedure in accordance with CoA C13.

Table 4-4. Monitoring details for *Crinia tinnula* and *Uperoleia mahonyi*.

Monitoring Activity	Description
Details of baseline data available	<i>Crinia tinnula</i> was identified from one location during surveys for the BAR in 2016 and 2018, and a second location in 2018. <i>Uperoleia mahonyi</i> was not positively identified during surveys for the BAR.
Details of baseline data to be obtained and when	Surveys for the BAR were undertaken in 2016 and 2018. Updated aural-visual surveys for both frog species will take place at the commencement of construction, pending suitable rainfall. These surveys will be undertaken within the swamp forest wetlands to the north and south of the Hunter Region Botanic Gardens (in proximity to the 2016 and 2018 records). Survey transects will begin adjacent to the construction boundary and extend east for a maximum distance of 250m (depending on extent of breeding habitat). pH testing of the surveyed waterbodies will be undertaken every 50m along the transect. In the instance that suitable rainfall (flooding rains) does not occur the alternate method will be implemented to collect baseline data (Table 4-5).
The frequency of monitoring to be undertaken	Wallum Froglet – During flooding rains - >10mm in a 24 hour cycle (previously >50mm rain at commencement of Project works). Mahony's Toadlet – Annually (Oct. – Mar.) during construction
The location of monitoring	Locations provided in Figure 4-4, Figure 4-5 and Table 4-6
Performance measure	Presence / absence
The reporting of monitoring results and analysis of results against relevant criteria	Ongoing presence / absence monitoring and pH testing is to be compared against baseline data. Assess whether any species absences or increase in waterbody pH (>5.5) could be a result of Project-related impacts. Results of data analysis are to be included in a monitoring report prepared following each monitoring event.
Trigger point for corrective actions	No presence detected during the DPE endorsed survey period (if detected during baseline monitoring).
Procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts	Unless otherwise explained by non-Project associated impacts (e.g. extreme climate events, bushfires etc.), corrective actions will be required should either species become absent from breeding habitat within 50m of the construction boundary. Depending on the cause of the decline, the Project Ecologist will determine the best course of action in consultation with TfNSW (see section 6). Corrective actions include increasing the survey effort, increasing the number of sites for pH testing, survey and control of invasive pests, and weed control.
Response	Presence of relevant frog species in breeding habitat within 24 months following corrective actions. pH at or below 5.5.

A constraint for detecting *Crinia tinnula* during targeted surveys is recent 'flooding rains'. As sufficient rainfall, greater than 50mm in 24 hours, did not occur prior to the commencement date for clearing works, an alternative methodology was undertaken to monitor the population of both *Crinia tinnula* and *Uperoleia mahonyi*. It must be noted that the most recent revision of this plan (Rev 06) established a new trigger of >10mm of flooding rains to trigger presence/absence surveys.

Commonwealth conservation advice for *Crinia tinnula* and *Uperoleia mahonyi* identifies habitat degradation as a leading threat to their persistence. Changes in hydrology, altered water chemistry, and increases in soil and water nutrient levels are likely to negatively impact these species. In addition, weed incursion has been highlighted as rendering habitat unsuitable. Potential uncertain indirect impacts from the Project are likely to be habitat related. Therefore, the aim for monitoring changes in condition of adjacent suitable habitat for *Crinia tinnula* and *Uperoleia mahonyi* is to identify whether any uncertain indirect impacts have occurred as a result of the Project.

For cryptic species that are difficult to detect and identify in the field, habitat monitoring may be preferential to presence / absence monitoring. Presence / absence monitoring for frogs is susceptible to recording false negatives, which means the survey is likely to show an absence of the target species despite their actual presence. This is particularly true for *Uperoleia mahonyi* because it cannot be positively identified through call recordings alone and must be hand captured. Monitoring important habitat metrics for the target species, such as water pH and vegetation condition, provides a rapid, robust, and repeatable experimental design that will readily show any Project-related impacts (when coupled with a control site). Habitat-based monitoring also provides spatially specific insights, which are important when the aim is to discern potential Project-related impacts to a species that occurs near to the disturbance area.

Monitoring will consist of two (2) permanent water quality monitoring sites and two (2) permanent rapid plots within areas of suitable habitat. One water quality monitoring site and rapid plot are to be established within proximity to the construction boundary (i.e. the 'experimental' site; in suitable habitat between the final clearing boundary and nearest record of *Crinia tinnula*) and one water quality monitoring site and rapid plot are to be established 150m – 500m upstream of the construction boundary (the control site). Relevant results from any nearby weed monitoring (see Appendix F) are to be incorporated into the monitoring report to support habitat monitoring for these species. Table 4-5 details the monitoring procedure in accordance with CoA C13.

Table 4-5. Monitoring procedure for alternate methodology for *Crinia tinnula* and *Uperoleia mahonyi*.

Monitoring Activity	Description
Details of baseline data available	Water quality monitoring was undertaken as part of the EIS at the wetland adjacent to Botanic Gardens (site M1BH2T 8) and can be used as the control site (Refer to the Soil and Surface Water monitoring). The following parameters were measured and recorded in the field: - Field parameters: - Electrical conductivity - pH - Turbidity - Dissolved oxygen - Temperature - Grab samples for laboratory analysis: - Total dissolved solids - Total suspended solids - Total Nitrogen (TN) - Total Phosphorus - Dissolved metals (aluminium, arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, iron, and manganese) - Major ions (sodium, magnesium, calcium, chloride, bicarbonate / carbonate, and sulfate) - TPH (total petroleum hydrocarbons: C6-C9 and C10-C36), BTEX (benzene, toluene ethylbenzene, xylene and total BTEX) and PAHs (Polycyclic aromatic hydrocarbons). An additional water quality monitoring site is to be established in suitable habitat between the final clearing boundary and nearest record of <i>Crinia tinnula</i>. The aforementioned parameters are to be recorded in order for comparison against the control site. One (1) rapid plot (20m x 20m full floristics plot) is to be established between the construction boundary and nearest record of <i>Crinia tinnula</i> and one is to be established 150m – 500m from the construction boundary.
Details of baseline data to be obtained and when	Water quality monitoring – control site: Baseline data already collected. Rapid plot – control site: Baseline data to be collected prior to construction. Water quality monitoring – experimental site: Baseline data to be collected prior to construction. Rapid plot – experimental site: Baseline data (minimum 1 sample for purpose of this Plan) to be collected prior to construction.
The frequency of monitoring to be undertaken	Bi-annually during construction (Oct. – Mar.).
The location of monitoring	Locations provided in Figure 4-4 and Table 4-6.
Performance measure	Weed cover and water quality.
The reporting of monitoring results and analysis of results against relevant criteria	Demonstrate that the condition of the experimental water sampling site has not reduced considerably compared to its condition in the baseline monitoring. Compare any changes in water quality at the experimental site with the control site to determine any Project-related impacts. Species assemblage and cover metrics of the rapid plot are to be compared against baseline levels, and between the sites. No new priority weed species are to be detected and cover of existing weeds must not increase by more than 20%. Assess whether any decline in habitat condition at the experimental site is a result of Project-related impacts and whether the habitat is still likely to support the target species. Results of data analysis are to be included in a monitoring report prepared following each monitoring event.
Trigger point for corrective actions	Project-related increase of weed cover >20%. pH >5.5.

Monitoring Activity	Description
Procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts	Unless otherwise explained by non-Project associated impacts (e.g. extreme climate events, bushfires etc.), corrective actions will be required should the condition of the habitat at the experimental site decline such that it is unlikely to support the target species. Depending on the cause of the decline, the Project Ecologist will determine the best course of action in consultation with TfNSW (see section 6). Corrective actions include increasing the survey effort, increasing the number of sites for pH testing, survey and control of invasive pests, and weed control.
Response	Weed coverage and pH within 20% and <5.5 of baseline levels, respectively.

Table 4-6: Threatened species/community monitoring locations (subject to land owner permission)

Common Name:	Species/Community:	Monitoring Plot ID:	X:	Y:
Plant Community Type	1071: Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion	P1	377171.42	6367880.94
	1071: Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion	P2	377349.15	6367991.16
	1071: Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion	P3	379615.52	6369616.49
	1590: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest	P4	372183.40	6368197.59
	1590: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest	P5	373074.44	6368372.64
	1590: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest	P6	372575.07	6368208.50
	1590: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest	P7	372509.01	6368542.01
	1590: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest	P8	373283.00	6368430.50
	1590: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest	P9	379061.92	6368835.41
	1590: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest	P10	373371.68	6368445.47
	1590: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest	P11	378762.69	6368495.02
	1590: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest	P12	378782.75	6368600.54
	1590: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest	P13	378926.91	6368762.43
	1598: Forest Red Gum grassy open forest on floodplains of the lower Hunter	P14	379429.28	6369233.33
	1716: Prickly-leaved Paperbark Forest on coastal lowlands of the Central Coast and Lower North Coast	P15	372237.48	6367562.70
	1717: Broad-leaved Paperbark - Swamp Mahogany – Swamp Oak – Saw Sedge swamp forest of the Central Coast and Lower North Coast	P16	380107.31	6370287.20
	1724: Broad-leaved Paperbark - Swamp Oak – Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast	P17	379234.35	6368983.13
	1727: Swamp Oak – Sea Rush – Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast	P18	377509.64	6368116.06
	1727: Swamp Oak – Sea Rush – Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast	P19	377710.73	6368572.83
	1727: Swamp Oak – Sea Rush – Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast	P20	377920.45	6368796.73

Common Name:	Species/Community:	Monitoring Plot ID:	X:	Y:
	1736: Water Couch – Tall Spike Rush freshwater wetland of the Central Coast and lower Hunter	P21	376421.03	6368235.35
	1736: Water Couch – Tall Spike Rush freshwater wetland of the Central Coast and lower Hunter	P22	379108.94	6369482.40
	1736: Water Couch – Tall Spike Rush freshwater wetland of the Central Coast and lower Hunter	P23	379274.60	6369624.11
	1736: Water Couch – Tall Spike Rush freshwater wetland of the Central Coast and lower Hunter	P24	378956.04	6369254.48
	1736: Water Couch – Tall Spike Rush freshwater wetland of the Central Coast and lower Hunter	P25	376331.15	6369020.28
	1736: Water Couch – Tall Spike Rush freshwater wetland of the Central Coast and lower Hunter	P26	375276.89	6368251.74
	1736: Water Couch – Tall Spike Rush freshwater wetland of the Central Coast and lower Hunter	P27	376393.88	6368806.92
	1736: Water Couch – Tall Spike Rush freshwater wetland of the Central Coast and lower Hunter	P28	378782.96	6369034.26
	1742: Jointed Twig-rush sedgeland	P29	379667.10	6369722.72
	1746: Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions	P30	377445.76	6368949.28
Threatened Ecological Community	Control Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	CP1	379535.56	6369107.29
	Control Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	CP2	379296.39	6368148.45
	Control Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	CP3	380399.65	6370425.64
	Control Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregion	CP4	376903.45	6367949.48
	Control Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	CP5	377500.33	6368521.46
	Control Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	CP6	377426.39	6368530.44

Black Hill to Tomago

Common Name:	Species/Community:	Monitoring Plot ID:	X:	Y:
Netted Bottlebrush	Callistemon linearifolius	C_1	373523.38	6368727.18
		C_2	373525.97	6368730.29
		C_3	373485.98	6368748.94
		C_4	373483.52	6368751.04
		C_5	373481.75	6368751.63
		C_6	373490.62	6368757.45
		C_7	373483.69	6368759.62
		C_8	373480.16	6368757.35
		C_9	373478.25	6368757.15
Wallum Froglet and Mahoney's Toadlet	<i>Crinia tinnula</i> and <i>Uperoleia mahonyi</i> .	Control Plot 1	380386	6369303
		Control Plot 2	379947	6369705
		Experimental Plot	380322	6370266
		W1 (water)	379720	6369837
		W2 (water)	379969	6369740

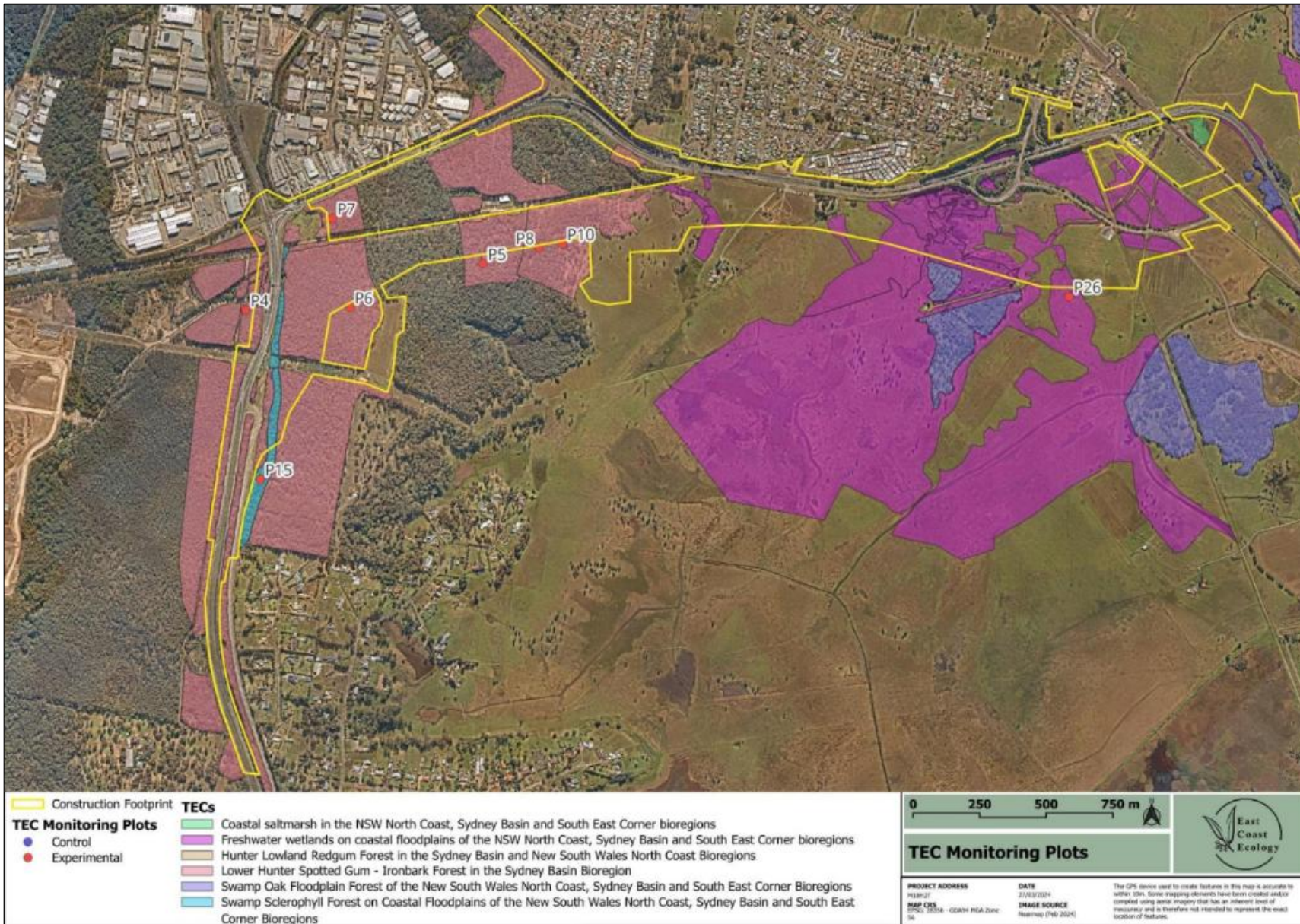


Figure 4-1 Threatened Ecological Communities Indicative monitoring locations

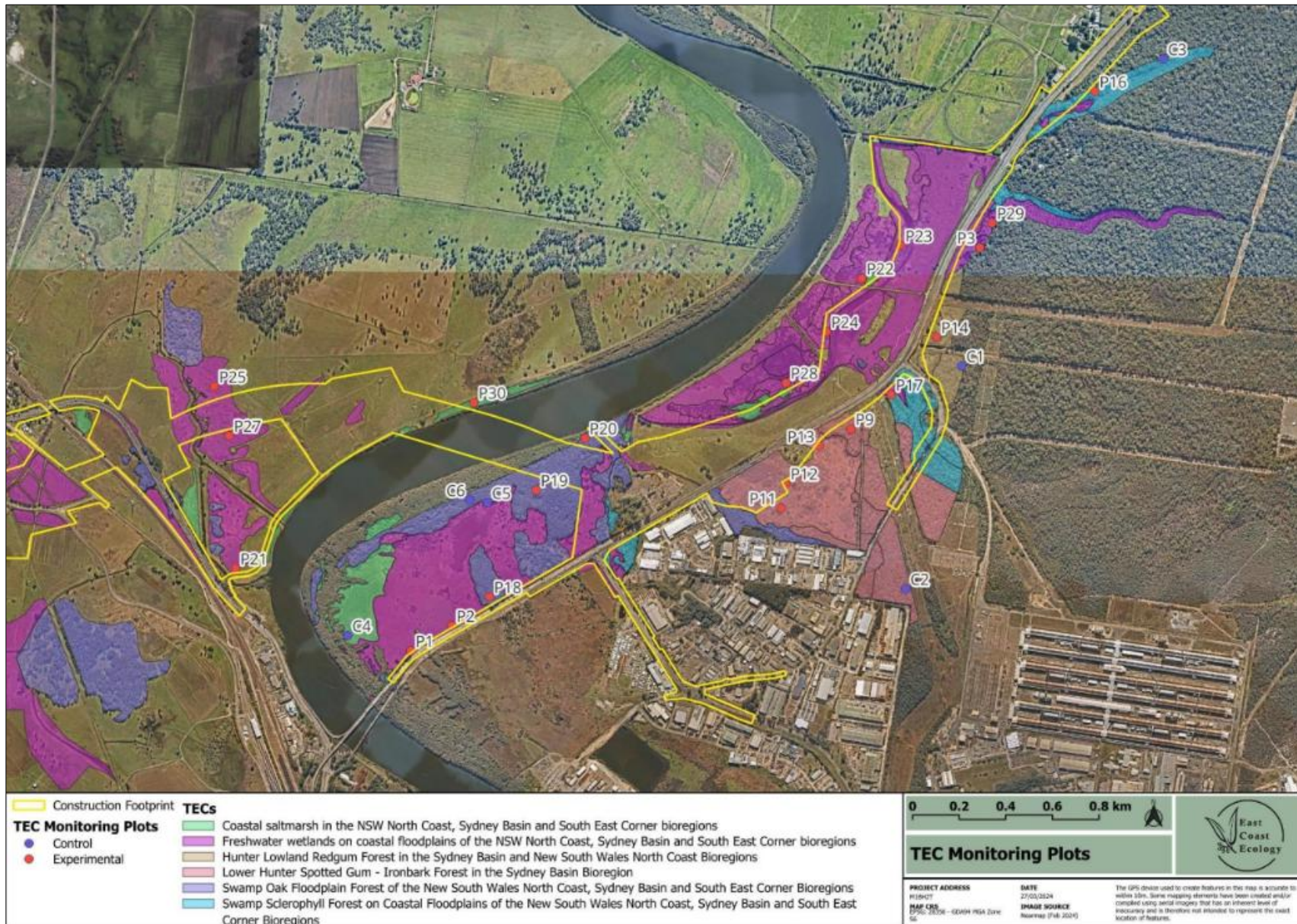


Figure 4-2 Threatened Ecological Communities Indicative monitoring locations



Figure 4-3 Callistemon linearifolius monitoring locations

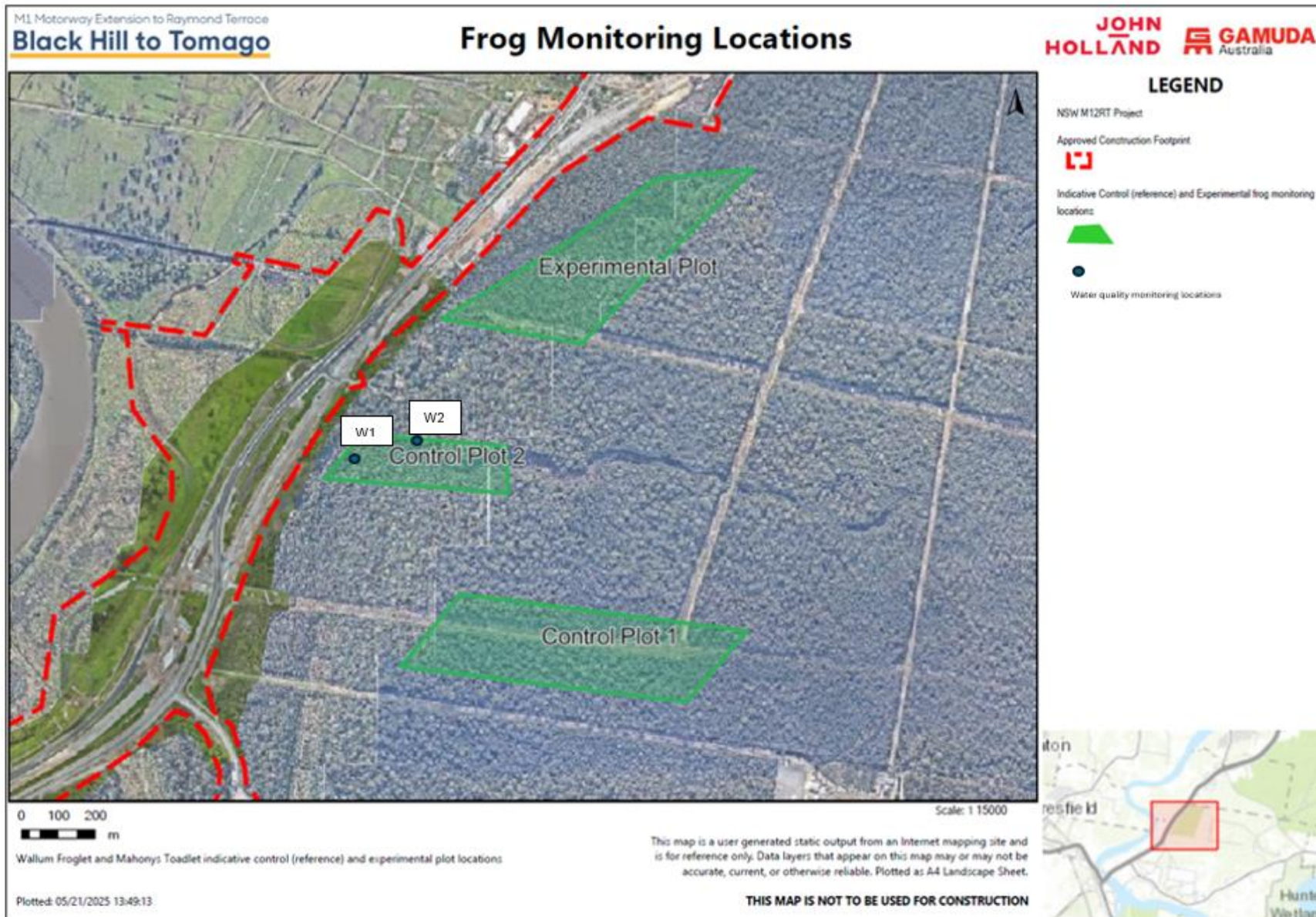


Figure 4-4 Wallum Froglet and Mahony's Toadlet monitoring locations

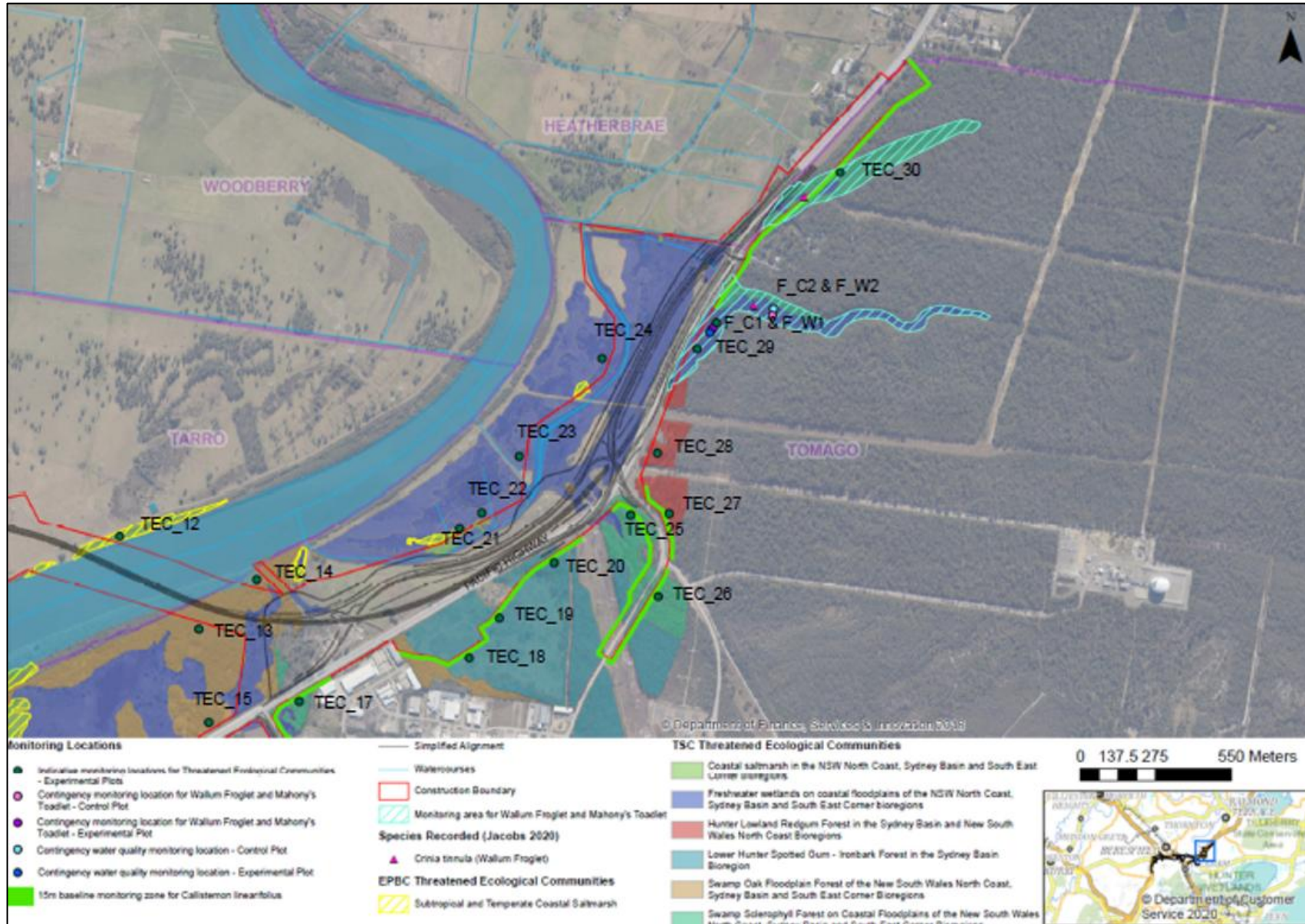


Figure 4-5 Indicative monitoring locations

5. Other Monitoring Programs

In addition to targeted monitoring of threatened entities, the Project FFMP includes monitoring procedures for:

- Weeds, pests, and pathogens (Weed and Pathogen Control Procedure)
- Artificial hollows (Replacement Habitat Strategy)
- Replacement tree planting (Replacement Habitat Strategy)
- Fauna crossing and connectivity structures (Fauna Crossing and Connectivity Strategy)
- Fauna friendly fencing (Fauna Crossing and Connectivity Strategy)

6. Adaptive Management

An adaptive management approach is to be employed in respect of the works forming part of this Program. An adaptive management approach involves an integrated process of monitoring, reviewing and then responding to the efficacy of the methodology and management measures to identify any alterations to the design and maintenance of works that may be required to ensure the objectives of the Program are achieved.

Where monitoring indicates that the construction works are having or could have a greater impact than approved, the Environment and Sustainability Manager and Construction Manager will review the results of the monitoring program and take action as soon as reasonably practicable to prevent further impacts. This may include implementing measures such as a stop work, additional fauna fencing and delineation, additional training, changing construction methodology or redesigning certain elements of the project.

If protected matters not included in section 4 are identified in habitat adjacent to the construction boundary, and if they are at risk of uncertain impacts from the Project, then this monitoring program should be reviewed and revised.

7. Reporting

The results from each monitoring session must be compiled into an annual Flora and Fauna Construction Monitoring report prepared by the Project Ecologist or Environment and Sustainability Manager. Reporting requirements are detailed in the FFMP sub-plan under section 7.6. Any monitoring data (including sensitive ecological data), surveys, maps, and other spatial and metadata will be prepared in accordance with the *Guidelines for biological survey and mapped data* (Commonwealth of Australia 2018) and the *Guide to providing maps and boundary data for EPBC Act projects* (Commonwealth of Australia 2021), or as otherwise specified by the Minister in writing.

Each monitoring report must include an analysis of the results including, but not limited to, exceedances of relevant criteria/targets/goals, reasons for any exceedances, trends in the data, and maximum, minimum, and average data results for all monitored parameters. The report must also detail any management and mitigation measures that were implemented to address exceedances during the reporting period. Results from the monitoring sessions are to be summarised and provided periodically throughout the year via monthly Environmental Review Group (ERG) meetings. Flora and Fauna construction monitoring program will be submitted to Planning Secretary and relevant government agencies annually. Flora and Fauna construction monitoring program will be submitted to the AG DCCEEW for information within 10 business days of it being accepted by the Planning Secretary

Attachment 1 - Baseline Water Quality Monitoring at M12RT8

Refer to the Soil and Surface Water Monitoring for baseline water quality monitoring data for monitoring location M12RT8 (Hunter River Wetland) as undertaken during the development of the M12RT Environmental Impact Statement.

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24 July 2025

[Redacted]
Principals Representative M12RT-BH2T
Regional Project Delivery
Infrastructure and Place
Transport for NSW
Level 7, 6 Stuart Avenue
Newcastle West NSW 2302

Ref: 250724-ER Approval M12RT-BH2T-FFMSP_REV05.

[Redacted]
RE: Approval of Minor Amendments. M1 Pacific Motorway extension to Raymond Terrace – Stage 1 – BH2T Construction Flora and Fauna Management Sub-plan, Revision 1.

Thank you for providing the following document for Environmental Representative (ER) approval of minor amendments as required by the Condition of Approval, A29(j) of the M1 Pacific Motorway extension to Raymond Terrace approval (SSI 7319):

- M1 Pacific Motorway Extension to Raymond Terrace – Stage 1 Black Hill to Tomago Appendix D -Construction Flora and Fauna Management Sub Plan (FFMP), Revision 5. 25th July 2025

I have the reviewed changes made to the document by John Holland Gamuda Australia Joint Venture, which include.

- Administrative updates to the document to address SSI 7319 MOD 1 Determined 18 November 2024.
- Updates to Appendix G- Flora and Fauna Construction Monitoring Program. Updates to the monitoring procedures have been made to address the outcomes documented in first six monthly monitoring report. Changes, which include an increase in the frequency of some monitoring and minor amendments to some monitoring locations were developed in consultation with the project ecologist.
- General administrative updates associated with the periodic review of the document.

As an approved ER for the M1 Pacific Motorway extension to Raymond Terrace project, I am satisfied the minor amendments do not increase impacts on sensitive land use(s) and are consistent with the Terms of Conditions of the Approval and the sub-plan approved by the Planning Secretary. Therefore, I approve the minor amendments made in Revision 05 of the BH2T Construction Flora and Fauna Management Sub-plan.

Yours sincerely

[Redacted Signature]

Environmental Representative – M12RT