APPENDIX B2

Flora and Fauna Management Sub Plan

Windsor Bridge Replacement Project

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Glossary / Abbreviations

BC Act	*Biodiversity Conservation Act 2016*
CEMP	Construction Environmental Management Plan
CoA	Condition of Approval
DPI	Department of Primary Industries (Fisheries)
DPIE	Department of Planning, Industry and Environment (formerly Department of Planning and Environment)
EA	Environmental Assessment
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
ESCP	Erosion and Sediment Control Plan
EWMS	Environmental Work Method Statements
FFMP	Flora and Fauna Management Plan
FM Act	*Fisheries Management Act 1994*
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service
OEH	Office of Environment and Heritage
SWMP	Soil and Water Management Plan
SPIR	Submissions / Preferred Infrastructure Report
TfNSW	Transport for New South Wales

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 Windsor Bridge Replacement Project (the Project).

The Windsor Bridge Replacement project team, comprised of the Transport for New South Wales (TfNSW) and Georgiou Group (Georgiou) have partnered together to undertake construction activities for the new road bridge over the Hawkesbury River at Windsor (the Windsor Bridge Replacement Project), on behalf of the New South Wales (NSW) government.

This FFMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), the environmental management measures listed in the Windsor Bridge Replacement Submissions / Preferred Infrastructure Report (SPIR) and all applicable legislation.

1.2 Background

The Project has been assessed as State Significant Infrastructure under the former Part 5.1 of the *Environmental Planning and Assessment Act* 1979 (EP&A Act). The *Windsor Bridge Replacement Project Environmental Impact Statement* (EIS) was prepared by Sinclair Knight Merz in November 2012 for Roads and Maritime. The EIS was on public exhibition until 17 December 2012. A Submissions Report (and preferred infrastructure report) was finalised in May 2013 which addressed stakeholder submissions received during the EIS exhibition period. Following this, in December 2013, the Project was approved by the Minister for Planning and Infrastructure. The EIS assessed the impacts of construction and operation of the Project on flora and fauna. As part of EIS development, a detailed flora and fauna assessment was prepared to address the requirements issued by the then Department of Planning. The flora and fauna assessment was included in the EIS as Working Paper 10-2: Flora and Fauna.

A Modification Report was submitted to DPIE in September 2019 and placed on public exhibition from 23 October 2019 to 7 November 2019. The submissions were addressed by Transport for NSW in the Submissions Report which was lodged with the Director-General in February 2020.

The Minister for Planning and Public Spaces approved the modification on 30 April 2020. The Minister's CoA were updated to incorporate the modification.

1.3 Environmental management systems overview

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

The FFMP is part of the Georgiou environmental management framework for the Project, as described in Section 4 of the CEMP. In accordance with CoA D5(b), this Plan has been developed in consultation with the Office of Environment and Heritage (OEH) and the Department of Primary Industries (Fishing and Aquaculture). Appendix A8 of the CEMP contains a table detailing consultation with relevant agencies to date, including dates, issues raised and how each issue has been addressed within this management plan. Ongoing consultation with the regulatory authorities will be carried out in accordance with Chapter 1 of the CEMP.

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

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

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

The review and document control processes for this Plan are described in Chapter 9 of the CEMP.

2 Purpose and objectives

2.1 Purpose

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

2.2 Objectives

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

- Ensure controls and procedures are implemented during construction activities to avoid, minimise or manage potential adverse impacts to flora and fauna within and adjacent to the Project corridor.
- Ensure measures are implemented to address the relevant CoA outlined in Table 3.1, and the management measures detailed in the SPIR (Table 6.1).
- Ensure measures are implemented to comply with all relevant legislation and other requirements as described in Section 3.1 of this Plan.

2.3 Targets

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

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

- No pollution or siltation of aquatic ecosystems, wetlands, endangered ecological communities or threatened species habitat.
- Minimise barriers to fauna movement and fish passage.

3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislation

Legislation relevant to flora and fauna management includes:

- *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *National Parks and Wildlife Act 1974* (NPW Act)
- *Biodiversity Conservation Act 2016*
- *Fisheries Management Act 1994* (FM Act)
- *Pesticides Act 1999.*

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

3.1.2 Guidelines

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

- TFNSW QA Specification G36 – Environmental Protection (Management System)
- TFNSW QA Specification G40– Clearing and Grubbing
- TFNSW QA Specification R176 – Native Seed Collection
- TFNSW QA Specification R178 – Vegetation
- TFNSW QA Specification R179 – Landscape Planting
- TFNSW Environmental Direction No.25 - Management of Tannins from Vegetation Mulch (January 2012)
- TFNSW *Biodiversity Guidelines* (September 2011)
- NSW Office of Water *Controlled Activities on Waterfront Land: Guidelines for Riparian Corridors on Waterfront* Land (July 2012)
- NSW Department of Primary Industries, *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*, Fairfull and Witheridge, 2003
- *Fishnote – Policy and Guidelines for Fish Friendly Waterway Crossings* – November 2003
- NSW National Parks & Wildlife Service. 2001. *Policy for the Translocation of Threatened Fauna in NSW: Policy and Procedure Statement No. 9* Threatened Species Unit, Hurstville NSW
- Australian Network for Plant Conservation. 2004. *Guidelines for the Translocation of Threatened Plants in Australia*, 2nd Edition
- Relevant recovery plans, priority action statements and best practice guidelines.

3.2 Minister's Conditions of Approval

The CoA relevant to this Plan are listed table 3-1 below. A cross reference is also included to indicate where the condition is addressed in this Plan or other Project management documents.

Table 3-1 Conditions of Approval relevant to flora and fauna

CoA No.	Condition Requirements	Document Reference
BIODIVERSITY		
CoA C34	A riparian corridor consisting of vegetation from the relevant local native vegetation communities shall be established along the Hawkesbury River bank areas disturbed by the Project with the exception of those areas required for scour protection for the safety of the bridge. The riparian corridor is to be consistent with the Controlled Activities on Waterfront Land: Guidelines for Riparian Corridors on Waterfront Land (NSW Office of Water, July 2012).	Vegetation Management Plan (CEMP Appendix B11)
CoA C35	A Vegetation Management Plan (VMP) is to be prepared consistent with the Controlled Activities on Waterfront Land: Guidelines for Vegetation Management Plan on Waterfront Land (NSW Office of Water, July 2012) that demonstrates the protection of remnant native riparian vegetation and the rehabilitation of the riparian corridor. The VMP must be complied with.	Vegetation Management Plan (CEMP Appendix B11)
CoA C36	Seed sources used for the rehabilitation of the riparian corridor are to be from local native botanical provenance where possible.	Vegetation Management Plan (CEMP Appendix B11), Urban Design and Landscape Plan
CoA C37	A minimum two year monitoring and maintenance period is required for the riparian zone commencing after final planting, or until such time as a minimum 80 per cent survival rate of each species planted and a maximum 5 per cent weed cover for the treated riparian corridor is achieved. The monitoring program is to include weed control monitoring.	Section 7.5 Vegetation Management Plan (CEMP Appendix B11)
CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)		
CoA D5 (b)	A Construction Flora and Fauna Management Sub-plan to detail how construction impacts on ecology will be minimised and managed. The sub-plan shall be developed in consultation with the OEH and DPI (Fishing and Aquaculture) and shall include, but not necessarily be limited to:	
	(i) details of pre-construction surveys undertaken by a suitably qualified and experienced ecologist to verify the construction boundaries/ footprint of the Project based on detailed design and to confirm the vegetation to be cleared as part of the Project (including tree hollows, threatened flora and fauna species and riparian vegetation);	Section 5.2.1 Sensitive Area Plans (CEMP Appendix A4)
	(ii) updated sensitive area/ vegetation maps based on (i) above and previous survey work;	Sensitive Area Plans (CEMP Appendix A4)

CoA No.	Condition Requirements	Document Reference
	(iii) details of general work practices and mitigation measures to be implemented during construction to minimise impacts on native fauna and native vegetation (particularly threatened species and EECs) not proposed to be cleared as part of the Project, including, but not necessarily limited to:	Section 6.1 Clearing and Grubbing Plan (Appendix F)
	• fencing of sensitive areas;	Table 6-1
	• a protocol for the removal and relocation of fauna during clearing;	Fauna Handling and Rescue Procedure (Appendix C)
	• engagement of a suitably qualified and experienced ecologist to identify locations where they would be present to oversee clearing activities and facilitate fauna rescues and re-location;	Table 6-1 Pre-clearing Checklist (Appendix A)
	• clearing timing with consideration to breeding periods, measures for maintaining existing habitat features (such as bush rock and tree branches etc.);	Table 6-1 Pre-clearing Checklist (Appendix A)
	• seed harvesting and appropriate topsoil management;	Vegetation Management Plan (CEMP Appendix B11)
	• construction worker education;	Table 6-1 Section 7.2
	• weed management (including controls to prevent the introduction or spread of *Phytophthora cinnamomi*).	Noxious Weed Management Protocol (Appendix E) Vegetation Management Plan (CEMP Appendix B11)
	• Erosion and sediment control and progressive re-vegetation.	Table 6-1 Construction Soil and Water Management Sub-plan (CEMP Appendix B4) Clearing and Grubbing Plan (Appendix F) Vegetation Management Plan (CEMP Appendix B11)
	(iv) specific procedures to deal with EEC/ threatened species anticipated to be encountered within the project corridor including re-location, translocation and/or management and protection measures;	Unexpected Threatened Species / EECs Procedure (Appendix D)
	(v) a procedure for dealing with unexpected EEC/threatened species identified during construction including cessation of work and notification of the OEH, determination of appropriate mitigation measures in consultation with the OEH (including relevant re-location measures); and	Unexpected Threatened Species / EECs Procedure (Appendix D)

CoA No.	Condition Requirements	Document Reference
	(vi) mechanism for the monitoring, review and amendment of this sub-plan.	Review and Improvement (Section 8)

4 Existing environment

The following sections summarise existing flora and fauna within and adjacent to the project area including species, communities and habitats. The key reference documents are Section 7.9 of the EIS and Working Paper 10-2: Flora and Fauna. Relevant ecological information is shown on the sensitive area maps included in Appendix A4 of the CEMP. The construction works boundary and trees to be retained / removed are within the landscape design drawings (appendix H).

4.1 Environmental aspects

4.1.1 Threatened ecological communities

National Parks and Wildlife Service (NPWS) mapping of the Cumberland Plain (NPWS, 2002) suggested that two threatened ecological communities (TECs) may be present within the study area. These TECs included Cumberland Plain Woodland (BC Act/EPBC Act) and River-flat Eucalypt Forest (BC Act). Field surveys in the study area did not record vegetation characteristics or key diagnostic species representative of the TECs identified in the NPWS vegetation mapping. Accordingly, no TECs were found during field investigations..

4.1.2 Threatened or otherwise significant plant species

A review of the OEH NSW Bionet data (OEH, 2012) and EPBC Act Protected Matters Search Tool (DSEWPaC, 2012) identified 15 threatened flora species previously recorded in the study area (14 listed under the EPBC Act and BC Act, and one listed under the BC Act only). The assessment of likelihood for these species determined these species would be unlikely or have a low likelihood to occur within the study area. Field surveys targeted the presence of threatened flora species, endangered populations and their habitats. No threatened flora species that were expected to occur based on the likelihood of occurrence assessments were observed during the survey. No threatened flora species were identified during field surveys.

4.1.3 Fauna habitats

Limited potential fauna habitats occur in the study area, as habitats have been extensively cleared and fragmented during the development of agricultural and rural settlements and urban and residential development. These are shown on the sensitive area plans. Fauna habitats identified in the study area include riparian forest, cleared grassland and freshwater aquatic habitats (within the Hawkesbury River). The existing bridge was also identified to provide limited roosting habitat opportunities for birds and bats within the study area. No critical habitat areas were identified in the study area. Field surveys identified all vegetation within the study area to provide poor quality fauna habitat, with poor structure of canopy, mid storey and lower groundcover flora. Ground debris was generally absent. No habitat trees (hollow-bearing trees including large dead trees) were identified within the study area.

Additionally, all riparian areas were in poor condition and provided minimal resources for fauna in teTfNSW of breeding and foraging opportunities. Shelter and refuge for some bird and arboreal mammal species may be provided in the canopy of riparian areas, particularly for the Common Ringtail Possum (*Pseudocheirus peregrines*). Riparian areas also provide habitat for aquatic species such as the Sydney Hawk Dragonfly (*Austrocordulia leonardi*) and Adams Emerald Dragonfly (*Archaeophya adamsi*).

While the existing Windsor bridge structure was identified to potentially serve as a man-made roosting habitat, no roosting birds or microbats were observed during the field surveys.
The habitats identified in the study area are likely to provide limited opportunities for shelter, breeding and foraging resources for some common frog and reptile species and a low diversity

of bird and mammal species. As a result, the diversity of fauna species recorded within the study area was low.

A total of seven native fauna species were recorded during surveys, comprising two reptile species and five bird species. Two introduced bird species were also recorded during field surveys. The birds identified in the area were predominantly urban birds, tolerant of modified and fragmented habitats such as parrots, miners and swallows. The most abundant species observed included the Magpie (*Gymnorhina tibicen*), Welcome Swallow (*Hirundo neoxena*) and Noisy Miner (*Manorina melanocephala*). The two reptile species recorded were the Eastern Water Dragon (*Physignathus lesueurii*) and Eastern Water Skink (*Eulamprus quoyii*). No evidence of feral animals was observed during the field survey; however the European Red Fox (*Vulpes vulpes*), Feral Cat (*Felis cattus*) and Feral Dog (*Canis familiaris*) are expected to occur within the study area.

4.1.4 Threatened fauna

A review of state and federal government databases (OEH, 2012 and DSEWPaC, 2012) identified a total of 48 threatened fauna species records within the locality, comprising 13 mammals, 27 birds, one reptile, three amphibians, one invertebrate and three fish species. These species were assessed to have an unlikely or low likelihood of occurring within the study area, with the exception of five species with a moderate likelihood to occur within the study area. These species included the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*), the Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), the Eastern Freetail Bat (*Mormopterus norfolkensis*), Southern Myotis (*Myotis macropus*) and the Freckled Duck (*Stictonetta naevosa*).

It is possible that the existing bridge may provide suitable roosting habitat for a range of threatened cave-roosting microchiropteran bats in the locality. This includes the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*) and the Southern Myotis (*Myotis adversus),* both of which have been recorded roosting in artificial structures including concrete bridges. However no bats were observed roosting under the bridge at the time of the field survey.

Field surveys targeted threatened species that were considered to have a moderate or high potential to occur in the study area. No threatened species (or habitats thereof) were identified during the surveys.

4.1.5 Aquatic fauna

The Hawkesbury River is a Class 1 Waterway, as it is a permanently flowing waterway containing a major fish habitat. No existing barriers to fish passage were observed within the study area. No threatened aquatic fauna species are expected to occur in the study area. The Sydney Hawk Dragonfly, the Adams Emerald Dragonfly and the Macquarie Perch (*Macquaria australasica*) are threatened aquatic species listed under the FM Act that have been identified as having a potential to occur within the study area. The condition of habitat for these species is low; therefore these species are unlikely to be present in the area.

4.1.6 Migratory species

A total of 13 migratory species were identified in the EPBC Act Protected Matters Report (February 2012) as potentially occurring within the locality, comprising eight migratory terrestrial species and five migratory wetland/marine species. A preliminary assessment of the likelihood of species occurrence in the study area identified that 10 species were unlikely or would have a low likelihood of being present in the study area (see working paper 10-2: flora and fauna). The White-bellied Sea Eagle (*Haliaeetus leucogaster*), White-throated Needletail

(*Hirundapus caudacutus*) and Cattle Egret (*Ardea ibis*) were considered to have a moderate likelihood of occurrence within the study area.

No migratory species were observed during the field survey. The study area does not contain any important habitat for any listed migratory species and therefore migratory species were not considered further in the assessment.

5 Environmental aspects and impacts

5.1 Construction activities

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

- Clearing of native vegetation (including habitat). The Vegetation Management Plan (CEMP Appendix B11) identifies clearing of approximately 1.95 hectares of vegetation with 0.65 hectares being riparian vegetation.
- Works around and within watercourses.
- Noise and dust impacts.
- Disturbance of soils, consequential erosion and the mobilisation of sediment.
- Use of chemicals / fuels (potential for spills).

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

5.2 Ecological impacts

Likely and/or potential impacts associated with project are discussed in Chapter 7 of the EIS and include:

- Loss of vegetation/habitat including threatened flora and threatened ecological communities and their habitats.
- Wildlife connectivity and habitat fragmentation.
- Injury/mortality.
- Weeds.
- Pests and pathogens.
- Changed hydrology.
- Groundwater dependent ecosystems.
- Aquatic impacts.
- Nosie, vibration and light.
- Impact of relevant key threatening processes.

Notwithstanding, mitigation and management measures provided in Table 6-1 aim to minimise the above likely and potential impacts on threatened flora and fauna. In the absence of appropriate mitigation measures, there is the potential for significant impacts on those threatened flora and fauna species identified in as occurring, or with the potential to occur, within the project corridor.

5.2.1 Pre-clearing surveys

As per CoA D5(b)(i), pre-clearing surveys have been undertaken by a suitably qualified and experienced ecologist (consistent with TFNSW Biodiversity Guidelines (RTA, 2011), to verify the construction boundaries/footprint based on the detailed design and confirm the vegetation to be cleared as part of the project (including tree hollows and riparian vegetation) prior to commencement of any clearing activities.

The pre-clearing survey is provided in Appendix G and has been submitted as part of the documentation necessary for G40 Cl 2.40 Hold Point – Vegetation Clearing. These pre-clearing surveys also satisfy the requirement of conducting pre-construction surveys in accordance with CoA D5(b)(i). The outcomes of the ecologist's survey found that the vegetation on the banks of the Hawkesbury River within the clearing boundary were predominately noxious weeds and priority weeds listed under Hawkesbury River Council. No threatened species were observed during the survey. No hollow bearing trees or logs were identified during the survey; however, it was noted that potential habitat may exist for bird and bat species amongst the girders and pylons underneath the existing Windsor Bridge.

As new weed species have been identified in the pre clearing survey, the weed and pathogen management protocol (appendix E) has been updated with the previously unidentified species. No findings from the survey required Table 6-1, or the sensitive area plans (CEMP Appendix A4) to be updated in accordance with CoA D5(b)(ii).

Prior to demolition, a survey of the existing bridge structure will be undertaken by a suitably qualified and experienced ecologist to confirm the bridge the presence of habitat for microchiropteran bats or other roosting bats. Should the results of the bat survey and roost assessment indicate that the existing bridge occupied by microbats, a Bat Management Plan will be prepared to mitigate the potential impacts on bats. The plan would include details of an appropriate work schedule, any further close inspections that may be required and exclusion and relocation of fauna away from the construction site.

6 Environmental mitigation and management measures

6.1 Flora and fauna mitigation and management measures

A range of environmental requirements and control measures are identified in the various environmental documents, including the Conditions of Approval, environmental management measures from the SPIR and other TfNSW specifications. Specific measures and requirements to address impacts on flora and fauna are outlined in Table 6-1.

WIRES will be made aware of the commencement of construction and consulted if any injured fauna are encountered or if any fauna are injured as a result of the works. In addition, a suitably qualified and experienced ecologist or WIRES representative will be present during the clearing of hollow bearing trees or other fauna habitat structures to manage and/or relocate any fauna present following procedures detailed in Appendix C – Fauna Handling Procedure. Clearing is to consider breeding periods, measures for maintaining (and if required, re-use of) existing habitat features (such as bush rock, tree branches, tree hollows etc.), seed harvesting and appropriate topsoil management. The pre-clearing surveys conducted by the ecologist also satisfy the requirement of conducting pre-construction surveys in accordance with CoA D5(b)(i).

Table 6-1 Flora and fauna management and mitigation measures

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
FLORA AND FAUNA					
Pre-construction and Site Preparation					
FF1	The Project induction will include relevant information, mitigation measures and procedures on protecting the biodiversity of the area during construction.	Training resources	Pre-construction Construction	Environmental Manager	G36 Sections 3.5 and 4.8 EIS Table 10-1 FF1
FF2	Temporary infrastructure (plant sites and offices etc.) will be located in cleared areas away from vegetation. Clear boundaries will be applied for construction and exclusion zones for equipment, machinery and traffic to prevent unnecessary damage to native vegetation and fauna habitats.		Pre-construction Construction	Environmental Manager	CoA D4(d) CoA D5(b)(i) G36 Sections 3.1 and 4.8 EIS Table 10-1 FF2
FF3	Clearing limits will be accurately and clearly marked including trees/vegetation to be retained including riparian zones. Marking of the boundary will be in accordance with the following procedure 1. *The boundary will be mapped and pegged by the surveyor* 2. *The construction team will follow the surveyors installing star pickets and boundary flagging just inside the pegged boundary.* 3. *Sensitive areas, no go zones or known heritage items not to be impacted will have more robust boundary delineation*	TFNSW Biodiversity Guidelines Landscape Design drawings (appendix H)	Pre-construction Construction	Environmental Manager	CoA D5(b)(i) CoA D5(b)(ii) G36 Section 4.8 EIS Table 10-1 FF3
Ecologist Pre-clearing Survey					
FF4	Once construction areas have been surveyed and marked, a BSc (Environmental Science) qualified and experienced fauna ecologist will undertake a pre-clearing survey to identify any concerns to specific species.		Pre-construction	Environmental Manager	CoA D5(b)(i) G36 Section 4.8 EIS Table 10-1 FF4
	A survey of the existing bridge structure will be undertaken by boat by an ecologist to confirm the bridge is not providing habitat for microchiropteran bats,other roosting bats or nesting birds		Pre-construction	Environmental Manager	CoA D5(b)(iv) G36 Section 4.8 EIS Table 10-1 FF4
	A Bat Management Plan will be prepared to mitigate potential impacts to bats, in the event they are identified in the ecologist survey prior to demolition, roosting in the existing bridge		Pre-construction Construction	Environmental Manager	CoA D5(b)(i) G36 Section 4.8 EIS Table 10-1 FF4

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
Fauna Measures During Clearing					
FF5	WIRES will be made aware of the Project and consulted if any injured fauna are encountered or if any fauna are injured as a result of the works.		Pre-construction Construction	Environmental Manager	CoA D5(b)(i) CoA D5(b)(iii) G36 Section 4.8 EIS Table 10-1 FF4
	An ecologist or WIRES representative will be present during the clearing of suspected vegetation that may support a habitat for fauna to manage and/or relocate any fauna present. This includes birds' nests as the nests may contain young birds yet to fledge the nest. Peak breeding season is between August and October for the species identified in the EIS and clearing will occur during this period.		Pre-construction	Environmental Manager	CoA D5(b)(i) CoA D5(b)(iii) G36 Section 4.8 EIS Table 10-1 FF4
	If trees with hollows are found during pre-clearing surveys, their removal will be avoided where practicable. Where this is not possible, the tree will be maintained intact as far as possible and placed on the ground in adjoining vegetation.		Pre-construction Construction	Environmental Manager Construction Manager	CoA D5(b)(i) G36 Section 4.8
	Habitat trees including trees with birds' nests will be inspected for fauna by ecologist or WIRES carer and habitat trees will be felled carefully to minimise impact.		Pre-construction	Environmental Manager	CoA D5(b)(iii) G36 Section 4.8
Clearing in Riparian Zones					
FF6	The areas of disturbance in the riparian zones will be minimised as far as practicable by clearly delineating work zones and areas to be protected with robust boundary fencing.	Landscape Design drawings (appendix H)	Pre-construction Construction	Environmental Manager	CoA D5(b)(i) CoA C35 EIS Table 10-1 FF6
	All works near riparian zones will have adequate sediment and erosion control, with relevant ESCP's updated as required.	Progressive Erosion and Sediment Control Plan (updated as required)	Construction	Environmental Manager Project/Site Engineers	CoA D5(b)(i) CoA D5(b)(iii) G36 Section 4.8 EIS Table 10-1 FF6
FF7	In-stream and riparian disturbance will be minimised during construction through clearly delineated working areas.		Pre-construction Construction	Environmental Manager Construction Manager	CoA D5(b)(i) G36 Section 4.8 EIS Table 10-1 FF10

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
FF8	Removal of instream woody snags (>3 m in length and >300 mm diameter) will be avoided where practicable. Any woody snags that require removal during construction will be relocated insitu.		Pre-construction Construction	Environmental Manager Construction Manager	CoA D5(b)(iii) G36 Section 4.8 EIS Table 10-1 FF10
FF9	In-stream disturbance from dredging will be managed and mitigated as appropriate to minimise impacts. Appropriate measures will include insitu measures to limit the risk of sediment plumes and increased turbidity, such as silt curtains (or similar).		Pre-construction Construction	Environmental Manager Construction Manager	CoA D5(b)(iii) G36 Section 4.8 EIS Table 10-1 FF11
Weed Management					
FF10	The Weed and Pathogen Management Protocol will be implemented during construction to manage any noxious weeds identified during pre-clearing surveys.	Noxious and environmental weed control handbook (NSW DPI)	Pre-construction Construction	Environmental Manager	CoA D5(b)(iii) G40 EIS Table 10-1 FF7
	All noxious weeds which are cleared as part of the project will be disposed of appropriately.	Weed and Pathogen Management Protocol (Appendix E)	Pre-construction Construction	Environmental Manager	CoA D5(b)(iii) G40 EIS Table 10-1 FF7
	Inspection/maintenance procedures will be implemented to reduce the carriage of weed material on machinery. Procedures will include the following; • The superintendent will conduct a pre-mobilisation checklist prior to all new plant and equipment entering site. • The ESR will conduct weekly environmental inspections using the Georgiou system Oneapp to record the findings and actions of the inspections.	Weed and Pathogen Management Protocol (Appendix E)	Noxious and environmental weed control handbook (NSW DPI)	Environmental Manager Project/Site Engineers	CoA D5(b)(iii) G36 Section 4.8 EIS Table 10-1 FF8
Monitoring					
FF11	A monitoring program (including a weekly checklist) will be developed to check that all proposed impact mitigation measures have been effectively implemented. Monitoring will be done through the use of the Georgiou Oneapp system		Pre-construction Construction	Environmental Manager	CoA D5(b)(vi) G36 Section 4.8 EIS Table 10-1 FF8

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	In the event that impact mitigation measures do not perform effectively, the management program will be adjusted with further appropriate measures.		Pre-construction Construction	Environmental Manager	CoA D5(b)(vi) G36 Section 4.8 EIS Table 10-1 FF8
Revegetation					
FF12	Areas disturbed as a result of the project will be stabilised and rehabilitated through a progressive landscaping program that takes advantage of optimal growing conditions and is appropriate to the final land use.	Vegetation Management Plan (CEMP Appendix B11)	Pre-construction Construction	Environmental Manager Construction Manager	CoA D5(b)(iii) CoA C34, C35 G38 EIS Table 10-1 FF12
	Where possible riparian zone rehabilitation will include appropriate native species.	Windsor Bridge Replacement 100% Landscape Design Drawings	Pre-construction Construction	Environmental Manager	CoA C34, C35, C36 EIS Table 10-1 FF12
	A riparian corridor consisting of vegetation from the relevant local native vegetation communities will be established along the Hawkesbury River bank areas disturbed by the project with the exception of those areas required for scour protection for the safety of the bridge.	Vegetation Management Plan (CEMP Appendix B11)	Construction	Environmental Manager	CoA 34
FF13	The species mix is will emulate the existing revegetated community. Density will be high enough to quickly establish vegetative cover and root mass to stabilise the riparian zone.	Windsor Bridge Replacement 100% Landscape Design Drawings	Pre-construction Construction	Environmental Manager	Vegetation Management Plan, Section 6
FF14	Seed sources used for the rehabilitation of the riparian corridor will be from local native botanical provenance where possible.	Vegetation Management Plan (CEMP Appendix B11)	Construction	Environmental Manager	CoA C36
FF15	Revegetation will be done using assisted natural regeneration (bushland regeneration) and active revegetation such as direct seeding and the planting of tubestock.	Vegetation Management Plan (CEMP Appendix B11)	Construction	Environmental Manager	Vegetation Management Plan, Section 5
Work Around the *Araucaria cunninghamii* tree					
FF16	The proposed batter located between the proposed road alignment and the *Araucaria cunninghamii* tree will be undertaken via one of the following methods, unless otherwise approved by Roads and Maritime:		Construction	Environmental Manager	Environmental assessment modification (September 2019)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	Option 1: All proposed work is located at least three metres from the subject tree (measured from the edge of the trunk). This option would not require further root investigation or assessment by the project arborist. The design of the modification has adjusted the batters to reduce the extent of excavation in the vicinity of the tree; or Option 2: The proposed work falls within three metres of the subject tree (measured from the edge of the trunk). This option would require further root investigation (by non-destructive methods) under supervision of the project arborist. Any proposed excavations that fall within 2.5 metres of the tree are not recommended and are likely to cause impacts that cannot be mitigated through the use of tree protection measures and/or tree sensitive construction techniques;				
FF17	Ensure the overhanging canopy of the *Araucaria cunninghamii* tree is protected and retained as its shape is important for its aesthetic appearance.		Construction	Environmental Manager	Environmental assessment modification (September 2019)

7 Compliance management

7.1 Roles and responsibilities

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

7.2 Training

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

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

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

7.3 Monitoring and inspections

Inspections of sensitive areas and activities with the potential to impact flora and fauna will occur for the duration of the project through a monitoring program (weekly checklist) to check that all proposed impact mitigation measures have been effectively implemented.

Requirements and responsibilities in relation to monitoring and inspections are documented in Section 8.2 of the CEMP. As detailed in Section 8.2 of the CEMP, certain monitoring requirements relating to rehabilitation are documented in the Vegetation Management Plan (CEMP Appendix B11).

7.4 Auditing

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

Audit requirements are detailed in Section 8.3 of the CEMP.

7.5 Reporting

Reporting requirements and responsibilities are documented in Section 8.5 of the CEMP. There are specific reporting requirements associated with additional survey work and monitoring including:

- Results of pre-clearing surveys and associated control measures.
- Monthly report incorporating a summary of weekly environmental inspections, as well as records of any non-conformances and measures taken to rectify non-conformances.

A two year monitoring and maintenance program (CoA C37) will assess and report on the effectiveness of final planting of the riparian zone and weed control monitoring as part of the Project. Details of the monitoring and maintenance program are included in the Vegetation Management Plan (Appendix B11 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 non-conformances and deficiencies.
- Verify the effectiveness of the corrective and preventative actions.
- Document any changes in procedures resulting from process improvement.
- Make comparisons with objectives and targets.

8.2 FFMP update and amendment

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

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

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

Appendices

Flora and Fauna Management Plan

Appendix A

Pre-clearing Checklist

Revision history

Revision	Date	Description	Approval
1			
B	19/06/18	RMS review	
A	28/05/18	For review	

Distribution of controlled copies

Copy no.	Issued to	Version
1	RMS	A
2	RMS	B
3		
4		
5		

Pre-clearing Checklist

Pre Clearing and Ground Disturbance 'Permit to Clear'

Checklist to be submitted to Georgiou Environmental Site Representative/Manager after reviewing the completed Pre-Clearing Report and at least two (2) days prior to clearing commencement. The Project Ecologist must be BSc (Environmental Science) qualified and experienced fauna ecologist. Clearing must not commence in any part of the area until this vegetation clearing permit has been approved.

Project:			*Date::*		
Vegetation Clearing Locations – Attach drawings/sketches/maps if required			*No of Attachments*		
Location:		*Ch From*		*Ch To:*	
Comments:					

#	Control Measures	Y/N/NA	Comments/Corrective Actions
Site Preparation			
1	*Are the proposed works covered by an existing Approval? (Note the documents that cover the Works, eg. Project approval or another approval)*		
2	*Have the clearing limits been established by the Survey Team?*		
4	*Have clearing boundary limits been established and clearly marked and fenced off, including from rivers, creeks, watercourses and drainage lines to indicate to the clearing contractors where to stop clearing?*		
	Has the Project Ecologist completed the Pre-Clearing report?		
4	*Has Hold Point G40 Cl 2.4 detailing pre-clearing information, including Ecologist report been submitted at least seven (7) days prior to commencement of clearing?*		
5	*Refer to Ecologist pre-clearing Report to answer and implement the following:*		
	a. Have EECs been identified and marked in the field? If yes, provide details of location and EEC on plan.		
	b. Is protective fencing installed around EECs and heritage items?		
	c. Have all hollow bearing trees, potential hollow bearing trees, trees containing nests, bush rocks and hollow logs to be cleared been clearly identified by the Project Ecologist for 2-stage clearing prior to clearing?		
	d. Have habitat trees and/or trees/vegetation to be preserved been identified and suitable protection implemented prior to clearing?		
	e. Were any fauna identified during the pre-clearing assessment? If yes, provide a brief description of fauna and any actions taken		
	f. Were any threatened fauna species identified during the survey? If yes, was this fauna moved on from site?		
	g. Were any threatened flora species identified during the survey? If yes, was this translocated from clearing area or fenced off for protection prior to clearing?		
	h. Have areas of weed infestation including topsoil been identified?		
	i. Were any trees outside the clearing limit been deemed unsound? If yes are they clearly marked?		
6	*Has the Sensitive Area Maps been updated to include the outcomes of the Ecologist Report?*		
Additional Environmental Controls			
7	*Has Council Weeds Officer been contacted? If yes, have all requested actions been undertaken?*		
8	*Have all residents with potential to be disturbed been advised at least two (2) weeks prior to clearing vegetation?*		

9	*If near a creek or waterway crossing, ensure riparian zone is managed in accordance with FFMSP - Management and Mitigation Measures*		
10	*Have sediment control measures been installed before clearing as required by the Soil and Water Management Plan?*		
Fauna Protection Controls			
11	*Has the Project Ecologist been notified and scheduled to undertake pre-clearance and clearance activities? Have fauna release sites been identified?*		
13	*Is a copy of Fauna Handling and Rescue Procedure available?*		
14	*Are there any animals including active nests present? If yes relocation is required (Refer to Appendix C – Fauna Handling and Rescue Procedure)*		
Training and Sign Off			
15	*Have the relevant construction personnel been briefed on the 2 stage clearing process and any specific area issues?*		
16	*Have all relevant staff and contractors been toolboxed on the clearing limits, sensitive area locations, no go areas, fauna descriptions and handling procedures etc.? Have all relevant workers signed off on EWMS?*		
Additional Comments:			

Completed by:		*Signature:*		*Date:*	
I have reviewed the "Permit to Clear" checklist and all measures have been implemented as required. The clearing between the above mentioned chainages may proceed in accordance with this procedure.					
Hold Point Signoff: *Environmental Site Representative Sign-off*					

Flora and Fauna Management Plan

Appendix B

Working around Trees Guideline

Revision history

Revision	Date	Description	Approval
1			
B	19/06/18	RMS review	
A	28/05/18	For review	

Distribution of controlled copies

Copy no.	Issued to	Version
1	RMS	A
2	RMS	B
3		
4		
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Working around Trees Guideline

Introduction

Purpose

This guideline has been prepared to reduce the impacts to trees retained throughout the works associated with the Windsor Bridge Replacement Project. It provides Georgiou staff and contractors with an easy to use guide of the minimum requirements of working around trees to reduce the risk of damage.

Damage to trees and roots from excavation or material /equipment storage can cause declining tree health leading to structural instability. Damage can also result in an increased risk to worker and public safety from unstable trees and possible fines for Georgiou and its subcontractors.

Induction/Training

Personnel involved in any aspect of working around trees will be trained in the requirements of this guideline. All personnel are to be inducted on the location of sensitive areas, exclusion zones, the associated fencing / signage delineating these areas and the relevant actions for them with regards to this guideline during the project induction, EWMS and regular toolbox talks.

Guidelines

Tree protection

For trees identified specifically for protection, environmental and construction personnel, under supervision of an ecologist where required, are to ensure appropriate demarcation, signposting and maintenance to ensure no impact to these trees. See the landscape design drawings (appendix H) for the trees to be retained and protected within the construction boundary.

Site material storage

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

General construction near trees

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

- Prior to using machinery within or close to the drip line of trees, observe the location of trunks, roots and branches to ensure damage is avoided.
- Some branches can be tied back if they are obstructing work. This depends on the flexibility and strength of the tree. Contact the Foreman who will get the ESR (who may contact the ecologist or arborist if required) to undertake flexibility test prior to tying back branches.
- Report any tree damage to the Foreman or ESR. Quick remedial action can usually prevent long term damage to the tree.

Excavations near trees

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

- Where possible, redesign drainage to avoid impact within the drip lines of retained vegetation.
- Excavation with machinery should occur outside the drip line of trees where possible.
- For necessary excavation works within the drip line of trees, where the tree is planned to be retained, smaller machinery or hand excavation should be used to avoid or minimise root damage.
- For all excavations within the drip zones of trees to be retained, proceed with caution and monitor for roots greater than 50mm in diameter. Arborist advice as to methods of cutting through even small roots should be obtained when excavating within drip zones.

Roots greater than 50mm must not be damaged unless approved by the ESR as damage to woody roots >50mm may make trees unstable and they can fall over. Larger roots may need to be cut by an arborist.

Tree trimming or removal

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

- The Foreman should notify the ESR of the location and need for the tree impact.
- The ESR should confirm that the tree (or other vegetation type) is not protected under relevant legislation and is able to be removed and/or trimmed.
- If impact is permitted as per Step 2, and the tree is to be retained, the ESR will contact an arborist to undertake the trimming of the tree(s) as required.
- If impact is permitted as per Step 2, and the tree is to be removed, the ESR will notify the Foreman that the tree can be removed.
- The Foreman should await confirmation from the ESR prior to re-commencing works around the tree(s).

Heavy machinery should not be used for pruning or trimming. Appropriate tools to use are loppers, chain saws and vehicle mounted saws. Larger limbs should generally be cut in accordance with the three cut method, shown below in Figure 1.

Limbs containing hollows should be retained wherever possible. If this is not possible, the hollow bearing limb should be inspected by the Project Ecologist, who supervises the felling operation, and placed in adjacent un-disturbed vegetation to provide fauna habitat.

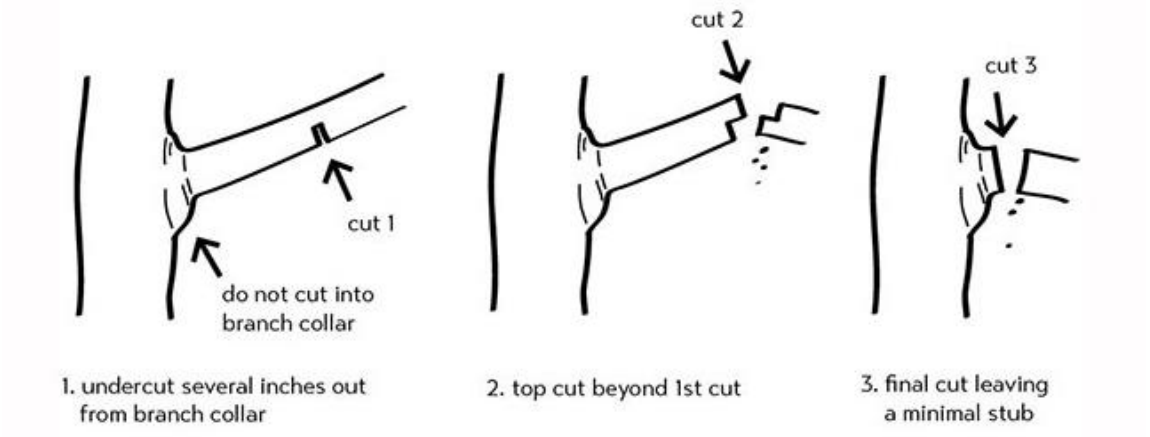

Figure 1 – Three cut method

Flora and Fauna Management Plan

Appendix C

Fauna Handling Procedure

Revision history

Revision	Date	Description	Approval
C	28/07/18	ER Review	
B	19/06/18	RMS Review	
A	28/05/18	For review	

Distribution of controlled copies

Copy no.	Issued to	Version
1	RMS	A
2	RMS	B
3	RMS	C
4		
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Fauna Handling and Rescue Procedure

Purpose
This procedure has been prepared to minimise the impacts on fauna, including threatened and protected during all works associated with the Windsor Bridge Replacement Project

Scope
This procedure applies to all native and introduced species (domestic or pest) that are found on the project site, including injured, shocked, juvenile and other animals.
Handling of fauna should be avoided where ever possible to reduce:

- stress on animals;
- spreading of disease (e.g. Chytrid Amphibian Fungus);
- risk to health or safety (e.g. venomous snakes, raptors, bats with potential to carry Australian Bat Lyssavirus).

Where handling of animals cannot be avoided, it should only be done by a licensed fauna ecologist or wildlife carer with specific animal handling experience.

To minimise the requirements to handle fauna, it is assumed that pre-clearing assessments outlined in Section 5.2.1 of the Flora and Fauna Management Plan are completed prior to clearing, the two stage clearing procedure as outline in Appendix F is followed, and the project ecologist is on site during clearing of vegetation and habitat trees.

Emergency Contacts

Contact	Contact Number
Project Ecologist	0407 461 092
Project Environmental Site Representative	0409 805 004
Superintendent	0403 311 285
WIRES	1300 094 737
Macquarie Veterinary Clinic, Windsor ▪ 24 Hawkesbury Valley Way, Windsor NSW	(02) 4587 7490

Induction/Training
All Georgiou personnel on the Windsor Bridge Replacement Project are to be inducted on this procedure and the relevant actions for them with regards to this procedure during the project site induction and regular toolbox talks.

Project Ecologist
A Project Ecologist will be employed to undertake the pre-clearing surveys and supervision of clearing activities.

WIRES
WIRES will be made aware of the Project and consulted if any injured fauna are encountered or if any fauna are injured as a result of the works.

Fauna Likely to be affected by the Works
While some mobile species, such as birds, may be able to move away from the path of clearing, other species that are likely to be direct affected by the works including:

- Less mobile species unable to move rapidly over relatively large distances (e.g. frogs and reptiles, nesting birds and juvenile fauna);
- Young birds yet to fledge their nest – peak breeding periods for the birds identified in the EIS is August to October;
- Arboreal and scansorial mammals (possums);

- Microbats residing in structures (bridges and culverts);
- other species utilising tree hollows (e.g. birds); and
- Fish and aquatic fauna (e.g. fish or eels) in waterways.

For these species, construction activities will potentially result in loss of roosting habitat and potential injury or mortality. Mobile species fleeing clearing areas are also at risk from collision with vehicles.

Measures to Minimise Impacts on Fauna
In accordance with FFMP Appendix A (Pre-clearing Checklist) and FFMP Appendix F (Clearing and Grubbing Plan), a range of measures will be implemented to assist in minimising impacts to fauna, including:

- identification and marking of the clearing limits
- pre-clearing surveys to identify:
    - hollow bearing trees and other trees occupied by fauna;
    - structures likely to be occupied by microbats;
    - waterways requiring dewatering;
    - suitable areas for relocation of fauna; and

Nonetheless, not all fauna will be able to flee the clearing or construction area. As such, the following procedures have been developed to manage the rescue and handling of fauna.

Supervision of Clearing
An ecologist or WIRES representative will be present during the clearing of suspected vegetation that may support a habitat for fauna to manage and/or relocate any fauna present.

The objective of the pre-commencement inspections and supervision of clearing is to direct clearing in a manner that either allows for fauna to safely flee the clearing area. Uninjured animals that are unable to flee the clearing area will be captured and placed in adjacent areas of analogous habitat that contains suitable refuge habitat, to areas of adjoining habitat.

Injured animals will be cared for according to specific animal care and ethics guidelines (http://www.animalethics.org.au/reader/arrp-policies-and-guidelines) and be given appropriate veterinary care, and if available, the services of one of the local animal welfare groups. Severely injured and pest animals may need to be euthanized at the assessment of a veterinarian.

Relocation of Fauna
Relocation of fauna will be undertaken by, or under advice from, the Project Ecologist or wildlife carer and records will be maintained in a register. If the animal is not injured or stressed, it will be released nearby in an area that is not to be disturbed by Construction, in accordance with the following:

- Sites identified as suitable release points by the Project Ecologist or wildlife rescuer.
- Sites of similar habitat and located as close to the original capture location as possible.
- If the species is nocturnal, release will be carried out at dusk.
- Avoid release during periods of heavy rainfall where feasible.
- Hollow-dependent species, particularly those with dependent young, will be released into a temporary nest box.

If the animal has been placed into care due to injury, age (i.e. young) or stress, upon its rehabilitation it will be released in an area that is not to be disturbed by the Project Construction works, at the discretion of the Project Ecologist or wildlife rescuer

Fauna Handling Considerations

The table below provides a summary of considerations for general handling and rescue of fauna. Fauna handling will be undertaken by or at the direction of the Project Ecologist or WIRES representative.

Taxa/Activity	Consideration
Handling of Snakes	Handling of snakes can be unsafe and bites from these species can result in serious illness, damage to organs or even death. Some monitor species also have anticoagulants that result in excessive bleeding. Handling of these species should be attempted by appropriately qualified personnel and where possible utilise no-direct contact handling techniques (i.e. use of snake hook and bag opposed to handing the animal).
Handling of bats / removal of structures (bridges and culverts)	Some species of bats carry the Australian Bat Lyssavirus (ABL) which is a form of rabies. Anyone handing bats should be vaccinated. Bats that are held should be stored in a calico bag or sealed bat nest box. Prior to clearing of existing structures, an assessment for microbats and other fauna residing in the structure shall be completed. If the assessment determines that microbats are likely roost it the structure, a site specific bat management strategy is to be developed to manage staged exclusion of the bats from the structure prior to removal.
Handling of frogs	Handling of frogs can result in the spread of the Amphibian Chytrid Fungus and shall be undertaken in accordance with the DECC Hygiene Protocol for Control of Disease in Frogs (DECC 2008) – Refer to Appendix F. Frogs and tadpoles are to be placed into plastic bag (zip lock) or other plastic containers with a small amount of water and vegetation.
Handling of mammals and birds	Mammals and birds are capable of causing injury to handlers (e.g. bites, scratches) or themselves if handled incorrectly. Mammals and birds should be placed into a calico/hessian bag or a cardboard box. Possums which can easily rip through calico bags and should be placed within double lined canvas bags.
Nestlings or juveniles	If habitat trees are found to contain nestlings or juveniles prior to felling then it would be preferable to leave trees intact until such a time that juveniles have vacated the nest or den. If, however, construction timing does not permit this then Georgiou will seek advice from TfNSW before proceeding.
Threatened species	If any habitat tree is found or suspected (based on fresh tree markings or scats) to contain any threatened species, the tree should be left in place for a minimum of two days and, if possible, be re-inspected prior to felling.
Arboreal animals	In the event that arboreal animals do not move or they cannot be captured because the tree hollow is too large, high or its recovery would breach WH&S requirements then the tree will be felled and animals recovered post-felling.
Handling of fish and aquatic species	Ensure that containers for holding aquatic species provide sufficient amount of water and adequate aeration.

Taxa/Activity	Consideration
Relocation and release of animals general	Animals should only be released at a time and place that is suitable to the species and provides it with a likely chance of survival (i.e. release should not increase the risk of stress or predation to the species). Release should not take place during periods of heavy rainfall.
Release of nocturnal species	Nocturnal animals captured during the day will be immediately taken to adjacent bushland and placed into a relocated tree hollow or nest box or held until the evening and released shortly after dusk (see below for holding of animals).
Temporarily holding animals	Captured animals may be held for a short period of time (preferably less than 24 hours prior to release). Animals kept for any purpose will be secured in a container (see above) and stored in a quiet, ventilated and preferably dark location away for construction activities. Injured animals will require additional care and may need to be nursed on route to care.
Injured Animals	Injured animals will be cared for according to specific animal care and ethics guidelines) and be given appropriate veterinary care, and if available, the services of one of the local animal welfare groups.
Euthanasia	In some instances severely injured and pest animals may need to be euthanized. This is to be done by a veterinarian after being assessed.
Release site selection	During the preliminary pre-clearing assessments, the project ecologist is to identify and assess suitable release sites for fauna adjacent to the project area.

Contingency procedure for unexpected discovery of fauna on-site during construction activities

In the event that wildlife is discovered on the site during construction activities that may harm the animal or pose a risk to site personnel, the following procedure should be followed:

1. **Stop all works** in the vicinity of the animal and notify your supervisor or superintendent who is to notify the Project Ecologist or Environmental Manager if the Project Ecologist is not present on site.

Provide exact location of the animal, clear directions to access the area and contact details for someone at the work front who will be able to meet the Project Ecologist or WIRES Representative and show them where the animal is.

2. **Establish an exclusion zone around the animal.** Control plant and vehicle movements around this area.
3. **Allow animal to leave the area without handling if the animal is mobile.** Make sure the animal has a clear safe path to leave the project area.
4. If aquatic fauna (frogs, fish, turtles etc.) are identified within the confines of the silt curtain then dip-netting will occur, the procedures below for safe handling, storage and relocation of captured aquatic fauna will be followed
5. If the animal is unable or unwilling to leave the area of its own accord, only a licensed fauna ecologist or wildlife carer with specific animal handling experience should attempt to handle and relocate the animal.
6. If the Project Ecologist or WIRES Representative is not immediately available, the following may be suitable to reduce stress to fauna and / or reduce the risk of further injury:

    Terrestrial Animals:

    a. Minimise the number of people around the animal;
    b. Cover larger animals with a towel or blanket and place in a cardboard box or hessian bag;
    c. Place smaller animals in a cotton back or shoe box;

d. Keep animal in a quiet, ventilated and preferably dark location away for construction activities.

Aquatic Animals

a. Minimise the number of people around the animal
b. Frogs/tadpoles to be handled wearing gloves and placed in a plastic bag with a small amount of water and leaf litter. Ensuring one individual (fully grown) to one bag.
c. Aquatic fauna (fish and other aquatic life ie. Turtles) to be placed in plastic aquaria or plastic container with sufficient water (do not fill for turtles).

7. If the animal cannot be safely handled;
    a. Maintain exclusion zone;
    b. Supervise the animal until the Project Ecologist or WIRES Representative arrives.
8. The Project Ecologist or WIRES Representative will either:
    a. relocate fauna to nearby areas that will not be disturbed by the project construction works that contains similar / suitable habitat for the species;
        i. fish and other aquatic fauna will be relocated to an area of the Hawkesbury River not impacted by the Project but as close to point of capture as possible
    b. hold the animal temporarily to release nocturnal animals at dusk or avoid period so heavy rainfall; or
    c. transport the animal to Veterinary Services (listed in Emergency contacts previously in this procedure) for assessment if the animal is injured or stressed
9. If the animal is a threatened species that is **NOT** identified in the EIS and FFMP, the Unexpected Threatened Species/EEC's Procedure (Flora and Fauna Management Plan – Appendix D) and the Environmental Site Representative is to notify the following relevant stakeholders;
    1. The TfNSW Environmental Manager (or delegate)
    2. The Environmental Representative
    3. The Project Ecologist
    4. The OEH
    5. Others as instructed by the ER or OEH.
10. Following consultation with the relevant stakeholders listed above, the Project Environmental Site Representative or Project Ecologist will implement any corrective actions and additional safeguards required.
11. If the animal has been injured, requires veterinarian assessment or euthanasia or is killed, an Environmental Incident Report (Appendix A5 CEMP) is to be completed in accordance with the Environmental incident classification and reporting procedure.

Flora and Fauna Management Plan
Appendix D
Unexpected Threatened Species/EECs Procedure

Revision history

Revision	Date	Description	Approval
C	25/07/18	DP&E & ER review	
B	19/06/18	RMS review	
A	28/05/18	For review	

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1	RMS	A
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4		
5		

Unexpected Threatened Species/EECs Procedure

Purpose
This procedure details the actions to be implemented when a threatened species is unexpectedly encountered during any construction activities associated with the Windsor Bridge Realignment.

Scope
This procedure is applicable to all activities conducted by Georgiou personnel that have the potential to come into contact with threatened species. Threatened Species include terrestrial and aquatic individual species, EEC and CEEC.

Induction/Training
All Georgiou personnel are to be inducted on the identification of potential threatened species occurring on site and the relevant actions for them with regards to this procedure during the project site induction and regular toolbox talks.
Procedure (refer to Flow Chart on the next page)

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

   a. If a threatened species, either flora or fauna, is encountered during excavation / construction / waterway activities:

      i. STOP ALL WORK in the vicinity of the find
      ii. Immediately notify the Georgiou ESR who will notify the Project Ecologist for a positive identification
      iii. Once confirmed, notify TfNSW

   b. Following positive identification, OEH will be notified of the unexpected threatened species or EEC. Mitigation measures including relevant relocation measures will be developed in consultation with OEH.
   c. OEH will be informed of any unplanned event of death or injury to threatened species during construction.

2. Assessment of Impact

   a. An assessment is to be undertaken by the ESR and Project Ecologist to determine the likely impact to the threatened species and appropriate management options developed. If a significant impact is likely to occur on a species that has not been previously identified during the project, RMS will be consulted immediately.

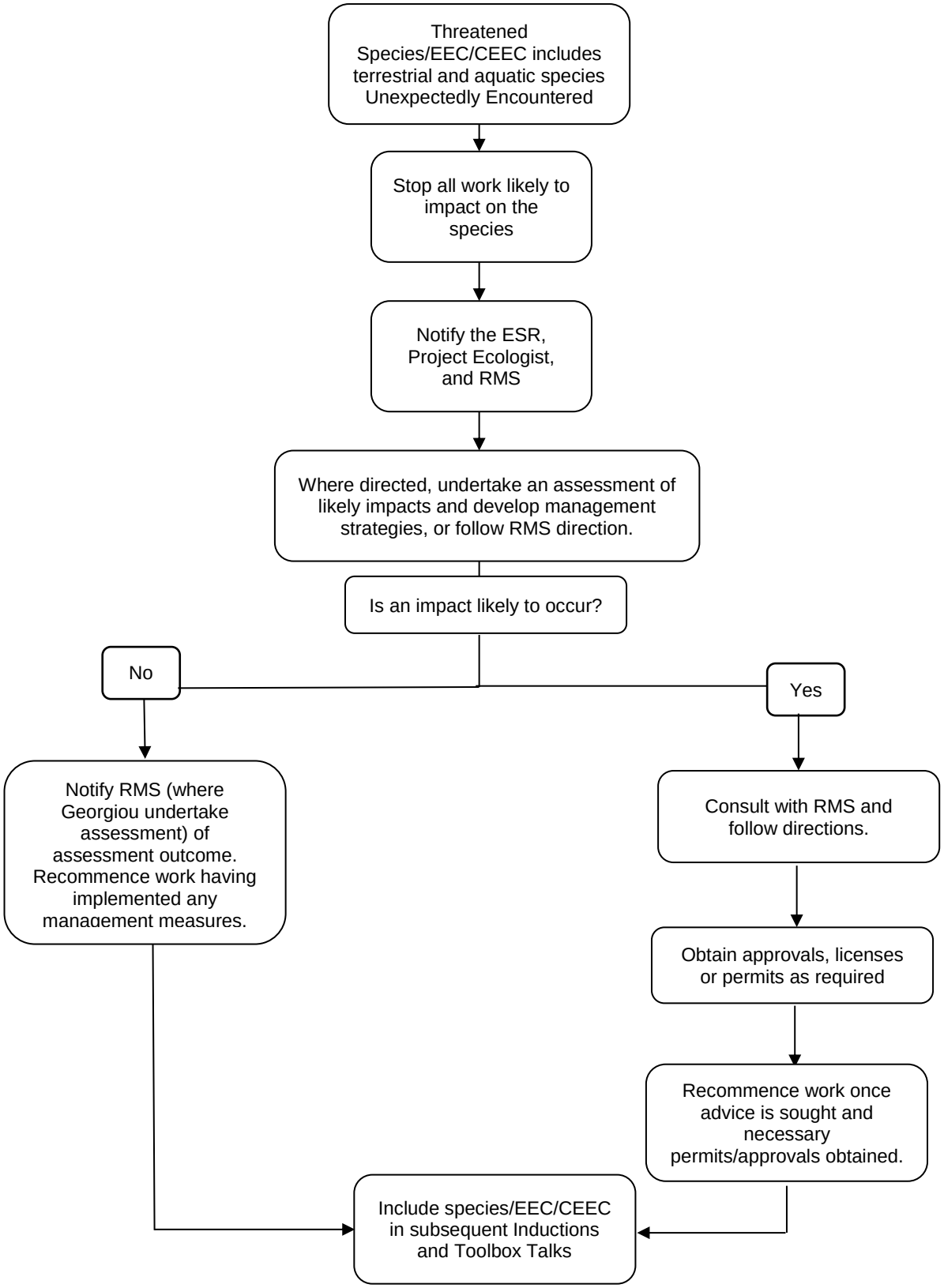
3. Approvals

   a. Georgiou/RMS will obtain any licences, permits or approvals required if the species is likely to be significantly impacted.

4. Recommencement of Works

   a. Works will recommence once necessary advice has been sought and permits obtained if required. If permits are not required, works can recommence after advice from the Project Ecologist, RMS and relevant agencies. Include threatened species in subsequent Project Inductions and Toolbox Talks.

Figure 1: Unexpected Threatened Species Find procedure Flow Chart



Flora and Fauna Management Plan

Appendix E

Weed and Pathogen Management Protocol

Revision history

Revision	Date	Description	Approval
C	25/07/18	DP&E & ER review	
B	19/06/18	RMS review	
A	28/05/18	For review	

Distribution of controlled copies

Copy no.	Issued to	Version
1	RMS	A
2	RMS	B
3	RMS	C
4		
5		

Weed and Pathogen Management Protocol

Purpose

This protocol details weed and pathogen management and control practices to be implemented throughout the construction phase of the Project to minimise the threat to remnant vegetation within the local area. The aims of weed and pathogen management are to:

- suppress and destroy existing noxious and environmental weed infestations within the Project corridor;
- prevent or minimise the spread of noxious and environmental weed species both within and outside the Project corridor; and
- Ensure that Georgiou satisfies its obligations to control weeds under the *Biosecurity Act 2015*, *Guide 6: Weed management* and *Guide 7: Pathogen management, Biodiversity Guidelines* (RTA, 2011) and the *Greater Sydney Regional Strategic Weed Management Plan 2017 - 2022*.
- Reduce and prevent the spread of pathogen - *Phytophthora cinnamomi*

This weed and pathogen management protocol has been developed for weed control activities and pathogen management associated with clearing and grubbing and weed suppression during the construction period.

Scope

In NSW all plants are regulated with a general biosecurity duty under the Biosecurity Act 2015 to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Weed management and control will be conducted on all weeds identified on site with attention to areas of vegetation and those weeds declared noxious within the Hawkesbury Shire Local Government Area. The full list of priority and other weed species, their classification and management measures is available *Greater Sydney Regional Strategic Weed Management Plan 2017 - 2022*. Priority weeds and other weeds of regional concern are also attached to this Protocol.

Weed management within the Project site will consist of initial removal of all vegetative cover on the site (including weeds) and ongoing monitoring and maintenance to ensure effective control of any new weed infestation that occurs.

Pathogen management and control will be conducted onsite in accordance with the Vegetation Management Plan to prevent the spread of *Phytophthora cinnamomi.*

Weed Control

Georgiou is to implement weed control procedures to control weed infestation on the worksite, and deter the introduction and/or spread of weed species during the construction activities. Weed control will have a strong focus on early identification of invasive weeds, with subsequent treatment and removal of noxious weed material, in order to reduce the potential magnitude of any future weed infestation.

Monitoring of weed infestations will occur as part of the routine weekly inspections to determine the effectiveness of management controls.

The superintendent, Foreman and Project Engineers will ensure all plant and machinery entering the site has been inspected to be free of weeds, this will be recorded on Pre-Site Acceptance Plant Checklist.

For weeds other than priority weeds, general weed control strategies are to be implemented. This may involve the spraying of roadside weeds, and direct manual removal or suppression of isolated weed infestations on the worksite. Where weed species adjoin aquatic systems the use mechanical measures, cut and paint or direct drill techniques will be adopted to reduce contamination of the waterways. Concerns over serious weed aggregations and issues would be referred to Hawkesbury City Council for further advice.

Any use of pesticides will be strictly in accordance with the *Pesticides Act 1999*. Use and Notification of pesticides used on site will be undertaken in accordance with RMS QA specifications G36/H and G36/G. Record sheets will be provided to TfNSW within 48 hours of application. In addition, pesticides will not be used adjacent to watercourses or in locations where pesticide residue might enter a watercourse (including the storm water system).

Where weeds cannot be effectively destroyed prior to topsoil stripping, contaminated topsoil will be isolated and either sterilised, encapsulated by deep buried, or disposed of at an approved offsite facility. Topsoil that is known to be contaminated with weeds will be managed as per Environment Site Representative instruction.

In addition the following controls will be implemented:

- Figures showing weed infested areas will be developed from the Ecologist pre-clearing survey.
- Large weed infestations are to be treated prior to clearing to avoid the spreading of live weed material and weed seed.
- Map and mark areas that are infested with weeds as an exclusion zone with fencing and signage to limit access by personnel and vehicles.
- Weed infestation locations will be identified during the pre-clearing survey and in site environmental inspections during construction.
- Weeds removed during vegetation clearing are to be segregated and stockpiled separately from native vegetation to be disposed of at an appropriately licensed landfill.
- mowing/slashing of areas infested with weeds before they seed to reduce the propagation of new plants
- separate weeds from native vegetation where native vegetation is to be used for mulch
- remove weeds immediately onto suitable trucks and dispose of without stockpiling
- Following weed removal, any exposed areas will be stabilised and/or rehabilitated to reduce erosion, and minimise the potential for further weed invasion.
- Where pesticides are to be used adjacent from a sensitive area, mechanical means of pest control (such as mowing or slashing) will be implemented or a hand held application of pesticides will be used.
- The use of pesticides will be avoided on hot days when plants are stressed, after the seed has set, within 24 hours of rain or when rain is imminent or when winds will cause drift of pesticides into non-target areas.

Prevention of weed spread / importation

Environmental controls will be implemented by Georgiou in consultation with the Project Ecologist to prevent the spread or introduction of weeds to the Project area. Controls will include:

- The Superintendent will certify that vehicles are weed free prior to entering the site. If vehicles are found to contain weed or seed material they will not be allowed to enter the site until they have been certified as weed free. This will be recorded on the plant/machinery mobilisation checklist.
- Construction machinery will be suitably cleaned where necessary prior to entering the project area to avoid spread of weeds from areas external to the project area.
- Designated cleaning areas will be situated so as not to allow mud to adhere to vehicles and machinery on exit from key weed-affected sites.
- Vehicles utilised to remove weeds from the project area will be suitably cleaned to prevent spreading of weed from onsite sources before moving off site.
- Program works from least to most weed infested areas, where possible.
- Any imported topsoil and landscaping materials are to be sourced from a location that appropriate testing demonstrates is free of weed propagules and/or Phytophthora cinnamomi. Details of the topsoil material source and testing undertaken must be provided to TfNSW before the topsoil is imported onto the site.

Phytophthora Prevention

Phytophthora cinnamomi is a microscopic soil-borne water mould which causes root rot of susceptible plant species. *Phytophthora cinnamomi* has been recorded in Sydney and dieback associated with the water mould is evident in many areas.

P. cinnamomi prevention measures will be implemented as follows;

- Tools, plant and equipment are to be inspected when first arriving on site to ensure they are free of soil foreign to the site. Records of this will be maintained on the mobilisation checklist for plant and equipment.
- If plant, tools and equipment arrive on site with soil or debris contractors will be informed they are not permitted on site until clean.

Soil testing or testing of effected plant material should be conducted if dieback is evidenced on site to determine the presence of *P. cinnamomi*.

Induction and Training

All Georgiou personnel are to be inducted on the existence of noxious weeds on site during the Project induction and as required in toolbox talks and the controls they are required to implement to minimise weed spread.

Programmed Weed Control Procedure

To control Project wide weed infestations during construction the Environment Site Representative (ESR) will ensure the following procedure is implemented:

1. The ESR shall arrange for an Ecologist to undertake a weed inspection of the site prior to Clearing and Grubbing

2. The Project Ecologist will prepare a pre-clearing report, in which, detail will be provided of the weed species on site, their locations and the recommended methods of control. This will be submitted under the G40 Vegetation Clearing Hold Point along with other the required documentation.

3. Weed control methods will be explored based on those detailed in the Vegetation Management Plan and the recommendations of the Ecologist pre-clearing survey, it

is predicted that primary control will be mechanical removal and segregation of weed contaminated materials during clearing.

4. The ESR will ensure that a record of pesticide application is kept and public notifications are made in accordance with relevant legislation and the RMS QA Specification G36, where pesticides are to be used in areas that could be accessed by members of the public. A sample pesticide application record sheet is attached to this procedure and further guidance available in RMS QA Specification G36; Annexure G.

5. The ESR shall ensure that a follow-up inspection is undertaken of identified weed infestation sites to ensure treatment was successful. If treatment was unsuccessful, re-treat the area until it is successful; and

6. Any weeds physically removed (particularly those bearing seeds) are to be separated from native vegetation and disposed of appropriately at a suitable vegetation waste facility.

7. The ESR will conduct inspections throughout the construction period and new areas of weed infestation identified on site will be appropriately controlled depending on species, location, and density. The results of these inspection are recorded in the Georgiou Oneapp system.

Note - The pre-clearing survey ecologist report will be submitted to TfNSW as a Hold Point (G40 Cl 2.4) on the presence of weeds and unsound trees together with a written notice that limits of clearing and areas of weed infestation have been identified by the ecologist **at least seven working days before starting any clearing.**

Weeds identified in the Environmental Impact Statement, 2012
A number of weeds were identified in the EIS biodiversity surveys in 2012, the weeds are listed in the Table-1 below. The Ecologist pre-clearing survey will confirm the presence /absence of these weeds onsite as well as any previously unidentified weed species prior to clearing and provide control requirements.

Table-1 Weeds identified in EIS, Windsor Bridge

Species	Prevalence on Site
Green Cestrum (*Cetsrum parqui)*	Along the southern bank of the river in the EIS study area.
Croften Weed *(Ageratina adenophora)*	Largely confined to the northern banks of the river to the east of the bridge, adjacent to agricultural land.
African lovegrass *(Eragrostis curvula)*	Largely confined to the northern banks of the river to the east of the bridge, adjacent to agricultural land.
Lantana *(Lantana camara)*	Scattered clumps along the southern bank of the river west of the bridge and immediately east of the bridge on the northern side of the river.
Broad-leaf Privet *(Ligustrum lucidum)*	Observed largely within the vegetation immediately east of the bridge on the northern side of the river. Sporadic individuals occur along the southern bank west of the bridge.
Small-leaf Privet *(Ligustrum sinense)*	
Johnson Grass *(Sorghum halepense)*	Observed on the floodplain and riverbank in areas devoid of trees east of the bridge on the northern side of the river.
Willow *(Salix babylonica)*	Sporadic within the vegetation on the southern bank of the river in the study area and a mature individual immediately east of the bridge on the northern side of the river. Some juveniles emerging.

Classification and management of priority weeds

The Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 identifies priority weeds and other regional weeds of concern for the Greater Sydney Region, and are provided in Appendix 1 and 2 respectively. Management requirements for weeds, whether that be specific regulatory measures (state level priorities) or outcomes to demonstrate compliance with the General Biosecurity Duty (regional priority weeds), are also detailed in these attachments.

The outcomes applied to a particular weed depend on factors such as the biology and ecology of the weed, the land use(s) in which it occurs, the distribution in the region and size of the infestation, potential pathways for infestation and others. These factors were taken into account in determining the suite of outcomes to demonstrate compliance with the General Biosecurity Duty and strategic responses. These obligations apply to all private and public landholders in the region.

Include Appendix 1, 2 of the Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022

http://greatersydney.lls.nsw.gov.au/ data/assets/pdf_file/0010/722368/Greater- Sydney-Regional-Weed-Mgmt-Plan-29-June-2017_FINAL-web-res.pdf

Flora and Fauna Management Plan

Appendix F

Clearing and Grubbing Plan

Revision history

Revision	Date	Description	Approval
C	25/07/18	DP&E and ER review	
B	19/06/18	RMS review	
A	28/05/18	For review	

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Clearing and Grubbing Plan

Purpose

This clearing procedure explains the process and measures to be implemented prior to, during and after vegetation clearing for construction activities and identifies who is responsible for implementing them.

Scope

This procedure is applicable to all native and introduced vegetation required to be cleared on the project site.

Induction/Training

All Georgiou/subcontractor personnel undertaking clearing or directly involved with works will be trained in this procedure through Toolbox Talks or Pre-Starts.

Preparation

Prior to vegetation clearing the ESR will ensure:

1. The limit of clearing, 'No-Go' areas/fencing and boundary fence line has been established on site as per requirements of G40 Cl 2.4. Including;
    a) includes a statement from an Ecologist that identifies the species and location of any weeds growing anywhere in the road reserve over the length to be cleared and grubbed;
    b) identifies all locations of threatened flora species and trees which have been marked or otherwise identified for preservation; and
    c) lists any trees outside the limits of clearing which are unsound and likely to fall upon the roadway or onto private property.
2. The Project Ecologist has undertaken a pre-clearing survey of vegetation prior to clearing, with the outcomes of this assessment compiled into a report which will be part of the documentation required for the G40 Cl 2.4 Hold Point. The site assessment and report includes the following;
    a) Identification of the species and location of any weeds growing within the area to be cleared and grubbed;
    b) Identification of the location of threatened flora species, EECs, threatened species habitat and trees adjacent to creeks and waterways which have been marked or otherwise demarcated for preservation;
    c) Identification of any trees outside the limits of clearing which are unsound and likely to fall upon the roadway or onto private land. These trees may need to be cleared or pruned in accordance with AS 4373 following the approval of the Roads and Maritime;
    d) Clearly marked and recorded all habitat trees within the clearing zone and ensure no previously unidentified threatened species are present
3. Where required, contact is made with the Hawkesbury City Council Weeds Officer to ascertain if any special precautions are required.
4. The ecologist pre-clearing report will be submitted to the TfNSW as a Hold Point (G40 Cl 2.4) on the presence of weeds and unsound trees together with a written notice that limits of clearing and areas of weed infestation identified in the ecologist report at least seven days before starting any clearing.

5. All residents with the potential to be disturbed have been advised prior to clearing vegetation.
6. A copy of Appendix C *Fauna Handling and Rescue Procedure* is available.

Site Setup and Training

Prior to vegetation clearing the ESR and Foreman will ensure:

1. All subcontractors and employees involved in the clearing are trained via Toolbox Talks or Pre-Starts on the environmental risks and aspects to be considered during clearing including
2. Limits of clearing will be fenced off with clearly visible temporary fencing (or similar) to protect threatened flora species. Vegetation to be retained to also be fenced off prior to the commencement of works and all Georgiou personnel and contractors to be inducted to understand the ecological sensitivity of these areas as per the Vegetation Management Plan and RMS Biodiversity Guidelines.
3. A boundary is established and clearly marked from creeks, watercourses and drainage lines to indicate where to stop clearing. Clearing of these areas cannot take place until immediately before construction commences in that area
4. Where required, weed eradication has been carried out and areas of weed-infected topsoil have been identified in accordance with the Weed and Pathogen Management Protocol – Appendix E
5. Where required, areas of contaminated soil have been identified and marked on site.
6. Sediment controls are in place where possible, as described in the *Soil and Water management Plan* and relevant *Progressive Erosion and Sediment Control Plan (PESCP)*
7. The Pre-Clearing and Ground Disturbance "Permit to Clear" Checklist has been completed
8. The methods used to mark and identify weeds to be removed and the disposal of weeds will be as per Appendix E – Weed and Pathogen Management Protocol

Clearing and Grubbing – 2-Stage Clearing Process

During vegetation clearing the ESR shall ensure that the 2-stage clearing procedure is followed as below:

1. The ESR is to monitor the clearing operations daily to ensure proper management and compliance with this procedure and relevant EWMS.
2. A suitably experienced and qualified Project Ecologist will be present during all clearing operations of vegetation marked as potential habitat.
3. Non-habitat trees are to be cleared first.
4. Habitat trees will be **left for 24 hours** after felling of the non-habitat trees nearby to allow any potential fauna the opportunity to move from the habitat trees.
5. Where possible, habitat trees are to be knocked with an excavator bucket or other machinery used for clearing to create only enough disturbance for fauna to move from the tree (this may not be possible for some large dead trees due to safety risks to plant operator). Excessive knocking of the tree must not take place. The tree is to be **left for 1 hour** before being felled as gently as possible
6. Habitat trees are to be removed strictly under the guidance of the Project Ecologist and in accordance with RMS Biodiversity Guideline 4, including the provision of a licensed

ecologist or WIRES representative during the clearing of habitat trees, the removal of non-habitat vegetation first, exercising caution when clearing habitat trees and keeping a record of the habitat removal process. Habitat trees are to be felled so as to keep as much of the integrity of the tree material around the hollow intact.

7. Felled habitat trees will be immediately inspected by the Project Ecologist for fauna and the *Hollow Inspection Checklist* below is to be completed. If fauna is found, the *Fauna Handling and Rescue Procedure* in Appendix C is to be followed and the *Clearing Data Sheet* to be completed. Habitat trees will be removed once the Project Ecologist has confirmed no fauna is present in the tree.
8. Grasses and small understorey species are to be retained adjacent to rivers, creeks and watercourses wherever possible.
9. Clearing and grubbing culverts is to be minimised. Small trees shrubs, grasses and sedges under bridges must be retained wherever possible
10. Techniques to minimise impacts on bank stability are to be implemented where relevant.
11. Inspection of these areas will form part of the weekly environmental inspection.
12. Holes left during removal of trees and stumps will be promptly backfilled with sound material and, where required, revegetated, as per RMS specifications R44 and R178.
13. Grubbing should be carried out to a depth of 0.5m below natural ground and 1.5m below top of Select Material Zone.
14. All trees, stud and logs of the sizes listed below which are outside the area to be cleared for the formation but considered by the Principal to be a potential traffic hazard must be trimmed or removed within a minimum disturbance to adjacent trees and vegetation.

Protection of trees to be retained within the clearing boundary

Trees and vegetation within the clearing boundary that is not within the design footprint and will not interfere with ancillary areas should be protected against any damage during construction. The storage of soils/material under trees can compact soil, limit water and oxygen uptake, damage roots and cause tree death. Therefore prior to the commencement of works near trees or vegetation to be retained, the superintendent should determine areas where machinery, materials and equipment can be stored that are outside the drip line of trees. The trees are to be protected via fencing with no materials to be stored within the drip line. The tree protection fencing for all proposed retained vegetation and individual retained trees is to be installed in accordance with AS 4970-2009 Protection of trees on development sites. See the landscape design drawings (appendix H) for the trees to be retained and protected within the construction (clearing) boundary.

After vegetation clearing

Holes remaining after trees and stumps have been grubbed and redundant drainage, utilities and other structures removed must be backfilled promptly with sound material to prevent the infiltration and ponding of water and prevent the risk of entrapment of fauna in excavations. The backfilling material must be compacted to at least the relative compaction of the material existing in the adjacent ground. Backfill must comply with the requirements of Specification RMS R44 when part of an engineered embankment or foundation. In the area defined in Clause 2.2 the final 50 mm of backfilling must be topsoil and the area must be vegetated within 7 days of removal of the stump. Topsoil and vegetation must comply with Specification RMS R178.

Native trees that are removed during clearing and grubbing will be used either in conjunction with soil erosion and sediment control measures or converted to mulch and stockpiled for use in landscape planting.

All materials cleared, pruned and grubbed unable to remain or be reused on site, will removed for recycling or disposal. Disposal will be in accordance with the Construction Waste and Energy Management Plan.

The ESR will ensure that the post clearing report (*Hollow Inspection Checklist* and *Clearing Data Sheet)* are completed by the Project Ecologist.

Hollow Inspection Checklist

Project:		*Inspection Date:*	

Criteria	*Answer/Comments*
Ecologist:	
Tree ID:	
Species	
Location: approx. CH	

Hollow Details		*Type*	*Entrance*		*Depth*	*Height from ground*	*Suitability/ evidence of fauna*
			Shape	*Size*			
1							
2							
3							
4							
5							
6							
7							
8							

Fauna Observed/Caught		*Species*	*#*	*Age/breeding status*	*Treatment*	*Release Details*
1						
2						
3						
4						
5						
6						
7						
8						

Comments:

Completed by:		*Signature:*		*Date:*	

Clearing Data Sheet

Record details of all fauna observed/caught during clearing operations.

Species	Details of how the animal was injured/found	Location	Action Undertaken i.e. captured/released, self-escape, taken to vet etc.

Toolbox

The objective of this toolbox is to ensure that all Georgiou personnel and subcontractors involved with clearing operations are aware of their responsibilities and the environmental procedure/work method.

- Pre-clearing surveys must be undertaken prior to clearing commencement
- All environmental controls are to be in place and maintained
- All personnel are aware of relevant marking of habitat trees, environmentally sensitive areas, weeds, unsound trees and trees to be retained
- All personnel are aware of the 2 stage clearing method
- Know the procedures to be undertaken without the appropriate signoffs
- If any fauna is detected during clearing, immediately notify the Foreman or Environmental Site Representative.

We the undersigned understand that the procedure/WMS nominated above has been explained and its contents are clearly understood. We also clearly understand the controls

Name	Position	Employer	Initial	Date

Flora and Fauna Management Plan
Appendix G

Pre-clearing Survey

Flora and Fauna Management Plan
Appendix H

Landscape Design Drawings

These drawings detail the construction boundary and trees to be removed / trees to be retained.