

# **Replacement of the Kings Highway bridge over the Clyde River at Nelligen – access and construction improvements**

Addendum review of environmental factors

Roads and Maritime Services | June 2019





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Prepared by GHD Pty Ltd and Roads and Maritime Services

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# Document controls

## Approval and authorisation

Title	Replacement of the Kings Highway bridge over the Clyde River at Nelligen – access and construction improvements addendum review of environmental factors
Accepted on behalf of NSW Roads and Maritime Services by:	Luke Brodie Project Manager Technical & Project Services – Regional Project Office
Signed:	
Dated:	06/06/2019

## Document status

Document status	Date	Prepared by	Reviewed by
Version 1	05 June 2019	Lucy Bourne	John McManus

# Executive summary

## The proposed modification

In October 2016, a review of environmental factors (REF) was prepared for Replacement of the Kings Highway bridge over the Clyde River at Nelligen (the project).

Roads and Maritime Services propose to modify the project. The proposed modification includes the adjustment of the project REF boundary at a number of locations to facilitate:

- Establishment of new facilities to store and set up equipment for the project north east of the Clyde River
- Expansion of the proposed site compound to facilitate safe vehicle and plant access from Old Nelligen Road
- Water quality basin that includes a combination of roadside swales, trash screens, and basins for bio-retention and spills
- Utility relocation along the crossing of the Clyde River and along Thule Road
- Extensions of drains to allow the discharge to flow through the natural path of the existing landscape beyond the project REF boundary
- Improved connections with the existing Wharf Street and Reid Street area in Nelligen and allow driveway access at Thule Road
- Safe and efficient operation of the construction site.

The proposed modification would:

- Provide an additional facility near the eastern abutment to store bridge girders, construction plant and equipment as well as provide safe access for vehicles from Old Nelligen Road
- Provide the minimum width required for the safe and efficient operation of the construction site and accommodate design changes to water quality/spill containment basins, culvert extensions and access
- Allow for relocation of utility assets on the western side of the bridge and southern sealed side of Thule road.

## Background

In October 2016, an REF was prepared for the project.

In parallel with the project REF, an environmental impact statement (project EIS) was prepared for the parts of the overall proposal located in areas mapped as coastal wetlands under State Environmental Planning Policy No 14 – Coastal Wetlands (SEPP 14) due to works in these areas being designated development.

The project REF and project EIS were placed on public display for community and stakeholder comment between 14 October 2016 and 18 November 2016. In March 2017, a submissions report was prepared to respond to issues raised and a letter was sent to Eurobodalla Shire Council resulting in some changes to the mitigation measures in the project EIS.

On 7 March 2017, Eurobodalla Shire Council granted development consent (including a number of conditions of consent) for the project EIS. The project REF was determined by Roads and Maritime on March 2017.

In April 2018, SEPP 14 was repealed and replaced by State Environment Planning Policy (Coastal Wetlands) 2018 (CM SEPP). The proposed modification does not occur on any coastal wetland mapped under CM SEPP and therefore does not trigger designated development and does not require consent from Council. The project EIS, development consent and project REF are subject to savings provisions.

## Need for the proposed modification

Section 2 of the project REF addresses the strategic need for the project and the benefits it would have in achieving the project objectives. The proposed modification described and assessed in this addendum REF is consistent with the strategic need for the project.

The proposed modification is needed to allow a minimum width for safe and efficient operation of the construction site. Additionally, the ancillary site facilities identified in the project REF have been found to be insufficient for the storage of bridge girders and construction equipment and plant, vehicle turnaround, as well as the safe and efficient operation of the construction site.

Detailed design identified a further modification was required for utility relocations and to facilitate smooth connections with the existing road and property driveway. In addition, due to the limited benefits of gross pollutant traps and other devices in areas with space constraints, detailed design includes a combination of roadside swales, trash screens and bio retention/spill containment basins at the western end of the project REF boundary.

The proposed modification is needed to allow efficient and timely construction of the project.

## Proposal objectives and development criteria

Section 2.3 of the project REF identifies the proposal objectives and development criteria that apply to the proposed modification.

The proposed modification is consistent with the above proposal objectives identified in the determined project REF.

## Options considered

In developing options for each feature of the proposed modification, Roads and Maritime aimed to meet the proposal objectives and where possible avoid major technical, social and environmental constraints.

The following options were considered:

- Option 1 – Do Nothing. This option would not enable the design and construction work to be undertaken as described and assessed in the determined project REF.
- Option 2 – Proposed modification. This option would allow storage of bridge girders, construction equipment and plant, as well as enable safe and efficient operation of the construction site. The proposed design changes would minimise the social and environmental impacts during construction and operations, including the safety of the workers and motorists during all stages of the project.

Option 2 was selected as the preferred option as it accommodates the design changes necessary to provide adequate storage for construction materials, plant and equipment while maintaining safe and efficient operation of the construction site.

# Statutory and planning framework

The project was approved under former Part 5 and Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) in March 2017.

Roads and Maritime is the proponent and determining authority for the proposed modification. Clause 94 of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by, or on behalf of, a public authority without consent.

As the proposed modification is for a road and is to be carried out on behalf of Roads and Maritime, it can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The development consent for the project EIS is saved under section 4.70 of the Environmental Planning and Assessment Act, 1979. No changes are proposed to be made to that consent.

## Community and stakeholder consultation

Consultation with potentially affected property owners, relevant government agencies and other stakeholders was carried out by Roads and Maritime during the development and concept design phase of the approved project REF and EIS proposal.

Roads and Maritimes has consulted with Department of Primary Industries during the development of this addendum REF under the ISEPP. As a result of this consultation process and consideration of recent changes to ISEPP, changes to five safeguards and three additional safeguards are proposed in this addendum REF.

## Environmental impacts

The main environmental impacts and mitigation measures for the proposed modification include:

### Biodiversity

The proposed modification would result in the following additional impacts on biodiversity:

- Removal of up to 4.31 ha of native vegetation compared to submissions report which is considered to be foraging habitat for threatened fauna species. Clearing of native vegetation would occur mainly along the edges of the existing highway, and would involve removal of a moderate diversity of non-threatened native plants, including mature trees.
- Removal an additional 1.88 ha of threatened ecological communities listed under the Biodiversity Conservation Act 2016 and the *Environment Protection and Biodiversity Conservation Act 1999*.
- Impacts on riparian vegetation and in-stream flora would be limited to the area immediately adjacent to the existing bridge and the location of the new bridge. The revised project boundary would result in the removal of riparian vegetation, including 0.52 ha Floodplain Swamp Forest (0.10 ha increase compared to the approved project REF proposal).
- Additional impacts on seagrass (0.07 ha increase) but no changes to impacts on mangroves and saltmarsh.
- There would be no additional direct impact on wetland habitats due to the proposed modification. Potential indirect impacts on coastal wetlands include reduce water quality as a result of erosion and sedimentation during construction and changes to surface water flows which would impact upon water availability within the wetlands.

The cumulative impact from the approved project REF boundary and the proposed modification assessed in this addendum REF are not likely to significantly impact threatened species, populations or ecological

communities or their habitats, within the meaning of the BC Act or FM Act and therefore a Species Impact Statement is not required.

The cumulative impact from the approved project REF proposal and the proposed modification assessed in this addendum REF are not likely to significantly impact threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act.

### **Noise and Vibration**

The potential noise and vibration impacts have been assessed with regards to the overall impact of the project, including the proposed modification. The assessment found that receivers along Wharf Street and Thule Road closest to the project would experience the highest number of exceedances of the noise management level (NML) during vegetation clearance and site compound establishment and removal. The worst-affected residential receiver is predicted to receive noise levels up to 88 dBA (increased from 80 dBA from the project REF).

The impacts of the proposed modification would be managed through implementation of the safeguards and management measures outlined in the Submissions Report with the exemption of one additional safeguard included in this addendum REF.

### **Non-Aboriginal Heritage**

The Bushranger's Tree is located within 35 metres of the proposed modification and therefore there is potential for vibration impacts to occur on this item. Changes to Non-Aboriginal Heritage safeguards are being proposed to manage this potential additional impact.

### **Landscape and visual amenity**

Sections of woody vegetation would be removed as part of the proposed modification and may result in temporary visual impacts. Affected areas would be rehabilitated post construction in accordance with the Project REF safeguards and mitigation measures.

### **Hydrology and flooding**

Sections of the proposed modification are located within possible flood affected areas, including Stockpile 4 and utility relocation (underboring and trenching locations) along Thule Road.

There is potential for some changes to surface water flows due to the presence of materials or equipment on site which could potentially redirect flows. As materials are not expected to be left on site for prolonged periods such impacts are considered minimal.

All other potential construction impacts associated with the proposed modification are consistent with those described in the project REF and as such, no further assessment has been carried out.

### **Soil and water**

There would be a minor increase in the area of exposed surface from the proposed modification (Stockpile 4 and project REF boundary expansions), including trenching and pits for underboring for the utility relocation. Underboring increases the risks of frac-out events. A frac-out is the unintentional return of drilling fluids to the surface. Additional safeguards are proposed to manage these risks.

Other potential construction and operation phase impacts for the proposed modification are consistent with the project REF.

## Justification and conclusion

The proposed modification is subject to assessment under Division 5.1 of the EP&A Act.

This addendum REF (AREF) has examined and considered to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

Mitigation measures as detailed in this AREF would minimise the expected impacts of the proposed modification. Consistent with the project REF and submissions report, the proposed modification would allow for the efficient and safe construction of the project. On balance, the proposed modification is considered justified.

The environmental impacts of the proposed modification are not likely to be significant and therefore it is not necessary for an environmental impact statement to be prepared and approval for the proposed modification to be sought from the Minister for Planning under Division 5.2 of the EP&A Act.

The proposed modification is unlikely to affect threatened species, populations or ecological communities or their habitats, within the meaning of the Biodiversity Conservation Act 2016 or the Fisheries Management Act 1994 and therefore Species Impact Statement is not required. The proposed modification is also unlikely to affect Commonwealth land or have a significant impact on any matters of national environmental significance.

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# 1. Introduction

## 1.1 Proposed modification overview

Roads and Maritime Services (Roads and Maritime) proposes to modify the Replacement of the Kings Highway bridge over the Clyde River at Nelligen (the project). The proposed modification includes the adjustment of the project REF boundary at a number of locations (as shown in Figure 1-1 and Figure 1-2) to facilitate:

- Establishment of new ancillary facilities, including a new laydown area north east of the Clyde River
- Expansion of the proposed site compound to facilitate safe vehicle and plant access from Old Nelligen Road
- Water quality/spill containment basin that includes a combination of roadside swales, trash screens, and bioretention/spill containment basins
- Public utility (Telstra and Essential Energy assets) relocation along the alignment crossing at the Clyde River and along Thule Road
- Culvert extensions to allow the discharge to flow through the natural path of the existing landscape beyond the project REF boundary
- A smooth tie-in with the existing Wharf Street and Reid Street area in Nelligen and allow driveway access at Thule Road
- Safe and efficient operation of the construction site.

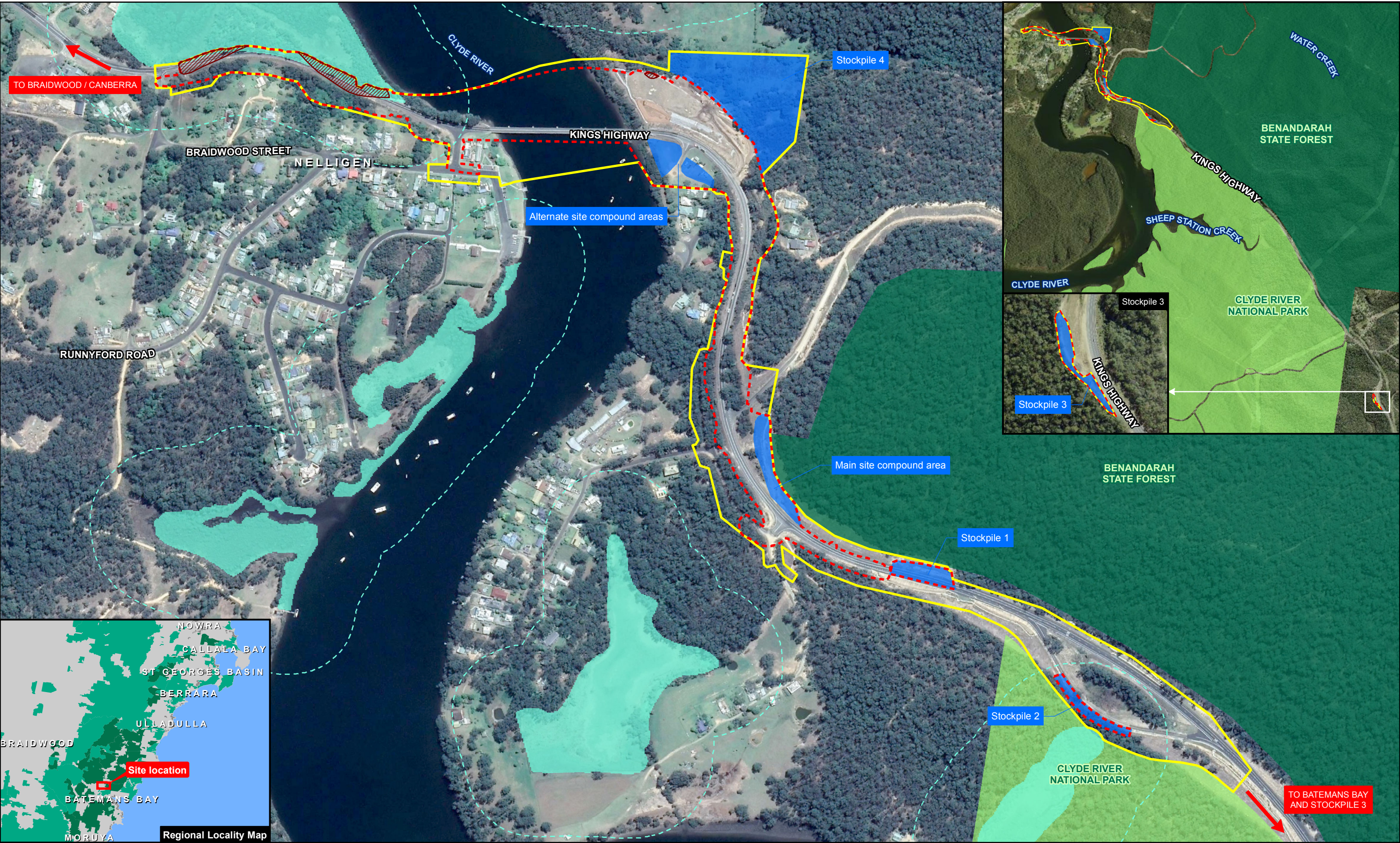
Chapter 3 describes the proposed modification in more detail.

In October 2016, a review of environmental factors (REF) (the project REF) was prepared for Replacement of the Kings Highway bridge over the Clyde River at Nelligen. In parallel with the project REF, an environmental impact statement (project EIS) was prepared for the parts of the overall proposal located in areas mapped as coastal wetlands under State Environmental Planning Policy No 14 – Coastal Wetlands (SEPP 14) due to works in these areas being designated development. The project REF and project EIS were placed on public display for community and stakeholder comment between 14 October 2016 and 18 November 2016. In March 2017, a submissions report was prepared to respond to issues raised and a letter was sent to Eurobodalla Shire Council resulting in some changes to the mitigation measures in the project EIS.

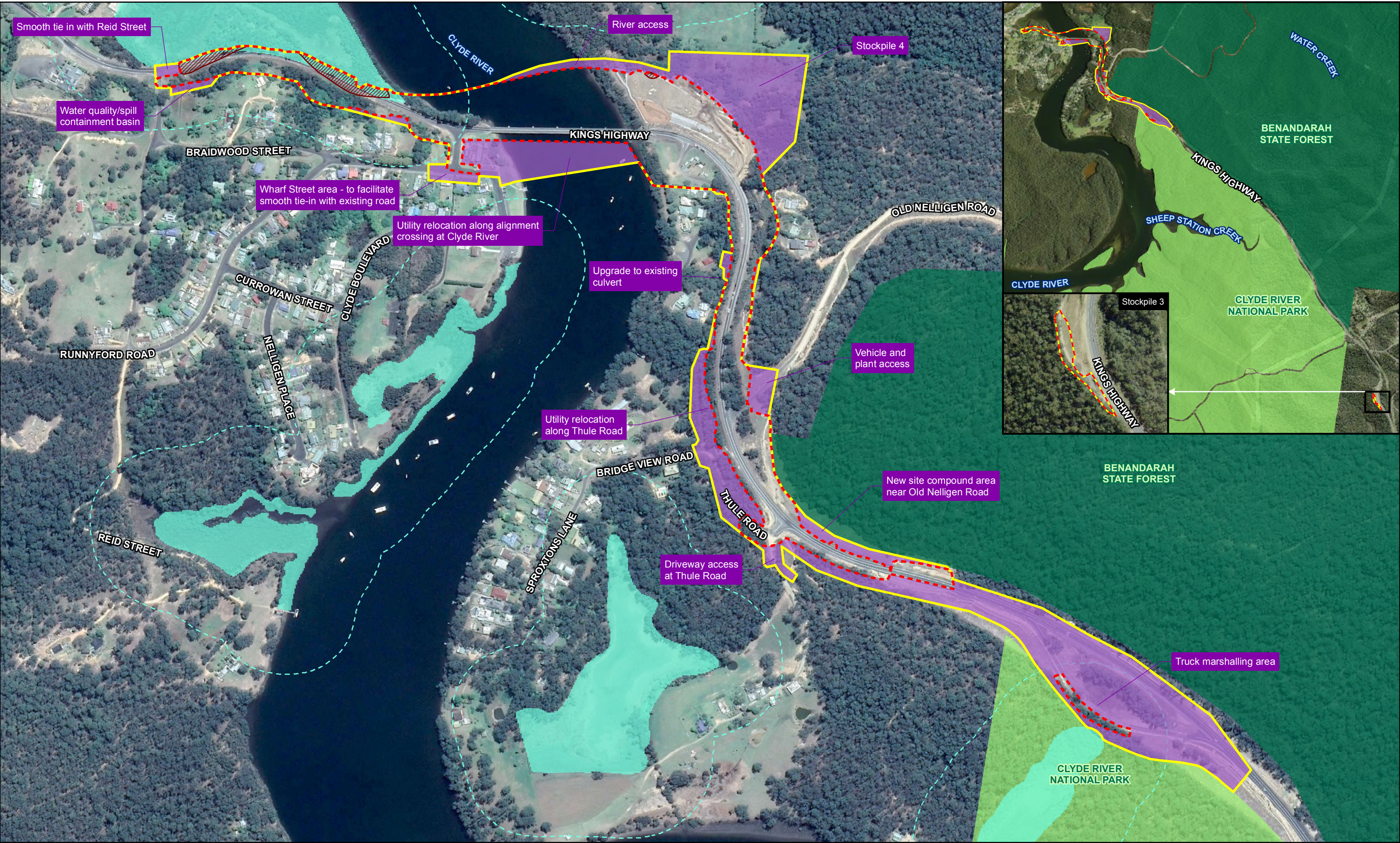
On 7 March 2017, Eurobodalla Shire Council granted development consent (including a number of conditions of consent) for the project EIS. The project REF was determined by Roads and Maritime on March 2017.

In April 2018, SEPP 14 was repealed and replaced by State Environment Planning Policy (Coastal Wetlands) 2018 (CM SEPP). The proposed modification does not occur on any coastal wetland mapped under CM SEPP and therefore does not trigger designated development and does not require consent from Council. The project EIS, development consent and project REF are subject to savings provisions. Refer to chapter 4 for further detail.











## 1.2 Purpose of the report

This addendum review of environmental factors (REF) has been prepared by GHD Pty Ltd (GHD) on behalf of Roads and Maritime. For the purposes of these works, Roads and Maritime is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This addendum REF is to be read in conjunction with the project REF, project EIS and submissions report. The purpose of this addendum REF is to describe the proposed modification, to document and assess the likely impacts of the proposed modification on the environment, and to detail mitigation and management measures to be implemented.

The description of the proposed work and assessment of associated environmental impacts has been undertaken in context of clause 228 of the Environmental Planning and Assessment Regulation 2000, *Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (*Is an EIS Required?* guidelines) (DUAP, 1995/1996), *Roads and Road Related Facilities EIS Guideline* (DUAP, 1996), the *Biodiversity Conservation Act 2016* (BC Act), the *Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In doing so, the addendum REF helps to fulfil the requirements of:

- Section 5.5 of the EP&A Act including that Roads and Maritime examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.
- The strategic assessment approval granted by the Federal Government under the EPBC Act in September 2015, with respect to the impacts of Roads and Maritime's road activities on nationally listed threatened species, ecological communities and migratory species.

The findings of the addendum REF would be considered when assessing:

- Whether the proposed modification is likely to result in a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act.
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report.
- The significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured.
- The potential for the proposed modification to significantly impact any other matters of national environmental significance or Commonwealth land and therefore the need to make a referral to the Australian Government Department of the Environment and Energy for a decision by the Australian Government Minister for the Environment on whether assessment and approval is required under the EPBC Act.

## 2. Need and options considered

### 2.1 Strategic need for the proposed modification

Chapter 2 of the project REF addresses the strategic need for the project, the project objectives and the options that were considered. The proposed modification described and assessed in this addendum REF is consistent with the strategic need for the project.

During the detailed design development Roads and Maritime identified a requirement for expansion of the approved project REF boundary along the project length to allow minimum width for safe and efficient operation of the construction site. The ancillary site facilities identified in the project REF were found to be insufficient for the storage of bridge girders and construction equipment and plant, vehicle turnaround, as well as the safe and efficient operation of the construction site.

Detailed design also identified a further modification was required for utility relocations. Telstra and Essential Energy assets crossing the Clyde River and along Thule Road and an additional area around Wharf Street and Thule Road to facilitate smooth tie-ins with the existing road and property driveway.

In addition, due to the limited benefits of gross pollutant traps and other devices in areas with space constraints, detailed design includes a combination of roadside swales, trash screens and bioretention/spill containment basins at the western end of the project REF boundary.

The proposed modification is needed to allow efficient and timely construction of the replacement of the Kings Highway bridge over the Clyde River at Nelligen.

### 2.2 Proposal objectives and development criteria

Section 2.3 of the project REF identifies the proposal objectives and development criteria that apply to the proposed modification. The proposal objectives are as follows:

- Provide a safe and reliable road crossing of the Clyde River at Nelligen without load or speed restrictions within the next ten years
- Provide a safer road environment on the bridge approaches that reduces the frequency and severity of crashes to below the class average
- Provide a safer crossing of the Clyde River for pedestrians and cyclists
- Support efficient freight movements without load or speed restrictions catering for higher mass limit B-doubles within the next ten years
- Eliminate the ongoing maintenance issues with the existing bridge
- Minimise environmental impacts on such things as heritage, biodiversity, noise and water quality.

The proposed modification is consistent with the above proposal objectives identified in the determined project REF.

### 2.3 Alternatives and options considered

In developing options for each feature of the proposed modification, Roads and Maritime sought to meet the proposal objectives and where possible avoid major technical, social and environmental constraints.

The following options were considered:

### ***Option 1 – Do nothing***

This option would not enable the design and construction work to be undertaken as described and assessed in the determined project REF.

### ***Option 2 – Additional ancillary facilities and design changes***

Three additional ancillary facilities are required to accommodate the storage of bridge girders, construction equipment and plant, as well as to enable safe and efficient operation of the construction site. These additional ancillary facilities are:

- An additional stockpile area to accommodate the storage of bridge girders, construction equipment and plant (Stockpile 4)
- Expansion of the proposed site compound to facilitate safe vehicle and plant access from Old Nelligen Road
- Minor expansion of the approved project REF boundary along the project length to provide the minimum width for safe and efficient operation of the construction site.

The proposed expansion of the approved project REF boundary would accommodate the necessary design changes, including:

- Additional area around Wharf Street required to facilitate a smooth tie-in with the existing road
- Change in utility alignment crossing the Clyde River and an underbore design for the construction and maintenance of Telstra and Essential Energy assets along Thule Road
- Water quality/spill containment basin that includes a combination of roadside swales, trash screens, and bioretention/spill containment basins
- Culvert extensions to allow the discharge to flow through the natural path of the existing landscape beyond the project REF boundary
- Additional area at the eastern extent to accommodate a truck turning bay
- Additional area at the eastern end of Thule Road to allow a smooth tie-in with the existing property driveway.

The proposed design changes have been developed with consideration to minimising the social and environmental impacts, including the safety of the workers and motorists during all stages of the project.

## **2.4 Preferred option**

Option 1 (the 'Do Nothing' option) was considered. However, this option would impede the viability of the project as these changes were considered necessary to provide for safe construction access and future operation and maintenance of the facilities. Option 1 was therefore not considered further.

Option 2 was selected as the preferred option as it accommodates the design changes necessary to provide adequate storage for construction materials, plant and equipment while maintaining safe and efficient operation of the construction site.

## 3. Description of the proposed modification

### 3.1 The proposed modification

Roads and Maritime proposes to modify the Replacement of the Kings Highway bridge over the Clyde River at Nelligen by expanding the approved project REF boundary to accommodate additional ancillary facilities and design changes. The proposed modification is shown in Figure 1-1 and Figure 1-2.

Key features of the proposed modification would include:

- Establishment of new ancillary facilities to allow an additional stockpile area near the eastern abutment to accommodate the storage of bridge girders, construction plant and equipment as well as safe vehicle and plant access from Old Nelligen Road
- Expansion of the approved project REF boundary at various locations to provide the minimum width for the safe and efficient operation of the construction site and accommodate design changes to water quality/spill containment basins, culvert extensions and access
- Public utility relocations of Telstra and Essential Energy assets on the western side of the bridge and southern sealed side of Thule road.

The proposed modification is within the Eurobodalla Shire Council local government area (LGA). The new stockpile facility is located on land zoned 1(a) (Rural Environmental Constraints and Agricultural Zone) under the Eurobodalla Rural Local Environmental Plan 1987 (refer to section 4.3).

The proposed modification does not occur in areas mapped as coastal wetland or littoral rainforest under the CM SEPP. Development consent 204/17 was issued on 7 March 2017 by Eurobodalla Shire Council for the parts of the overall proposal located within these areas. No changes are proposed to be made to this consent.

#### 3.1.1 Ancillary facilities

Five ancillary facility sites in total are proposed for the project. The main site compound and three stockpile locations (referred to as Stockpile 1, Stockpile 2 and Stockpile 3) (refer to Figure 1-1) were assessed as part of the project REF and subsequent submissions report. Additional ancillary facilities proposed in this addendum REF include a new stockpile area (Stockpile 4), and an increase to the area for the main site compound and Stockpile 2 to allow safe access.

The location of the compound site and four stockpile sites is provided in Figure 1-1, while details of the potential activities at each proposed modification are provided in Table 3-1.

The locations of these ancillary facilities have been selected with consideration of the following criteria, outlined in section 3.4 of the project REF:

- Not prone to flash flooding and more than 40 metres from a watercourse, where possible
- More than 50 metres from residential dwellings, where possible
- In preciously disturbed areas that do not require the clearing of native vegetation
- In plain view of the public to deter theft and illegal dumping
- Outside the drip line of trees and on level ground, wherever possible
- On relatively flat level ground
- Away from areas of heritage conservation value.



Upon completion of construction, the temporary site compound and stockpiles would be removed, the site cleared of all rubbish and materials and rehabilitated. The proposed ancillary facilities would be used for the duration of construction, anticipated to be two years.

Table 3-1 Ancillary facilities

Ancillary facility	Location	Proposed use	Reference documents
Main site compound	About 630 metres south east of the bridge on the eastern side of Kings highway and the southern side of Old Nelligen Road.	<p>The site is an existing stockpile area used for the East Nelligen Project, located within a portion of Batemans Bay Cycad Forest (moderate/good-poor).</p> <p>The site compound would include portable buildings with amenities, secure and bunded storage areas for site materials, office space for on-site personnel, and associated parking. It will also be used as a stockpile area.</p> <p><b><u>Proposed modification</u></b></p> <p>Expansion of the approved project REF boundary by about 0.4 ha along Old Nelligen Road to allow safe vehicle and plant access to the site compound from Old Nelligen Road.</p> <p>The site compound would also extend by about 150 metres to the south east along the verge of Kings Highway.</p> <p>It is assumed that vegetation would be removed as part of this boundary extension.</p>	Project REF and addendum REF
Stockpile 1	About 170 metres east of Bridge View Road on the northern side of the Kings Highway.	<p>The site is an existing stockpile area used for the East Nelligen Project.</p> <p>The area will be used for general stockpiling of material required for the overall proposal.</p> <p><b><u>No change</u></b></p>	Submissions report
Stockpile 2	About 500 metres south-east of Bridge View Road. This location is a redundant section of the highway which has been bypassed by the East Nelligen Project.	<p>The site is currently used infrequently as a heavy vehicle checking station. The use of this site consists of the roadway only with no clearing proposed as part of this addendum REF.</p> <p>Site is to be used as a stockpile area for the temporary storage of large precast components of the new bridge. Storage in this area would be undertaken in consultation with Roads and Maritime Compliance Regulatory Services who have used the site as a heavy vehicle inspection bay in the past.</p> <p><b><u>Proposed modification</u></b></p> <p>Additionally, the area would be used as a truck turning bay and marshalling area during construction as well as a temporary stockpile area for large precast components of the new bridge.</p> <p>The eastern extension of the project REF boundary has been included to enable trucks to access the turning bay and marshalling area. No additional vegetation clearing is proposed as part of this extension.</p>	Submissions report and addendum REF
Stockpile 3	About 1.7 kilometres north of the Kings Highway/Princes Highway intersection on the western side of the Kings Highway.	<p>Area is to be used as a stockpile area and for the storage of large precast components of the new bridge.</p> <p><b><u>No change</u></b></p>	Submissions report

Ancillary facility	Location	Proposed use	Reference documents
<b>Stockpile 4 (new)</b>	About 140 metres east of the bridge near the eastern abutment to the north of the Kings Highway.	<p><b><u>Proposed modification</u></b></p> <p>About two hectares of Roads and Maritime land (River-flat Eucalypt Forest) is to be used as a laydown area for bridge girders construction equipment and plant and vehicle turnaround. The stockpile is located within a flood prone area. However, due to the temporary nature of the site and its distance from the Clyde River, Roads and Maritime consider the site acceptable. Minimal vegetation clearing would occur to create access to the stockpile. The impacts are detailed in section 6.1 of this addendum REF.</p>	Addendum REF

### 3.1.2 Design changes

An expansion of the approved project REF boundary at various locations is required to accommodate the following design changes.

#### ***Water quality/Spill containment basin***

Due to the limited benefits of gross pollutant traps and other proprietary devices in areas with space constraints, these are no longer proposed. The detailed design includes a combination of roadside swales, trash screens and bioretention/spill containment basins at the western extent of the project REF boundary (refer Table 3-2 and Figure 3-1 below). This change is expected to meet the project's pollutant removal targets during operation and remove around 0.06 ha of Southeast Lowland Grassy Woodland (refer also to section 6.1).

Table 3-2 water quality/spill containment basins

Basin/ location	Type	Requirement	Settling volume m <sup>3</sup>	Spill containment volume m <sup>3</sup>	Area (Base) m <sup>2</sup>
1 (early works/ construction)	Sediment Basin	Construction	245	-	400
1 (permanent)	Bioretention Basin Spill Containment	Operation	120	40 (Min)	400
2	Bioretention Basin Spill Containment	Operation	58	40 (Min)	150
3	Sediment Basin/Swale Spill Containment	Operation	44	40 (Min)	42

#### ***Upgrade to existing culverts***

As part of the storm water management, three culvert extensions are required (one south and two north of Old Nelligen Rd). The proposed culvert modifications are to replace or widen proposed and existing culverts to allow for the discharge to flow through the natural path of the existing landscape beyond the approved project REF boundary (refer to locations in Figure 3-1).

## **Access**

An expansion of the approved project REF boundary at various locations is required to provide the minimum width for the safe and efficient operation of the construction site. Proposed modification areas that have been expanded to improve access include the area for vehicle turnaround at the eastern extent, a stockpile site northeast of the bridge, access to the river at the east of the new bridge, compound areas near Old Nelligen Road and smaller areas of land adjacent to the highway east and west of the bridge for access to the river (refer Figure 1-2).







### 3.1.3 Public utility relocation

Following consultation with Telstra and Essential Energy, an underbore design is proposed for the utility lines running along the western side of the project. Underboring was considered the most appropriate method for the construction and maintenance of both Telstra and Essential Energy assets. This change in utility design has required the expansion of the project REF boundary south west of the bridge and on the western sealed side of Thule road (refer Figure 1-2).

The work for the Telstra cable relocation along Thule road requires relocating the cable by underboring and trenching. The current services run along the eastern side of Thule Road. The proposed modification would require the expansion of the project REF boundary to the western side of Thule Road. The majority of the utility line would be installed through underboring along the western verge of Thule Road. Associated junction pits would also be located along Thule Road. Trenching would be undertaken along a section of Bridge View Road to connect the proposed modification to the existing line.

## 3.2 Design

A summary of the design criteria and engineering constraints that characterise the proposed modification are provided in the following sections.

### 3.2.1 Design criteria

The design for the proposed modification was prepared in accordance with the standards provided in the project REF, project EIS, submissions report and ongoing consultation.

### 3.2.2 Engineering constraints

Section 3.2.2 of the project REF identifies the engineering constraints that apply to the project. No further engineering constraints have been considered in this addendum REF.

### 3.2.3 Main features of the proposed modification

The main features of the proposed modification are:

- Establishment of new ancillary facilities, including a new laydown area north east of the Clyde River, new site compound area near Old Nelligen Road and water quality/spill containment basin at the western extent of the approved project REF boundary
- Public utility relocations of Telstra and Essential Energy assets along the alignment crossing at the Clyde River and along Thule Road
- A smooth tie-in with the existing Wharf and Reid Street area in Nelligen and allow driveway access at Thule Road
- Expansion of the approved project REF boundary at various locations along the project length. This feature would provide the minimum width required for the safe and efficient operation of the construction site and accommodate design changes to water quality/spill containment basins, culvert extensions and access.

The main features of the proposed modification are shown in Figure 1-1 and Figure 1-2.

## 3.3 Construction activities

The likely construction methodology, staging, work hours, and plant and equipment would be as described in the project REF. As stated in Section 3.3.1 of the project REF, the detailed construction staging plans and methods would be determined by the construction contractor(s).

The final construction plan and methods chosen by the contractor would also be required to be consistent with environment safeguards outlined in section 7 of this addendum REF.

### 3.3.1 Work methodology

Section 3.3.1 of the project REF identifies the work methodology that also applies to the proposed modification.

### 3.3.2 Construction hours and duration

It is anticipated that the main construction works associated with the revised proposal, including the proposed modification, would start in 2019/2020 and be completed in 2022.

It is anticipated that construction would be largely carried out during standard construction working hours in accordance with the *Interim Construction Noise Guideline* (DECC, 2009):

- Monday to Friday: 7 am to 6 pm
- Saturday: 8 am to 1 pm
- Sundays and public holidays: no work.

Site compound establishment and demobilisation would be carried out during standard working hours only. Use of site compounds would periodically include out of hours works, in particular when receiving deliveries.

Any out of hours works would be undertaken in accordance with the Construction Noise and Vibration Guidelines (Roads and Maritime 2016) or the Interim Construction Noise Guideline (DECC 2009) (ICNG) and project Environment Protection Licence (EPL).

### 3.3.3 Plant and equipment

Section 3.3.3 of the project REF identifies the construction plant and equipment that would be used to construct the proposed modification.

### 3.3.4 Earthworks

There would be minimal earthworks required for the compounds as topography was considered during site selection and sites were selected as they are relatively flat. It is anticipated that the compound sites would be levelled and covered in gravel and a small portion of the site would be concreted.

Section 3.3.4 of the project REF identifies the volumes of earthworks (21,000 cubic metres cut and 44,000 cubic metres fill) required for construction of the project. The proposed modification requires an additional 500 cubic metres cut and no additional fill. Total extractive activities also include rock cutting and topsoil stripping not reported in the project REF. The estimated total extractive activities, including the proposed modification, would comprise up to a maximum of 70,000 cubic metres. This total volume of extractive activities reflects refinements of the design done through detailed design development which has allowed for more accurate estimates, the addition of water quality basins and the culvert extensions.

### 3.3.5 Source and quantity of materials

Section 3.3.5 of the project REF identifies the source and quantity of materials required for construction of the project. The proposed modification would be in accordance with the project REF.

### 3.3.6 Traffic management and access

Construction vehicles would access Stockpile 4 and other additional ancillary facilities included in the proposed modification directly from the Kings Highway. The number and type of vehicles travelling to and from the project would not alter as a result of the proposed modification (refer Table 3.4 of the project REF).

Construction traffic would include light and heavy vehicles transporting equipment, materials and spoil, and construction workers accessing the ancillary facilities. Where practical, materials and plant would be removed and delivered outside peak traffic periods to minimise delays. Traffic control measures would be used to manage access to/from compounds and the import and export of material. Section 3.3.6 of the project REF details traffic management and access that would also be used for the proposed modification.

## 3.4 Ancillary facilities

A main site compound within the approved project REF boundary with an additional three stockpiles were proposed and approved as part of the submissions report. As part of this proposed modification, minor design changes have been proposed for the main site compound and Stockpile 2 and an additional laydown area, referred to as Stockpile 4.

The potential environmental impacts associated with Stockpile 4 and other ancillary facilities proposed modifications are assessed in this addendum REF. Should the construction contractor select alternative compound sites, then an additional environmental assessment and approval would be required.

## 3.5 Public utility relocation

The utilities impacted by the proposed modification were identified as requiring relocation in the project REF. Underboring of the Telstra and Essential Energy assets was identified as the best option during the detailed design stage.

## 3.6 Property acquisition

No additional property acquisition would be needed for the proposed modification.

## 4. Statutory and planning framework

### 4.1 State Environmental Planning Policies

#### ***State Environmental Planning Policy (Infrastructure) 2007***

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Clause 94 of ISEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

As the proposed modification is for road infrastructure facilities and is to be carried out by Roads and Maritime, it can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The proposed modification is not located on land reserved under the *National Parks and Wildlife Act 1974* (NPW Act), State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (Major Development) 2005.

Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by ISEPP (where applicable), is discussed in chapter 5 of this addendum REF.

#### ***State Environmental Planning Policy No 14 – Coastal Wetlands (repealed)***

On 7 March 2017, Eurobodalla Shire Council granted development consent for the project EIS for parts of the overall proposal located in areas mapped as coastal wetlands under State Environmental Planning Policy No 14 – Coastal Wetlands (SEPP 14).

On 3 April 2018, SEPP 14 was repealed and replaced by State Environment Planning Policy (Coastal Wetlands) 2008.

The development consent for the project EIS is saved under section 4.70 of the Environmental Planning and Assessment Act, 1979. No changes are proposed to be made to that consent.

### 4.2 State Environmental Planning Policy (Coastal Wetlands) 2018

State Environmental Planning Policy (Coastal Wetlands) 2018 (CM SEPP) commenced on 3 April 2018 and replaced State Environmental Planning Policy No 14 – Coastal Wetlands, State Environment Planning Policy No 26 - Littoral Rainforest and State Environment Planning Policy No 71 - Coastal Protection.

CM SEPP promotes an integrated and coordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the Coastal Management Act, 2016.

Under the savings provisions in clause 21(2) of CM SEPP the areas already assessed in the project REF, which are now mapped as coastal wetlands, are not subject to clause 10 of CM SEPP. In addition, the proposed modification does not affect any areas mapped as coastal wetlands under clause 10 of CM SEPP. Therefore, designated development is not triggered and consent from Council is not required.

This addendum REF takes into consideration the other mapped areas under CM SEPP as relevant to both the project REF and the proposed modification (See Table 4-1).



Table 4-1 CM SEPP development controls considerations

Coastal management areas	Consideration
(a) the coastal wetlands (clause 10)	<p>The proposed modification does not affect any areas mapped as coastal wetlands under clause 10 of CM SEPP.</p> <p>A small section of the project REF impacts on areas mapped as coastal wetlands. However, under the savings provisions in clause 21(2) of CM SEPP the areas already assessed in the project REF, which are now mapped as coastal wetlands, are not subject to clause 10 of CM SEPP.</p>
(b) Coastal wetland proximity area (clause 11)	<p>The proposed modification and the overall proposal would not significantly impact on:</p> <ul style="list-style-type: none"> <li>• The biophysical, hydrological or ecological integrity of the adjacent coastal wetland, or</li> <li>• The quantity and quality of surface and ground water flows to and from the adjacent coastal wetland.</li> </ul>
(c) Coastal vulnerability area (clause 12)	Coastal vulnerability areas have not been mapped yet.
(d) Coastal environment area (clause 13)	<p>The proposed modification and the project REF are located within areas mapped as coastal environment areas under clause 13 of CM SEPP. The project REF, project EIS, Submissions Report and this addendum REF have considered potential adverse impacts on:</p> <ul style="list-style-type: none"> <li>• the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,</li> <li>• local coastal environmental values and natural coastal processes,</li> <li>• the water quality of Batemans Marine Park,</li> <li>• marine vegetation, native vegetation and fauna and their habitats,</li> <li>• existing public open space and safe access to and along the Clyde River, including persons with a disability, or</li> <li>• Aboriginal cultural heritage, practices and places.</li> </ul> <p>The revised proposal, including the proposed modification, has been designed, sited and would be managed to avoid, minimise and mitigate the assessed potential impacts outlined above. Refer to Chapter 6 for further detail.</p> <p>There are no undeveloped headlands, foreshores, beaches, natural rock platforms or surf zones within the revised proposal.</p>

## 4.3 Local Environmental Plans

The project is located within the Eurobodalla Shire Council local government area (LGA) and therefore the *Eurobodalla Local Environmental Plan 2012* (Eurobodalla LEP) applies to the project. Part of the site is, however, a deferred matter under the Eurobodalla LEP. The *Eurobodalla Rural Local Environmental Plan 1987* (Eurobodalla Rural LEP) applies to some sections of land.

### ***Eurobodalla Local Environmental Plan 2012***

A substantial proportion of the project (including the proposed modification) would be within the existing road corridor, with only minor impacts to other land uses. Table 4-1 outlines the proposed modification that would occur within each zone.

Table 4-1 Local Environmental Plan zones and proposed modification

Zone (LEP 2012)	Objectives of the zone	Consistency with zone objectives
SP2 – Infrastructure	<ul style="list-style-type: none"> <li>To provide for infrastructure and related uses</li> <li>To prevent development that is not compatible with or that may detract from the provision of infrastructure.</li> </ul>	<p>The proposed modification in this zone (including vehicle and plant access, water quality/spill containment basin, utility relocation along Thule Road, new site compound area near Old Nelligen Road, Stockpile 2 and extensions to existing culverts) would allow for the safe and efficient operation of the construction site. The revised proposal, including the proposed modification, would provide a new bridge and associated roadways, which would benefit the wider south coast region.</p>
RE1 – Public recreation	<ul style="list-style-type: none"> <li>To enable land to be used for public open space or recreational purposes</li> <li>To provide a range of recreational settings and activities and compatible land uses</li> <li>To protect and enhance the natural environment for recreational purposes</li> <li>To conserve the scenic and environmental resources of the land including the protection of environmental assets such as remnant vegetation, waterways and wetlands, and habitats for threatened species, populations and communities.</li> </ul>	<p>The proposed modification in this zone (including utility relocation and road widening to improve safety) would in the long term conserve the public recreation areas along the Clyde River and in some locations open the river edge to the public due to the removal of the existing bridge.</p>
RU1 – Primary Production	<ul style="list-style-type: none"> <li>To encourage sustainable primary industry production by maintaining and enhancing the natural resource base</li> <li>To encourage diversity in primary industry enterprises and systems appropriate for the area</li> <li>To minimise the fragmentation and alienation of resource lands</li> <li>To minimise conflict between land uses within this zone and land uses within adjoining zones</li> <li>To minimise the visual impact of development on the rural landscape</li> <li>To provide for recreational and tourist activities that support the agricultural, environmental and conservation value of the land.</li> </ul>	<p>The proposed modification in this zone (driveway access to Thule Road) would minimise potential for impacts to driveway access. The revised proposal, including the proposed modification, would ultimately provide a new bridge and associated roadways which would benefit the wider south coast region.</p>
RU5 – Village	<ul style="list-style-type: none"> <li>To provide for a range of land uses, services and facilities that are associated with a rural village</li> <li>To recognise the areas of Nelligen, Bodalla, Central Tilba and Tilba Tilba as</li> </ul>	<p>The proposed modification in this zone (including the Wharf Street area – to facilitate smooth tie-in with the existing road and utility relocation) would not result in any impacts to the overall feel of the Nelligen village as the proposed modification would avoid impacts</p>

Zone (LEP 2012)	Objectives of the zone	Consistency with zone objectives
	<p>rural villages</p> <ul style="list-style-type: none"> <li>To protect and conserve the historical significance, character and scenic quality of rural village settings.</li> </ul>	<p>on any of the heritage buildings which contribute to the village feel. The revised proposal would also provide additional foreshore space in the village as the new bridge would be located further to the north of the existing bridge.</p>
E2 – Environmental conservation	<ul style="list-style-type: none"> <li>To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values</li> <li>To prevent development that could destroy, damage or otherwise have an adverse effect on those values</li> <li>To identify sensitive coastal lakes, estuaries, wetlands, overland flow paths and riparian zones and those areas at risk from coastline hazards, including sea level rise</li> <li>To protect and improve water quality</li> <li>To protect and enhance the natural environment for recreation purposes</li> <li>To manage items, places and landscapes of Aboriginal cultural heritage significance into the future in collaboration with the local Aboriginal community.</li> </ul>	<p>The proposed modification in this zone (including driveway access to Thule Road and Stockpile 4) would result in impacts on native vegetation (permanent removal of an additional 4.31 ha of native vegetation). The revised proposal, including proposed modification, has been designed to minimise impacts on sensitive areas and offsets will be proposed in the Biodiversity Offset Strategy.</p>
E4 – Environmental living	<ul style="list-style-type: none"> <li>To provide for low-impact residential development in areas with special ecological, scientific or aesthetic values</li> <li>To ensure that residential development does not have an adverse effect on those values</li> <li>To protect the size and shape of vegetation remnants if consistent with the protection of assets from bush fire</li> <li>To ensure that development in the area does not unreasonably increase the demand for public services or public facilities</li> <li>To manage items, places and landscapes of Aboriginal cultural heritage significance in to the future in collaboration with the local Aboriginal community.</li> </ul>	<p>The proposed modification in this zone (utility relocation along Thule Road) would not have any additional construction or operation impacts to Aboriginal cultural heritage.</p>
W1 – Natural Waterways	<ul style="list-style-type: none"> <li>To protect the ecological and scenic values of natural waterways</li> <li>To prevent development that would have an adverse effect on the natural values of waterways in this zone</li> <li>To provide for sustainable fishing</li> </ul>	<p>The proposed modification in this zone (utility relocation) is not considered to have an adverse effect on the natural values of the waterways zone as it involve relocation of an existing utility and is not considered to impact upon any recreational or commercial fishing activities.</p>

Zone (LEP 2012)	Objectives of the zone	Consistency with zone objectives
	industries and recreational fishing	
DM – Deferred matter* <i>*the zoning of the areas has been deferred to the Eurobodalla Rural Local Environmental Plan 1987</i>	Stockpile 4 - under the Eurobodalla Rural LEP, (within the deferred matter area) Stockpile 4 is zoned 1(a) (Rural Environmental Constraints and Agricultural Zone) – refer section below.	

The project is permitted without consent under the Infrastructure SEPP (refer section 5), the consent requirements of the LEP do not apply, with the exception of areas within SEPP (Coastal Management) 2018 which require consent from Eurobodalla Shire Council (refer section 4.1).

The proposed modification is not within SEPP (Coastal Management) wetlands and development consent 204-17 was determined on 07 March 2017 for those areas protected under SEPP14 (where the footprint has not been changed).

### ***Eurobodalla Rural Local Environmental Plan 1987***

Part of the proposed modification is located on land which is a deferred matter under the Eurobodalla LEP. This means the zoning reverts to the previous LEP, the Eurobodalla Rural LEP. Under the Eurobodalla Rural LEP the modification (within the deferred matter area) is zoned 1(a) (Rural Environmental Constraints and Agricultural Zone). The objectives of this zone seek to ensure the use of land for rural purposes. While the project may not specifically meet the objectives of this zone, the proposed modification would be permissible with consent on this land as it is considered to be a 'public utility undertaking' and for the purpose of a road.

As the revised project REF proposal is permitted without consent under the Infrastructure SEPP (refer section 4.1), the consent requirements of the LEP do not apply.

## **4.4 Other relevant NSW legislation**

### **4.4.1 Biodiversity Conservation Act 2016**

The *Biodiversity Conservation Act 2016* (BC Act) was passed by the NSW Parliament in November 2016 and came into effect on 25 August 2017. The *Threatened Species Conservation Act 1995* (TSC Act), *Native Vegetation Act 2003* (NV Act) and some parts of the *National Parks and Wildlife Act 1974* (NPW Act) were repealed on 25 August 2017. As a result, the matters relating to the listing of threatened species, biodiversity impact assessment, offsetting and related offences are now contained within the BC Act.

The BC Act, together with the *Biodiversity Conservation Regulation 2017*, provide a mechanism to address impacts on biodiversity from land clearing associated with development. Under this legislation, there are provisions for a Biodiversity Offsets Scheme (BOS), which includes a framework to avoid, minimise and offset impacts of development on biodiversity.

The potential impacts of the proposed modification on threatened species are discussed in the biodiversity section (section 6.1). Further information is provided in section 6.1 and Appendix C.

#### 4.4.2 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) provides the basis for legal protection and management of National Parks estate and Aboriginal sites and objects in NSW.

Some of the features of the proposed modification are adjacent to the Benandarah State Forest to the north and the Clyde River National Park to the south. Further information is provided in the project REF.

Section 86 lists offences relating to harming or desecrating Aboriginal objects. An Aboriginal heritage impact permit (AHIP) is required under section 90 of the Act to harm an Aboriginal heritage object and has been obtained (AHIP C0003256).

An Aboriginal heritage due diligence assessment was undertaken for the proposed modification (Appendix D). The proposed modification would not result in impacts additional to those identified in the project REF. Further information is provided in section 6.2 and Appendix D.

#### 4.4.3 Biosecurity Act 2015

The *Biosecurity Act 2015* (Biosecurity Act) substituted the repealed the *Noxious Weeds Act 1993* on 1 July 2017. The Biosecurity Act specifies the duties of public and private landholders as to the control of priority weeds. Under the Act, priority weeds have been identified for Local Government Areas and assigned duties of control. Under Part 3 of the Biosecurity Act any person who deals with biosecurity matters (i.e listed weed species) and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by biosecurity matters has the duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated and minimised.

Priority weeds identified within the revised project boundary, including the proposed modification, (e.g Asparagus Fern and Blackberry) would be managed in accordance with the requirements of the *Biosecurity Act*.

Further information about the potential biosecurity impacts of the proposal is provided in section 6.1.

#### 4.4.4 Crown Lands Management Act 2016

The *Crown Land Management Act 2016* (Crown Lands Management Act) repealed the *Crown Lands Act 1989* on 1 July 2018. Parts of the proposed modification subject to this addendum REF are located on Crown Land along the Kings Highway on both sides of the river (Figure 4-1). This land is administered under the Crown Lands Management Act. Under Clause 4.12, the Minister for Primary Industries may, by notice published in the Gazette (i.e a *government agency vesting notice*), vest specified transferable Crown land to a government agency if:

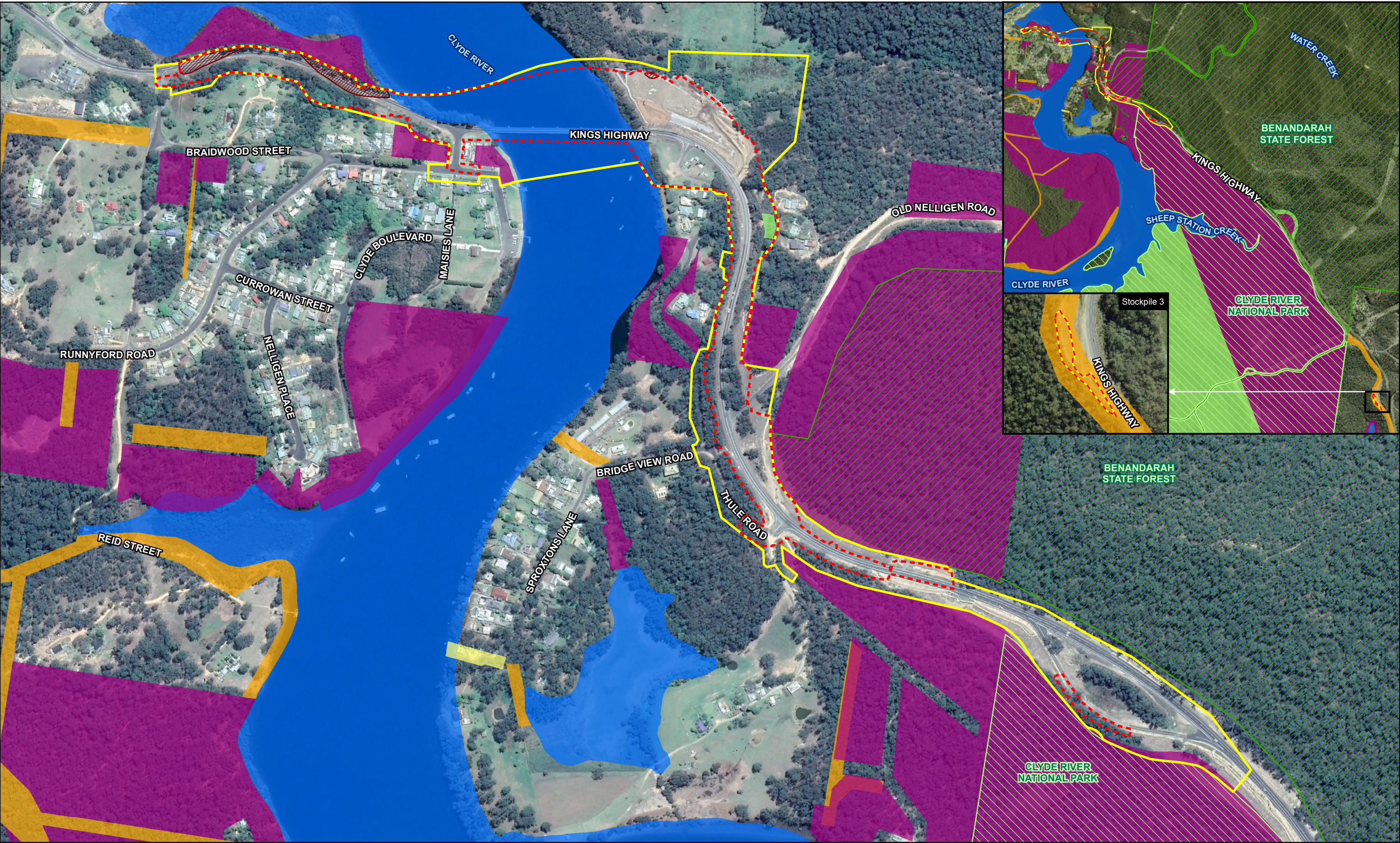
(a) *the Minister is satisfied that:*

(i) *it is in the public interest to vest the land in the agency, or*

(ii) *the agency would, because of the functions that are conferred or imposed on the agency, be an appropriate owner and manager of the land.*

In accordance with the Crown Lands Management Act, work proposed as part of the addendum REF within Crown Land needs a permit from the Department of Industry (Crown Lands Division). The areas affected include the additional areas within the Clyde River and western riverbank shown in Figure 4-1.







## 4.4.5 Marine Estate Management Act 2014

The Clyde River in the vicinity of the proposed modification has been declared to be part of the Batemans Marine Park (the Marine Park) which is located on the NSW south coast between Murramarang Beach near Bawley Point in the north and the entrance to Wallaga Lake at Murunna Point in the south. Sections of the proposed modification are located within the Marine Park.

An operational plan for the Marine Park was prepared in November 2010. This document outlines how the Marine Park is to be operated in line with the zoning plan for the Marine Park and the objects of the *Marine Parks Act 1997*. The revised proposal, including the proposed modification, where it is located within the Marine Park is zoned as 'habitat protection' under the zoning plan.

Section 55(3) of the *Marine Estate Management Act 2014* requires that a determining authority must not carry out, or grant approval to carry out, an activity within a marine park without considering the criteria detailed in Table 4-2.

Table 4-2 Section 55(3) of the *Marine Estate Management Act 2014* criteria

Criteria	Consistency of the revised proposal
i) If there are management rules for the marine park or aquatic reserve, the purposes of the zone within which the area concerned is situated as specified in those management rules	The revised proposal, including the proposed modification, would result in some reduction in the biological diversity and habitat of the Marine Park due to the requirement for vegetation removal along the edge of the Clyde River. Overall, the area to be impacted is considered relatively small and unlikely to substantially reduce the biological diversity of the Marine Park. The proposed modification has been designed to minimise impacts on the Marine Park and is not considered to impact upon any recreational or commercial fishing activities.
ii) The permissible uses of the area concerned under the regulations or the management rules	The habitat protection zones provide for the protection of habitat and areas of cultural significance and allow for a range of recreational and commercial fishing activities and also influences developments within the Marine Park (e.g wharfs, boat ramps) to ensure they concur with the objects of the zone and minimise impacts to key habitats. The proposed modification has been designed to minimise impacts and is not considered to impact upon any recreational or commercial fishing activities.
iii) If a management plan for the marine park or aquatic reserve has been made, the objectives of the marine park or aquatic reserve	Objective 1 – to conserve marine biodiversity, marine habitats and maintain ecological processes in the marine park Objective 2 – to provide for ecologically sustainable uses (including commercial and recreational fishing) Objective 3 – to provide for opportunities for public appreciation, understanding and enjoyment.  The revised proposal, including the proposed modification, would result in some reduction in the biological diversity and habitat of the Marine Park due to the requirement for vegetation removal along the edge of the Clyde River. Overall the area to be impacted is considered relatively small and unlikely to substantially reduce the biological diversity of the Marine Park. The proposed modification has been designed to minimise impacts and is not considered to impact upon any recreational or commercial fishing activities.
iv) Any relevant marine park or aquatic reserve notifications	N/A

Section 56(3) of the *Marine Estate Management Act 2014* requires that a determining authority must not carry out, or approve an activity in the locality of a marine park without considering the criteria in Table 4-3.

Table 4-3 Section 56(3) of the *Marine Estate Management Act 2014* criteria

Criteria	Consistency of the proposed modification
i) The purposes of marine parks or aquatic reserves, the regulations and any advice given to it by the relevant Ministers on the impact on the marine park or aquatic reserve of the carrying out of an activity in the locality	The revised proposal, including the proposed modification, would result in some reduction in the biological diversity and habitat of the Marine Park due to the requirement for vegetation removal along the edge of the Clyde River. Overall, the area to be impacted is considered relatively small and unlikely to substantially reduce the biological diversity of the Marine Park. The proposed modification has been designed to minimise impacts and is not considered to impact upon any recreational or commercial fishing activities.
ii) If, of the opinion that the proposed activity is likely to have an effect on the plants or animals within the marine park or aquatic reserve or their habitat, the determining authority had consulted with the relevant Ministers	The revised proposal would result in some reduction in the biological diversity and habitat of the Marine Park due to the requirement for vegetation removal along the edge of the Clyde River. Overall the area to be impacted is considered relatively small and unlikely to substantially reduce the biological diversity of the Marine Park.

### Permit requirements

Within the habitat protection zone under the Batemans Marine Mark Operational Plan, a permit is required to be obtained for infrastructure development. Roads and Maritime would be required to obtain a NSW Marine Parks permit for any works within the Marine Park under Clause 1.16(2)(a) of the *Marine Estate Management (Management Rules) Regulation 1999*.

When assessing the permit application, the DPI would be required to consider the application against the criteria outlined in Clause 9 of the *Marine Estate Management Regulation 2017*. Table 4-4 outlines the consistency of the revised proposal, including the proposed modification, with the assessment criteria for Marine Parks permits.

Table 4-4 Assessment criteria for Marine Parks permit

Criteria	Consistency of the revised proposal
(a) The objects of the act (as specified in section 3 of the Act)	<p>The revised proposal would result in some reduction in the biological diversity of the Marine Park due to the requirement for vegetation removal along the edge of the Clyde River. Overall, the area to be impacted is considered relatively small and unlikely to substantially reduce the biological diversity of the Marine Park. Areas to be impacted would be offset by Roads and Maritime.</p> <p>The revised proposal would facilitate economic opportunities for the people of NSW and the surrounding regional communities as it would provide an improved river crossing. This would ensure that the Kings Highway can continue to be used as a key transport route resulting in economic benefits for the wider region.</p>
(b) the purposes of marine parks and aquatic reserves (as specified in sections 22 and 33 of the Act respectively)	The revised proposal, while resulting in a reduction in the biological diversity due to removal of vegetation, is not considered to result in a substantial reduction in diversity. The revised proposal (including the proposed modification) has been designed where possible to minimise impacts on vegetation located along the Clyde River.
(c) The objects of the zone in which the activity is proposed to be carried out	<p>The revised proposal is not considered to contravene the objectives of the habitat protection zone as it would not result in any substantial impacts on the biological diversity of the zone or any impacts to heritage located within the habitat protection zone.</p> <p>Where impacts are expected biodiversity offsets have been considered as outlined in section 6.1.5.</p>
(d) The activities that are permissible in the	The revised proposal is considered to be for the purpose of public



Criteria	Consistency of the revised proposal
zone in which the activity is proposed to be carried out (as specified in the relevant management rules)	safety as the existing bridge which is to be replaced is showing signs of deterioration and therefore is considered a safety risk in the next five to ten years. This is consistent with the uses to which a permit can be obtained within the habitat protection zone under Clause 1.16(2) of <i>Marine Estate Management (Management Rules) Regulation 1999</i> .
(e) Any operational plan for the marine park adopted by the Marine Parks Authority pursuant to section 25 (4) of the <i>Marine Parks Act 1997</i> (before its repeal) that continues to have effect because of clause 5 of Schedule 2 to the <i>Marine Estate Management Act 2014</i>	The revised proposal while resulting in a reduction in the biological diversity due to removal of vegetation is not considered to result in a substantial reduction in diversity. This means that the revised proposal is considered to be consistent with the operational plan. The revised proposal is considered to be a permissible use under the zoning plan which forms part of the operational plan.
(f) Any management plan for the marine park or aquatic reserve	No management plan exists for the Marine Park. The operational plan is considered to be the management plan for this Marine Park.
(g) Any threatened species or other protected flora or fauna under the <i>Fisheries Management Act 1994</i> , the <i>National Parks and Wildlife Act 1974</i> or the <i>Threatened Species Conservation Act 1995</i> that may be affected by the proposed activity	The revised proposal is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the BC Act or FM Act. Impacts on threatened species or other protected flora and fauna are discussed further in section 6.1.
(h) The form of transport to be used to gain access to the zone in, on or from which the activity is proposed to be carried out, having regard to the adequacy of facilities for parking, mooring and landing vehicles, vessels and aircraft, and for loading and unloading them	The revised proposal area within the habitat protection zone would be accessed via the Clyde River through temporary structures designed to minimise potential impacts on the Marine Park. Vessels will be selected and managed in a way that impacts on the Marine Park are minimised as much as possible. See safeguards and mitigation measures in Table 7-1.
(i) The type of equipment to be used in connection with the proposed activity	The construction methodology for the proposed modification is outlined in section 3.3.3 of the project REF.
(j) The arrangements that have been made for the prevention, mitigation and making good of any damage to the marine park or aquatic reserve arising from the proposed activity	Impacts to vegetation within the Marine Park would be offset as outlined in section 6.1.5. Rehabilitation works within the Marine Park would also be undertaken once construction is complete in this area. Further details of this rehabilitation would be confirmed prior to construction and be included within the CEMP to be prepared for the revised proposal.
(k) Such other requirements as the relevant Ministers consider appropriate to the proposed activity	N/A

#### 4.4.6 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) aims to conserve, develop and share the fishery resources for the benefit of present and future generations. Approvals are potentially required for the following activities:

- Dredging and reclamation (section 201)
- Protection of marine vegetation (section 205)
- Obstruction of fish passage (section 219).

Section 199 of the FM Act states that an approval is not required for a public authority to undertake dredging or reclamation work. They are, however, required to give the Minister written notice of the

proposed works and consider any matters received from the Minister within 28 days of the notice as the works are to be undertaken in the Clyde River which is identified as key fish habitat.

Mangroves, saltmarsh and seagrasses are located along the banks of the Clyde River and will be impacted by the revised proposal. These are classified as marine vegetation under the FM Act and *Fisheries Management (General) Regulation 2010*. A permit under section 205 of the FM Act is therefore required prior to damaging this vegetation. Impacts of the proposed modification on mangroves, saltmarsh and seagrasses are considered further in section 6.1.3.

The proposed modification would involve works within the Clyde River. However, works would not obstruct fish passage as part of the river would be passable at any given time. A permit is therefore not considered to be required under section 219 of the FM Act.

#### 4.4.7 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) focuses on protecting, restoring and enhancing the environment within NSW, and through the use of various mechanisms, reduce potential risks to human health and the environment. It aims to provide opportunity for increased public involvement and access to information regarding environmental protection.

Based on the total cut requirements for construction of the project (a maximum of 70,000 cubic metres) the project triggers the 30,000 tonne limit under Schedule 1 of the POEO Act and an EPL would be required.

#### 4.4.8 Heritage Act 1977

The *Heritage Act 1977* is concerned with all aspects of conservation ranging from the most basic protection against indiscriminate damage and demolition of buildings and sites, through to restoration and enhancement.

Approval under section 57(1) is required for works to a place, building, work, relic, moveable object, precinct, or land listed on the State Heritage Register. An excavation permit is required under section 139 to disturb or excavate any land containing or likely to contain a relic.

The proposed modification does not result in any changes to the impacts to heritage items to those assessed in the project REF, Submissions Report and project EIS.

Further information is provided in section 6.2 of this addendum REF and Appendix D.

#### 4.4.9 Water Management Act 2000

The proposed modification area is covered by the *Water Sharing Plan for the Clyde River Unregulated and Alluvial Water Sources 2016* and therefore the *Water Management Act 2000* (WM Act) applies this addendum REF.

The WM Act aims to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. A controlled activity approval is required from the NSW Office of Water for certain types of developments and activities that are carried out in or near a river, lake or estuary.

Roads and Maritime is exempt from the requirements to obtain a controlled activity approval under Clause 38 of the *Water Management (General) Regulation 2004*.

The proposed modification does not result in any changes to those assessed in the project REF, Submissions Report and project EIS.

## 4.5 Commonwealth legislation

### 4.5.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) a referral is required to the Australian Government for proposed 'actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These are considered in Appendix H and section 6 of this addendum REF.

A referral is not required for proposed road actions that may affect nationally listed threatened species, endangered ecological communities and migratory species. This is because requirements for considering impacts to these biodiversity matters are the subject of a strategic assessment approval granted under the EPBC Act by the Australian Government in September 2015.

Potential impacts to these biodiversity matters are also considered as part of section 6.1.3 of the addendum REF and Appendix A.

#### ***Findings – matters of national environmental significance (other than biodiversity matters)***

The assessment of the proposed modification's impact on matters of national environmental significance and the environment of Commonwealth land found that there would be no change to the findings of the determined activity (project REF) and would be unlikely to cause a significant impact on matters of national environmental significance or the environment of Commonwealth land. A referral to the Australian Government Department of the Environment and Energy is not required.

### 4.5.2 Native Title Act 1993

Since the public display of the project REF, project EIS and Submissions Report in 2016 and 2017, a Native Title claim has been registered to the NSW south coast. Native Title claim NC2017/003, lodged by the South Coast People, was registered with the National Native Title Tribunal on 31 January 2018. The claim extends along the NSW south coast from southern Sydney to Eden. Roads and Maritime would comply with all relevant legislative requirements in regard to this claim.

## 4.6 Confirmation of statutory position

The proposed modification is categorised as development for the purpose of road infrastructure facilities and is being carried out by or on behalf of a public authority. Under clause 94 of the ISEPP the proposed modification is permissible without consent. The proposed modification is not State Significant Infrastructure or State Significant Development. The proposed modification can be assessed under Division 5.1 of the EP&A Act. Consent from Council is not required.

## 5. Consultation

Consultation with potentially affected property owners, relevant government agencies and other stakeholders has been carried out by Roads and Maritime during the development and concept design phase of the approved project REF and EIS proposal. Following the public display of the project REF between 14 October 2016 and 18 November 2016 and the public display of the EIS between 19 October 2016 and 18 November 2016 at five locations, Roads and Maritime received 13 submissions in total. The submissions report considered all submissions received from display of the project REF and project EIS.

Clauses 13, 14, 15 and 16 of the ISEPP require that public authorities undertake consultation with councils and other public authorities, when proposing to carry out development without consent. Table 5-1 below lists the item and assesses whether these are relevant to the proposed modification to the project.

Table 5-1 Assessment of items of Clauses 13, 14, 15 and 16 of the ISEPP

Item	Response / where addressed in addendum REF
<b>Clause 13</b>	
Substantial impact on stormwater management services provided by a council.	The proposed modification would not result in substantial impacts on stormwater management services provided by council or the connection into such a system. ISEPP consultation with Eurobodalla Shire Council is not required.
Likely to generate traffic to an extent that would strain the capacity of the road system in a local government area.	The proposed modification would not result in any substantial increase in the traffic as assessed by the project REF and therefore would not strain the capacity of the road system in the local government area. ISEPP consultation with Eurobodalla Shire Council is not required.
Involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council.	The proposed modification would not result in substantial impacts on a sewerage system owned by council or the connection into such system. ISEPP consultation with Eurobodalla Shire Council is not required.
Involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council.	ISEPP consultation regarding the water supply for the construction compound from a council owned water supply system has been undertaken. The proposed modification does not introduce changes to water use and connections to water supply systems with respect to those described in the project REF ISEPP consultation. Further ISEPP consultation with Eurobodalla Shire Council is not required.
Involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential.	The proposed modification would not result in any impacts on public places under the council's management or control. ISEPP consultation with Eurobodalla Shire Council is not required.
Involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which a council is the roads authority under the <i>Roads Act 1993</i> (if the public authority that is carrying out the development, or on whose behalf it is being carried out, is not responsible for the maintenance of the road or footpath).	The proposed modification would not result in any substantial increase in excavation required by the project. ISEPP consultation with Eurobodalla Shire Council is not required.
<b>Clause 14</b>	

Item	Response / where addressed in addendum REF
Is likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area.	The proposed modification is not likely to impact upon any locally listed items or heritage conservation areas. ISEPP consultation with Eurobodalla Shire Council is not required.
Clause 15	
Development that is to be carried out on flood liable land that may be carried out without consent and that would change flood patterns other than to a minor extent.	Some of the features of the proposed modification are located on flood liable land, including Stockpile 4 which would be used for stockpiling materials (temporary in nature). The proposed modification is unlikely to change flood patterns other than to a minor extent. ISEPP consultation with Eurobodalla Shire Council is not required.
<b>Clause 15AA</b>	
Development that is to be carried out on flood liable land that may be carried out without consent.	The location of Stockpile 4 would require consultation with SES as it is located on flood liable land. However, the Schedule 5, clause 5 of ISEPP provides savings that allow the amendments to not apply to REFs which the determining authority had commenced considering before 31 August 2018. This addendum is exempt from this clause as scoping for the addendum REF was commenced in July 2018. Nevertheless, an additional safeguard has been included to consult with SES regarding the Flood Management Plan prior to commencement of the works.
<b>Clause 16</b>	
Clause 16 of the ISEPP states that a consent authority must not carry out any of the following development without giving written notice to the specified authority and taken their responses into consideration:	
(a) <i>development adjacent to land reserved under the National Parks and Wildlife Act 1974 or to land acquired under Part 11 of that Act—the Office of Environment and Heritage,</i>	Some features of the proposed modification are located adjacent to land reserved under the National Parks and Wildlife Act 1974. Clyde River National Park is located to the south of the proposed modification and Benandarah State Forest is located to the north. The proposed modification only includes truck marshalling adjacent to the Clyde River National Park. No new development would be carried out adjacent to the Clyde River National Park as part of the proposed modification. Therefore, no consultation with Office of Environment and Heritage is required.
(b) <i>development on land in Zone E1 National Parks and Nature Reserves or in a land use zone that is equivalent to that zone adjacent to a marine park declared under the Marine Parks Act 1997—the Office of Environment and Heritage,</i>	The proposed modification does not include any development on land in Zone E1 National Parks and Nature Reserves or in a land use zone that is equivalent to that zone adjacent to a marine park declared under the Marine Parks Act 1997. ISEPP consultation with Office of Environment and Heritage is not required.
(c) <i>development adjacent to an aquatic reserve or a marine park declared under the Marine Estate Management Act 2014—the Department of Industry,</i>	The proposed modification has increased the impact area on the Clyde River, a sensitive receiving environment and includes developments adjacent to and within Batemans Marine Park. ISEPP consultation with the Department of Primary Industries has been carried out on 06 November 2018. Table 5-2 provides a summary of the outcomes of this



Item	Response / where addressed in addendum REF
	consultation.
(d) <i>development in the foreshore area within the meaning of the Sydney Harbour Foreshore Authority Act 1998—the Sydney Harbour Foreshore Authority,</i>	The proposed modification is not located within the foreshore area as defined by the <i>Sydney Harbour Foreshore Authority Act 1998</i> .
(e) <i>development comprising a fixed or floating structure in or over navigable waters—the Maritime Authority of NSW,</i>	The proposed modification has increased the impact area on the Clyde River, by expanding the project REF boundary north and south of the existing bridge. However, it does not include changes to the fixed or floating structure in or over navigable waters in the Clyde River. Therefore, consultation with the Maritime Authority of NSW is not required for the purpose of the proposed modification.
(f) <i>development for the purposes of a health services facility, correctional centre or group home, or for residential purposes, in an area that is bush fire prone land (as defined by the Act)—the NSW Rural Fire Service.</i>	The proposed modification does not include development for the purpose of a health services facility, correctional centre, group home or residences.
(g) <i>development that may increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map—the Director of the Observatory,</i>	The proposed modification is not located within the dark sky region map.
(h) <i>development on defence communications facility buffer land within the meaning of clause 5.15 of the Standard Instrument—the Secretary of the Commonwealth Department of Defence</i>	The proposed modification is not located within defence communications facility buffer land.
(i) <i>development on land in a mine subsidence district within the meaning of the Mine Subsidence Compensation Act 1961—the Mine Subsidence Board</i>	The proposed modification is not located on land in a mine subsidence district.

## 5.1 Consultation outcomes

As noted above, Roads and Maritimes has consulted with Department of Primary Industries during the development of this addendum REF under the ISEPP. Table 5-2 provides a summary of the outcomes of this consultation.

Table 5-2 Summary of consultation with the Department of Primary Industries

Agency	Issue	Response / where addressed in addendum REF
Department of Primary Industries	Will the additional basin encroach into the saltmarsh or sit below the highest astronomical tide limit?	The additional operational basin is located within Southern Lowland Grassy Woodland (Threatened Ecological Communities under BC Act) opposite to the wetland protected under CM SEPP and does not encroach into saltmarsh.  Although a Highest Astronomical Tide (HAT) level is not available, the High High Water Springs Solstice (HHWSS) level is considered to be a close proxy. The HHWSS at Clyde River at Nelligen is 0.985m AHD. As such, all the basins are above the HHWSS/HAT.
	The sizing and design of the basin should ensure that any water discharged complies with the water quality benchmarks for estuaries of the	The sizing and design of the basin would be in accordance with Blue Book and the Project EPL requirements. The stormwater management design has

Agency	Issue	Response / where addressed in addendum REF
	catchments within the Batemans Marine Park.	been designed to meet NSW Water Quality Objectives for the Clyde River during the operation phase.
	Where possible construction waste water should be captured and removed or re-used before a discharge level is reached. The separation of 'clean' and 'dirty' stormwater from the site should also be achieved.	Noted. This is in line with current Roads and Maritime practice. Similar practices would be expected during construction.
	Additional losses of marine vegetation will need to be offset in accordance with the New South Wales Department of Primary Industry Policy and guidelines for fish habitat conservation and management (DPI 2013) in consultation with DPI.	Noted. The proposed modification being assessed in this addendum REF would result in 0.07 ha increase of seagrass being affected compared to the Submissions Report and there are no increased impacts on mangroves and saltmarsh. Consultation with DPI regarding marine vegetation offsets are ongoing and will be continued.
	Stockpile 2 is in close proximity to the CM SEPP wetlands. Best management practice with respect to stormwater, erosion and sediment control should be implemented at the site in accordance with Managing Urban Stormwater, Soils and Construction guidelines; 4th Edition Landcom 2004 (The Blue Book) and the Department of Environment and Heritage's Managing Urban Stormwater, Soils and Construction Guidelines, main road construction (The Blue Book 2, 2009). Clearing and grubbing works to road batters should be completed with the aim of revegetating and stabilising the disturbed areas as soon as possible and well prior to the completion of the surface road works.	Noted. This is in line with Roads and Maritime standard requirements and current safeguards SW1, AQ1 and BIO7 of the Submissions Report.
	The public utility relocation works will require a permit under CI 1.16 (2)(a) of the Marine Estate Management (Management Rules) Regulation 1999 for works in a habitat protection zone. Environmental risks associated with underboring works, such as frac-out events, should be considered and addressed during pre-construction and construction.	Frac-outs are events when the drilling fluids unintentionally return to the surface. They normally occur when either the drilling pressure is greater than the outside overburden (earth) pressure, or the fluid finds a seepage pathway (such as fault lines, fractures, or loose material). Measures to minimise the potential for a frac-out during underboring will be investigated during pre-construction and implemented through the Construction Environment Management Plan and Sub-Plans.
	A bathymetric survey of the river bed of the pre-existing condition and behaviour of the bed should be carried out prior to the works commencing and should on completion to determine any impact of the new bridge on sediment flow.	A bathymetric survey was carried out as part of detailed design and used as part of the design development process for decision making.
	A general benthic survey should also be completed to better assess impacts on the various habitats and assemblages within the footprint area.	An additional safeguard will be added to carry out a benthic survey.

## 5.2 Ongoing or future consultation

Roads and Maritime will continue to consult with the community and relevant stakeholders during the construction of the revised project REF proposal and the overall proposal.

The aims of ongoing communications and consultation are to provide the community with:

- Accurate and accessible information regarding the processes and activities associated with the overall proposal
- Information in a timely manner
- Appropriate avenues for providing comment or raising concerns, and to ensure they are aware of the avenues
- A high level of responsiveness to their issues and concerns throughout development and delivery of the overall proposal.

This consultation would be undertaken by Roads and Maritime and the construction contractor. The community would be updated about the progress of construction and provided notification of any road closures or night works in advance of the works occurring.

A community and stakeholder participation plan would be developed and implemented by the construction contractor to effectively manage consultation during the construction stage of the revised project REF proposal and overall proposal. This will include a consultation process with New South Wales State Emergency Service regarding works within and near flood liable land.



## 6. Environmental assessment

This section of the addendum REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposed modification of the Replacement of the Kings Highway bridge over the Clyde River at Nelligen. All aspects of the environment potentially impacted upon by the proposed modification are considered. This includes consideration of the factors specified in the guidelines *Roads and Related Facilities EIS Guideline* (DUAP, 1996) and *Is an EIS required?* (DUAP, 1999) as required under clause 228(1) of the Environmental Planning and Assessment Regulation 2000. The factors specified in clause 228(2) of the Environmental Planning and Assessment Regulation 2000 are also considered in Appendix A.

Additional assessments have been undertaken for biodiversity, noise and Aboriginal heritage in the proposed modification areas. These assessments are located in Appendices C to G.

Site-specific safeguards and management measures are provided to ameliorate the identified potential impacts.

### 6.1 Biodiversity

#### 6.1.1 Methodology

An additional field survey was conducted by an ecologist on Friday 12 October 2018, to assess areas associated with the proposed modification outside the approved project REF boundary. The detailed description and location of the three survey plots are included in Appendix C. The survey effort included:

- Broad-scale vegetation survey, vegetation mapping and opportunistic threatened flora observations
- Three 20 metre x 50 metre Biodiversity Assessment Method (BAM) / BioBanking plot-transects (BAM 2017 and BioBanking Assessment Methodology (BBAM) 2014 data collected) (plots 6, 7 and 8).

Additional flora survey was restricted to Stockpile 4 in the north-east of the site to confirm previous classifications of native vegetation in this area (GHD 2016) and quantify additional impacts of the proposed modification. The locations of survey sites are shown in Appendix C.

The eastern extension of the project REF boundary is to accommodate a truck turning bay and truck marshalling area within the existing road infrastructure and would not result in any direct clearing of existing vegetation. As a result the eastern extension has not been assessed in the Biodiversity Impact Assessment (BIA) Addendum.

#### ***Flora sampling***

Three plots were sampled during the field survey to assess additional areas of impact under the proposed modification seen in Figure 3.1 of Appendix C. Plots were sampled in accordance with existing stratification of the approved project REF proposal. BAM (OEH 2017) and BBAM (OEH 2014) survey data was recorded within each of the three additional plots to ensure that datasets were sufficient to satisfy the requirements of multiple potential biodiversity offsetting scenarios under the Roads and Maritime internal policy.

#### ***Vegetation mapping***

Vegetation mapping undertaken for the BIA (GHD 2016) was updated in October 2018 in accordance with data collected within the additional three flora survey plots.

## Aquatic habitat assessment

Methods and results of aquatic seagrass surveys within the approved project REF boundary are detailed in Section 3.1 of the Nelligen Bridge REF Submissions Report (Roads and Maritime 2017).

## 6.1.2 Existing environment

### Flora

#### Flora species

An additional 14 flora species from an additional 5 families were recorded within the proposed modification area in comparison to the BIA (GHD 2016). The flora species comprised 7 indigenous and 7 exotic or non-indigenous species.

In total, across the entire revised project boundary, one-hundred-and-twenty-three species of flora from 56 families were recorded, comprising 98 indigenous native and 25 exotic or non-indigenous native species. The Poaceae (grasses: 19 species, 12 native), Fabaceae (peas and Acacias - scramblers, climbers and woody shrubs: 12 species, 10 native) and Myrtaceae (Eucalypts and other 'gums': eight native species) were the most diverse families recorded. No threatened flora species were recorded. The full list of species recorded is presented in Appendix C.

#### Plant community types and vegetation zones

No additional Plant Community Types (PCTs) were recorded during additional flora survey within the proposed modification area. One additional native vegetation zone was recorded in the form of Low condition South Coast River-flat Forest (Vegetation Zone 13 / plot 6) shown in Figure 6-1. Plots 7 and 8 were located within areas of Moderate/Good-poor condition South Coast River-flat Forest (Vegetation Zone 5). Low condition South Coast River-flat Forest is contiguous with Moderate/Good-poor and Moderate/Good-medium patches of this PCT present within the eastern floodplains of the REF study area. Within the REF study area, medium condition areas of South Coast River-flat Forest occur adjacent to areas of Floodplain Swamp Forest along the river bank. This vegetation zone ranges in condition, with poor condition vegetation adjacent and inland and Low condition South Coast River-flat Forest comprising paddock within the north-east of the REF study area (Stockpile 4).

Following the addition of Low condition South Coast River-flat Forest (Vegetation Zone 13), thirteen vegetation zones, reflecting each PCT and non-native vegetation were recorded and mapped within the project REF study area (see Table 6-1). Attributes of the two vegetation zones within which additional flora plots were surveyed (Vegetation Zones 6 and 13 in Table 4-1 of Appendix C) are summarised and described in Table 4-6 and 4-13 of Appendix C. Data from BioBanking/BAM plot/transects are also included in Appendix C, along with benchmark values for each PCT.

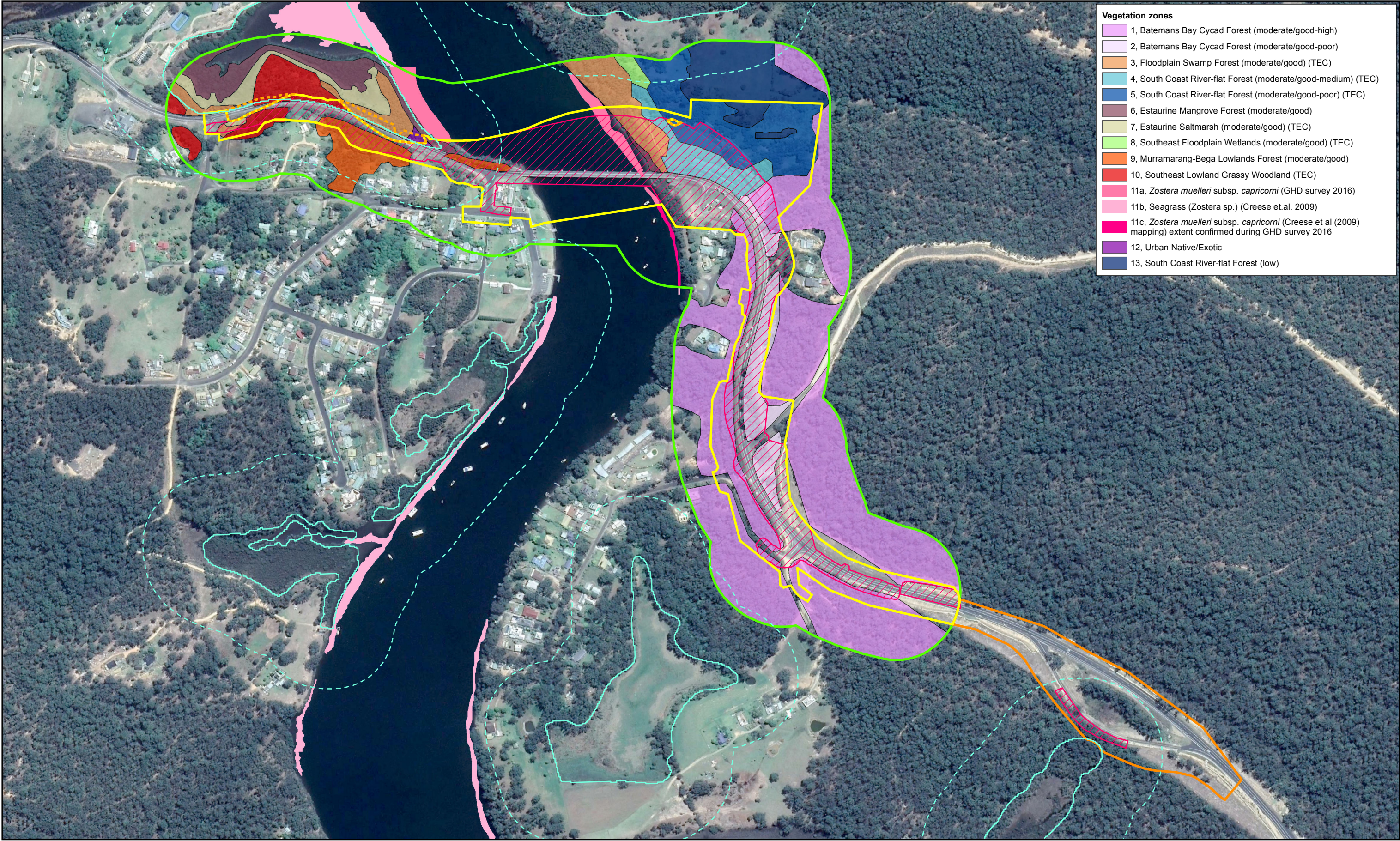
#### Priority weeds

The field survey recorded two declared priority weeds within the revised project boundary, Asparagus Fern (*Asparagus aethiopicus*) and Blackberry (*Rubus fruticosus* species aggregate). These weed species occur at low density within the revised project boundary.

#### Threatened ecological communities

Five threatened ecological communities occur within the REF study area (see Figure 6-1). Of these, four would be impacted by the proposed modification, with the quantum of impact increasing as a result of the proposed modification on three of these TECs. The status and change in vegetation clearing for these threatened ecological communities is shown in Table 6-1.

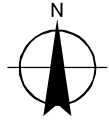




- Vegetation zones**
- 1, Batemans Bay Cycad Forest (moderate/good-high)
  - 2, Batemans Bay Cycad Forest (moderate/good-poor)
  - 3, Floodplain Swamp Forest (moderate/good) (TEC)
  - 4, South Coast River-flat Forest (moderate/good-medium) (TEC)
  - 5, South Coast River-flat Forest (moderate/good-poor) (TEC)
  - 6, Estaurine Mangrove Forest (moderate/good)
  - 7, Estaurine Saltmarsh (moderate/good) (TEC)
  - 8, Southeast Floodplain Wetlands (moderate/good) (TEC)
  - 9, Murramarang-Bega Lowlands Forest (moderate/good)
  - 10, Southeast Lowland Grassy Woodland (TEC)
  - 11a, *Zostera muelleri* subsp. *capricorni* (GHD survey 2016)
  - 11b, Seagrass (*Zostera* sp.) (Creese et.al. 2009)
  - 11c, *Zostera muelleri* subsp. *capricorni* (Creese et al (2009) mapping) extent confirmed during GHD survey 2016
  - 12, Urban Native/Exotic
  - 13, South Coast River-flat Forest (low)

Paper Size A3  
0 50 100 200  
Metres

Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



**LEGEND**

- Revised REF proposal (2018)
- Revised REF proposal (2018) (Eastern extension)
- REF study area
- Approved REF proposal (2017)
- Approved EIS proposal (2017)
- Proximity Area for SEPP Coastal Management (2018)\*
- SEPP Coastal Management (2018)\*

\*The SEPP Coastal Management layer was provided by DPE via SEED as a raster dataset, and converted to vector format by GHD for display purposes, which may make it subject to slight inaccuracies. The proximity area is a 100m buffer of these mapped wetlands, based on the description provided on SEED. As such, it is only an estimate of the proximity area.

N.B. Habitat assessment was undertaken throughout study area

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Vegetation **Figure 6-1**



## **Fauna**

### **Fauna species**

No additional fauna species were recorded within the proposed modification area compared to the BIA (GHD 2016). A total of 64 fauna species were recorded within the revised project boundary during the original field surveys carried out for the project REF. Refer to section 6.1.2 of the project REF for more detail.

### **Fauna habitat**

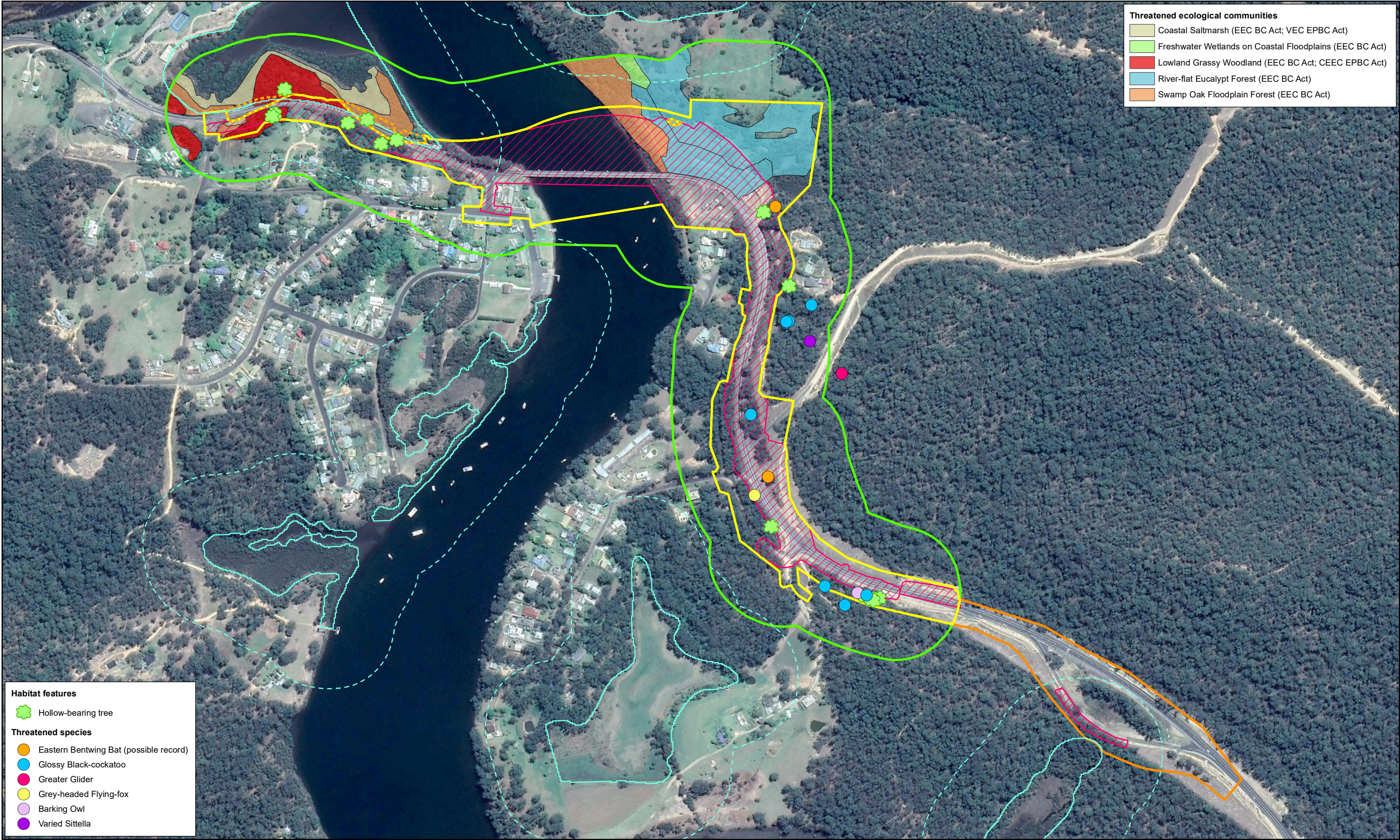
The fauna habitat within the proposed modification is consistent with those present within the approved project REF boundary. The study area generally has good fauna habitat values, due to moderate habitat complexity, allowing for a moderate diversity of fauna species. Species recorded included those that require large tracts of native vegetation to persist, as well as generalist species able to utilise disturbed areas. Refer to section 6.1.2 of the project REF for more detail.

### **Threatened fauna species**

No additional threatened fauna species were recorded within the proposed modification area compared to the BIA (GHD 2016). Figure 6-2 shows threatened species records and habitat features within the revised project REF proposal. Two threatened fauna species were recorded within or near the project REF study area. Three individuals of the Varied Sittella were recorded foraging in the canopy of Batemans Bay Cycad Forest and evidence of the Glossy Black Cockatoo was recorded at many locations in woodland patches on the eastern side of the Clyde River.

Refer to section 6.1.2 of the project REF for more detail.







## 6.1.3 Potential impacts

### Construction

Construction would result in the permanent removal of up to 9.13 ha of native vegetation following the proposed modification (an increase of 4.31 ha compared to submissions report).

Construction would include the removal of a proportion of four TECs present within the revised project REF boundary, including an additional 1.88 ha due to the proposed modification. It is assumed that the footprint of all temporary and permanent components of the project will be confined to the revised project boundary, as shown in Figure 1-1. For the purposes of this addendum REF, it has also been assumed that all of the existing vegetation within the revised project boundary would be removed, excluding the changes to the eastern extension. Accordingly, areas of native vegetation to be cleared may be overestimates, as the revised project boundary is considered as an outer boundary of the construction footprint and areas for compound sites. As such, the project will aim to retain as much vegetation as possible within the revised project boundary.

### Removal of native vegetation

Clearing of native vegetation occurs mainly along the edges of the existing highway, and would involve removal of a moderate diversity of non-threatened native plants, including mature trees. Mature trees have value within plant populations as sources of seed. However, given the presence of extensive areas of these vegetation communities and species within the surrounding State Forest and National Park estate, removal of a small proportion of mature individuals would not threaten the persistence of local populations. It is likely that flora populations would persist in the soil seed bank and within existing habitats beyond (and adjoining) the project REF study area. Reproduction within local native plant populations is unlikely to be adversely affected in the long term by the small-scale removal of (or damage to) individual plants.

About 5.99 hectares of the revised project REF proposal area is composed of previously modified, cleared and developed land (increase of 1.64 ha compared to the approved project REF boundary). These areas contain little native vegetation cover and have limited habitat value for native plants. Any vegetation clearing required in these areas would principally remove pasture grasses, a small number of individuals of non-threatened native plants and noxious and environmental weeds.

The extent of clearing of native vegetation within the revised project boundary is summarised in Table 6-1.

Table 6-1 Clearing of native vegetation including threatened ecological communities

Tozer et al (2010) map unit	Status	Area to be cleared (Approved project REF proposal) (ha)	Area to be cleared (Revised project REF proposal) (ha)	Change in vegetation clearing (ha)
Floodplain Swamp Forest	Swamp Oak Floodplain Forest EEC (BC Act) Coastal Swamp Oak (Casuarina glauca) Forest EEC (EPBC Act)	0.42	0.52	0.10
South Coast River-flat Forest (Moderate/ good - Med)	River-flat Eucalypt Forest on Coastal Floodplains EEC (BC Act)	0.82	0.95	0.13
South Coast River-flat Forest (Moderate/ good - poor)	River-flat Eucalypt Forest on Coastal Floodplains EEC (BC Act)	0.41	2.00	1.59



Tozer et al (2010) map unit	Status	Area to be cleared (Approved project REF proposal) (ha)	Area to be cleared (Revised project REF proposal) (ha)	Change in vegetation clearing (ha)
South Coast River-flat Forest (Low)	n/a	n/a	0.30	0.30
Estuarine Saltmarsh	Coastal Saltmarsh EEC (BC Act) Subtropical and temperate Coastal Saltmarsh VEC (EPBC Act).	0.03	0.03	0.00
Southeast Lowland Grassy Woodland	Lowland Grassy Woodland of the South east Corner EEC (BC Act) / CEEC (EPBC Act)	0.25	0.31	0.06
Batemans Bay Cycad Forest (mod-good – high)	Not listed	0.87	2.78	1.91
Batemans Bay Cycad Forest (mod-good – poor)	Not listed	1.22	1.35	0.13
Estuarine Mangrove Forest (mod-good)	Key fish habitat (FM Act)	0.13	0.13	0.00
Southeast Floodplain Wetlands (mod-good)	Freshwater Wetlands on Coastal Floodplains (BC Act)	0.00	0.00	0.00
Murramurang- Bega Lowlands Forest (mod-good)	Not listed	0.49	0.51	0.02
Seagrass Meadows (Zostera)	Key fish habitat (FM Act)	0.18	0.25	0.07
Urban native/exotic	n/a	0.01	0.01	0.00
Cleared land	n/a	4.35	5.99	1.64
<b>Total area of TEC</b>		<b>1.93</b>	<b>3.81</b>	<b>1.88</b>
<b>Total Native Vegetation</b>		<b>4.82</b>	<b>9.13</b>	<b>4.31</b>

### Removal of terrestrial fauna habitats

The revised project REF proposal would remove up to 9.13 ha of native vegetation, including marine vegetation such as Seagrass Meadows (increase of 4.31 ha compared to the approved project REF proposal). Of this native vegetation, 8.72 ha form terrestrial fauna habitat. The majority of vegetation that would be removed is located along the already disturbed edge of the existing highway, or is adjacent to partially cleared agricultural land. The native vegetation that would be removed does, however, provide habitat for a range of fauna species. Clearing of this vegetation would permanently remove foraging and breeding resources for native fauna, particularly in forest and woodland habitats, which comprise a canopy of eucalypt trees of varying age classes. Eucalyptus and other native canopy species provide nectar resources as well as foraging substrate for a diverse range of arboreal species, such as birds and arboreal mammals, as well as bats.

No additional hollow-bearing trees would be removed due to the proposed modification. In total, up to 14 hollow-bearing trees would be removed within the revised project boundary. However, it is likely that some of these hollow-bearing trees may be able to be retained during construction. Hollow-bearing trees are critical habitat components for many tree-dwelling fauna species, including arboreal mammals,

microchiropteran bats and woodland birds that rely on hollows for shelter and breeding habitat. Due to the long timeframe it takes for hollows to form in eucalypts (usually greater than 150 years) (Gibbons et al 2000), the loss of these hollows represents a long-term reduction in habitat resources for fauna. Details on numbers and sizes of hollows that may be removed within the revised project boundary are provided in Appendix B of Appendix C.

Shrub layers and leaf litter would also be removed within the revised project boundary as a result of construction works. This would result in the loss of habitat for small woodland birds that rely on these resources for foraging and breeding. In addition, loss of leaf litter would remove habitat for small reptiles and gastropods that rely on this feature for shelter, breeding and foraging.

There would be no additional direct impact on wetland habitats due to the proposed modification.

### Impacts on aquatic habitats

Impacts on riparian vegetation and in-stream flora would be limited to the area immediately adjacent to the existing bridge and the location of the new bridge. The revised project boundary would result in the removal of riparian vegetation, including 0.52 ha Floodplain Swamp Forest (0.10 ha increase compared to the approved project REF proposal).

Mangroves, saltmarsh and seagrasses are protected as 'marine vegetation' under the New South Wales *Fisheries Management Act 1994* as they are key fish habitat. Following the proposed modification, construction of the revised project REF proposal would have a minor direct impact on aquatic habitats, comprising the removal of 0.13 hectares of mangroves, 0.03 hectares of saltmarsh and 0.25 ha of seagrasses (0.07 ha increase compared to the approved project REF proposal, no increase for mangroves and saltmarsh). Marine vegetation provides important habitat for aquatic fauna, including refuge areas for fish and foraging habitat for a range of species.

### Indirect Impacts – Wetlands

There are no proposed changes to the alignment of the road. As such, the project REF, EIS and submissions report adequately assess the operational impacts on wetlands.

There is potential for some indirect impacts on wetlands during construction. Such impacts could include:

- Water quality impacts due to works associated with the revised project REF proposal upstream and adjacent to the wetlands
- Changes to surface water flows which would impact upon water availability within the wetlands.

The above impacts are considered to be manageable with the implementation of safeguards and management measures proposed in section 7.2 and therefore unlikely to be significant. Such impacts would largely be minimised through implementing an erosion and sediment control plan which would further develop the conceptual erosion and sediment control plan provided in Figure 6.19 of the project REF. This plan would seek to ensure that clean water flows remain around the revised proposal and that any dirty water from the revised proposal area is captured and treated prior to discharge back into the environment and the adjacent wetlands. Potential operation phase impacts for the proposed modification are consistent with the project REF (discussed in sections 6.1.3 and 6.7.2 of the project REF).

### Cumulative impacts

The total extent of clearing from the approved project REF boundary plus the project EIS proposal is shown in Table 5-2 of Appendix C.

The revised project boundary would increase the extent of vegetation clearing in the locality, and increase the removal of habitats for flora and fauna species, including threatened species. Other developments in the locality would also lead to a reduction in vegetation and habitats. Given the small area of the revised



project boundary, and large areas of native vegetation present in the locality, cumulative impacts of the proposed modification are expected to be negligible overall.

#### Impact on State-listed threatened biota

The revised project REF proposal, including the proposed modification, would potentially impact on a number of State-listed threatened biota (Table 6-2). These potential impacts include:

- Loss of 3.81 ha of TECs
- Loss of 4.55 ha of potential foraging and nesting habitat for Varied Sittella (three individuals recorded within project REF study area)
- Loss of 3.60 ha of Glossy Black-cockatoo potential foraging habitat (recorded in the locality in 2015 by OEH)
- Loss of 4.55 ha of canopied forest and 1.35 ha of shrubland which is potential foraging habitat for Squirrel Glider, Yellow-bellied Glider and Brush-tailed Phascogale (previously recorded in the locality in 2015 by OEH) and Greater Glider (recorded near approved project REF study area; see Figure 6-2)
- Loss of 8.72 ha of terrestrial native vegetation that forms potential foraging habitat for threatened microchiropteran bats (previously recorded in the locality in 2015 by OEH), including Grey-headed Flying-fox recorded within with approved project REF study area (see Figure 6-2).

Table 6-2 Summary of potential impacts of the revised proposal on threatened biota and assessment of whether a significant impact is likely

Biota type	Communities/Species	Potential impacts of revised project REF proposal	Level of impact	AoS* prepared	Significant impact likely?
Threatened ecological communities	Swamp Oak Floodplain Forest (EEC - BC Act)	Loss of 0.52 ha	Low	Yes	No
	River-flat Eucalypt Forest (EEC - BC Act)	Loss of 2.95 ha	Moderate	Yes	No
	Coastal Saltmarsh (EEC - BC Act)	Loss of 0.03 ha	Low	Yes	No
	Lowland Grassy Woodland (EEC - BC Act, CEEC - EPBC Act)	Loss of 0.31 ha	Low	Yes	No
Woodland birds	Varied Sittella (BC Act)	Loss of known foraging habitat Loss of potential breeding habitat Three individuals recorded in the REF study area	Moderate	Yes	No
Hollow-dependent birds	Glossy Black-cockatoo (BC Act)	Loss of known foraging habitat Loss of potential breeding habitat	Moderate	Yes	No

Biota type	Communities/Species	Potential impacts of revised project REF proposal	Level of impact	AoS* prepared	Significant impact likely?
	Little Lorikeet (BC Act) Gang-gang Cockatoo (BC Act) Powerful Owl (BC Act) Masked Owl (BC Act)	Loss of potential foraging habitat Breeding habitat unlikely to be impacted	Low	No	No
Grey-headed Flying-fox	Grey-headed Flying-fox (BC Act, EPBC Act)	Loss of very small area of known foraging habitat No breeding habitat present	Low	No	No
Hollow-breeding/roosting bats	Eastern False Pipistrelle (BC Act) Eastern Freetail Bat (BC Act) Greater Broad-nosed Bat (BC Act) Large-footed Myotis (BC Act) Yellow-bellied Sheath-tail-bat (BC Act)	Loss of very small area of potential foraging habitat Loss of potential breeding habitat	Moderate	Yes	No
Cave-breeding bats	Eastern Bentwing Bat (BC Act) Large-footed Myotis (BC Act)	Loss of very small area of known foraging habitat No breeding habitat present Removal of potential roosting habitat	Moderate	No	No
Hollow-dependent arboreal mammals	Brush-tailed Phascogale (BC Act) Greater Glider (EPBC Act) Squirrel Glider (BC Act) Yellow-bellied Glider (BC Act)	Loss of potential foraging habitat Loss of potential breeding habitat Potential reduction in habitat connectivity	Moderate	Yes	No
Fish	Australian Grayling (FM Act, EPBC Act)	Impact on migration habitat	Moderate	Yes	No

#### Indirect impact - Wildlife connectivity and habitat fragmentation

The revised project boundary would further fragment habitat in the locality by increasing the width of the gap created by the project in some locations. The revised project boundary would require clearing up to 9.13 hectares of native vegetation primarily from alongside the existing highway following the proposed



modification (increase of 4.31 ha compared to the approved project REF boundary). Additional impacts would occur where clearing is to occur to create the new bridge alignment. The proposed modification would have a negligible impact on the primary habitat corridor mapped along both sides of Nelligen Creek. The revised project boundary would not sever this corridor or isolate stands of habitat.

### **Conclusion on significance of impacts**

The cumulative impact from the approved project REF boundary and the proposed modification assessed in this addendum REF are not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the BC Act or FM Act and therefore a Species Impact Statement is not required.

The cumulative impact from the approved project REF proposal and the proposed modification assessed in this addendum REF are not likely to significantly impact threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act.

## **6.1.4 Safeguards and management measures**

The impacts of the proposed modification would be managed through implementation of the safeguards and management measures described in Table 7- 1 of this addendum REF.

## **6.1.5 Biodiversity offsets**

As shown in Table 7-1 of Appendix C, under Roads and Maritime (2016) consideration must be given to providing offsets for the following impacts upon:

- Lowland Grassy Woodland
- 4.55 ha of canopied Eucalypt forest that provides habitat for Commonwealth-listed threatened species (comprising 2.78 ha of Batemans Bay Cycad Forest; 0.95 ha of South Coast River-flat Forest; 0.51 ha of Murramarang-Bega Lowlands Forest; 0.32 ha Southeast Lowland Grassy Woodland)
- the removal of key fish habitat in the form of mangroves, saltmarsh and seagrasses.

In accordance with the Roads and Maritime (2016b) guidelines, a Biodiversity Offset Strategy should be developed for the project when the detailed design has been finalised and final impact areas are known.

As previously noted, River-flat Eucalypt Forest (of which South Coast River-flat Forest forms a component) is currently under assessment for listing as a critically endangered ecological community under the EPBC Act. If the proposal has not been completed, and River-flat Eucalypt Forest is listed under the EPBC Act within that time, then impacts of the proposal upon this vegetation community must be considered under the Act. The implications of this prospective listing would also need to be considered in relation to Roads and Maritime policy and guidelines relating to offsetting of biodiversity impacts. If River-flat Eucalypt Forest is listed as CEEC, impacts at the proposal site would also require offset under part 4 of the 2016 Roads and Maritime offset guidelines (see Table 7 1 of Appendix C).

In September 2015, a 'strategic assessment' approval was granted by the Australian Minister for the Environment in accordance with the EPBC Act. Under the strategic assessment, if a significant impact is considered likely on a MNES, impacts must be offset using an endorsed method (e.g. the Framework for Biodiversity Assessment (FBA) (OEH, 2014b)). As discussed in section 6.1.3, the revised project REF proposal is unlikely to have a significant impact on any MNES.

## 6.2 Aboriginal heritage

### 6.2.1 Methodology

Roads and Maritime engaged Umwelt Australian Pty Limited (Umwelt) to prepare an Aboriginal cultural heritage assessment (ACHA) for the proposed modification area in accordance with the Stage 2 requirements of the Roads and Maritime *Service Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI)*.

A visual inspection of the proposed modification area was undertaken by Nicola Roche, Manager Cultural Heritage, on 3 October 2018.

In accordance with the Stage 2 PACHCI requirements, consultation was undertaken with the relevant local Aboriginal land council, being the Batemans Bay LALC. Uncle Les Simon of the Batemans Bay LALC attended a visual inspection of the addendum study area on 3 October 2018 and provided an Aboriginal Stakeholder Cultural Heritage Survey Report, as required under the Stage 2 PACHCI. A copy of the Aboriginal Stakeholder Cultural Heritage Survey Report provided by the Bateman's Bay LALC is attached at Appendix 1 of Appendix D.

### 6.2.2 Existing environment

Like the 2016 study area, the proposed modification areas have been subject to a range of disturbances over time predominately the result of the construction of the Kings Highway and Nelligen Bridge.

#### Archaeological Context

Based on the information outlined in Appendix D, the following summary of the archaeological context of the proposed modification and revised proposal study areas is provided below:

- The majority of the sites recorded locally are low density artefact scatters
- Isolated finds and PADs are the next most common site type recorded in the surrounding landscape
- Middens with low density artefact scatters and a midden have also been recorded within five kilometres of the addendum study areas
- Sites are more commonly recorded in association with ridges, ridge crests and ridge slopes
- Sites are also recorded on creek flats, creek terraces, spurs, saddles and slopes
- The most common artefact type is flake. However, broken flakes, flaked pieces, hammerstones, cores (including blade, bipolar and fragments), flaked pieces, manuports and a broken blade have been recorded
- Raw materials recorded include quartz, silcrete, chert, volcanic, quartzite, fine grained volcanic, acid volcanic, porphyry, rhyolite and sandstone. There is no single dominant raw material. However, quartz, volcanic and silcrete are most commonly used.

The 2018 study did not find any additional PADs or sites of archaeological value present on proposed modification area. The study did not identify any other sites or areas of PAD based on the nature of the identified landforms and/or the extent of prior disturbance.

#### Visual Context

During the survey of the proposed modification areas, no new Aboriginal archaeological sites (including scarred trees) were identified. Levels of visibility and exposure across all of the surveyed areas were



relatively low, thereby necessitating consideration of whether Aboriginal objects could be present but not visible.

The outcome of the study, detailed in Appendix D, is consistent with the results of the 2016 assessment for areas immediately adjoining the addendum study areas. Additionally, the assessment was also consistent with that provided by Batemans Bay Local Aboriginal Land Council.

### 6.2.3 Policy setting

The Office of Environment and Heritage (OEH) is primarily responsible for regulating the management of Aboriginal cultural heritage in New South Wales under the *National Parks and Wildlife Act 1974* (NPW Act). Supporting the NPW Act is the National Parks and Wildlife Regulation 2009 (the Regulation) and other codes of practice and guidelines including the due diligence code.

The NPW Act defines an Aboriginal object as:

*any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales.*

In accordance with Section 86(1) of the NPW Act, it is an offence to harm or desecrate a known Aboriginal object, whilst it is also an offence to harm an Aboriginal object under Section 86(2). Harm is defined as any act or omission that:

- a) destroys, defaces or damages an object or place, or
- b) in relation to an object - moves the object from the land on which it had been situated, or
- c) is specified by the regulations, or
- d) causes or permits the object or place to be harmed in a manner referred to in paragraph (a), (b) or (c), but does not include any act or omission that:
- e) desecrates the object or place (noting that desecration constitutes an offence separate to harm), or
- f) is trivial or negligible, or
- g) is excluded from this definition by the regulations.

Section 87(2,4) establishes that it is a defence to prosecution under Section 86(2) (the strict liability offence) if due diligence was exercised to reasonably determine that the activity or omission would not result in harm to an Aboriginal object or if the activity or omission constituting the offence is a low impact act or omission (in accordance with Section 80B of the Regulation). The Regulation identifies that compliance with the due diligence code is taken to constitute due diligence in determining whether a proposed activity will harm an Aboriginal object.

Roads and Maritimes has obtained AHIP C0003256 required under section 90 of the Act to harm an Aboriginal heritage object for the revised proposal.

### 6.2.4 Potential impacts

#### **Construction**

There are no additional construction impacts.

The REF Addendum Stage 2 PACHCI Assessment (Appendix D) concluded that the areas of the proposed modification have a nil-low or low degree of archaeological potential. As such, there are no identified constraints to works proceeding for the proposed modification, provided that the project REF safeguards are followed, including following the Standard Management Procedure - Unexpected Heritage Items.

Input received from the Bateman's Bay LALC has been attached to this report at Appendix 1 of Appendix D, for reference and does not make specific recommendations.

### Operation

There are no additional operation impacts.

## 6.2.5 Safeguards and management measures

The impacts of the proposed modification would be managed through implementation of the safeguards and management measures described in Table 7- 1 of this addendum REF. Changes to Aboriginal heritage safeguards required for the proposed modification are detailed below.

Impact	Environmental safeguards	Responsibility	Timing	Reference
Aboriginal heritage impacts	Works within the area of Roads and Maritime Nelligen Artefact Scatter (AS1) Scatters will <del>not be undertaken until an AHIP is approved for this area</del> be undertaken in accordance with AHIP C0003256.	RMS Contractor	Pre-construction	Project REF
<u>Aboriginal cultural heritage item encountered during work</u>	<u>All persons working on site involved in ground disturbing works will be made aware that it is an offence under Section 86 of the NPW Act to harm or desecrate an Aboriginal object unless that harm or desecration is the subject of an approved Aboriginal Heritage Impact Permit (AHIP).</u>	<u>Contractor</u>	<u>Construction</u>	<u>Addendum REF</u>



## 6.3 Noise

A Noise and Vibration Assessment (NVA) was prepared for the project REF and then revised as part of the submissions report (this is summarised in sections 6.5 of the REF and 3.3 of the submissions report).

The features of the proposed modification that are likely to impact the potential construction noise are:

- Proposed vegetation clearing along the revised project boundary (CS01)
- Stockpile 4 to the north of the eastern side of the bridge (CS02 and CS15).

As the other scenarios have not been impacted by the proposed modification, these have not been assessed in this addendum REF.

### 6.3.1 Methodology

The proposed modification affects the construction scenarios pertaining to the site establishment and operation assessed within the project REF. The construction scenarios that are to be re-assessed within this addendum REF are presented in Table 6-3. The activity sound power level for each scenario in the project REF has been used for this assessment (based on the Construction Noise and Vibration Guideline (CNVG), RMS 2016) as the same construction equipment is anticipated to be used for each scenario.

Table 6-3 Construction scenarios and activity sound power level

Scenario	Construction Area	Activity	Description	Activity sound power level, dBA
CS01	Vegetation clearing and site compounds	Site compound and establishment	Establish site compound and fencing Install erosion and sediment controls General land clearing, vegetation removal	116
CS02	Site compounds	Site compound	Delivery of materials and equipment Access to office/storage areas Plant and equipment	116
CS15	Site compounds	Disestablishment of site compound	Disestablishment of site compound Area clean up	107

Computer noise modelling was conducted using the same assumptions and inputs as the project REF (see Table 4-10 of Appendix G in the project REF).

### 6.3.2 Existing environment

The assessed sensitive receivers within the study area are consistent with the project REF. These sensitive receivers are shown in Figure 6-3, along with the construction work areas for CS01, CS02 and CS15. For reference, five commercial receiver buildings and 219 residential receiver buildings have been identified within the project REF study area.





Figure 6-3



### 6.3.3 Criteria

Construction noise levels were predicted to the sensitive receivers detailed within the project REF and have been assessed against the criteria presented in Table 6-4.

Table 6-4 Construction noise management levels

Receivers	Construction noise management levels				
	Standard construction hours		Outside of standard construction hours		
	Noise affected	Highly noise affected	Day	Evening	Night
Residential	44	75	39	35 <sup>1</sup>	35 <sup>1</sup>
Commercial	70	-	-	-	-

Notes:

- 1) Noise management levels are based on a RBL of 30 dBA as the measured background levels were below 30 dBA
- 2) Noise management level only applies when the property is in use during the standard construction hours

The noise management level for sleep disturbance is based on a maximum internal noise level of 55 dBA  $L_{Amax}$  as recommended by the Road Noise Policy and a 10 dBA reduction in noise from outside the building. The RNP acknowledges that one or two noise events per night with maximum external noise levels of 75 to 80 dBA are unlikely to substantially affect health and wellbeing. There is further detail regarding the sleep disturbance criteria in Table 6.15 of the Project REF.

### 6.3.4 Potential impacts

The potential impacts are assessed with regards to the overall impact of the project, including the proposed modification (subject of this addendum REF). The predicted noise levels to all sensitive receivers for CS01, CS02 and CS15 (along with the additional mitigation measures) are presented in Appendix E. The  $L_{Aeq(15min)}$  noise contours for CS01, CS02 and CS15 are shown in Appendix F.

#### **Construction – residential receivers**

Table 6-5 presents a summary of the predicted noise impacts to residential receivers during standard hours and outside of standard hours work periods for the project overall. CS01 is predicted to result in the highest number of exceedances of the noise management level (NML), followed by CS02 and CS15, respectively. The worst-affected residential receiver is R127 and is predicted to receive noise levels up to 88 dBA during CS01 (increased from 80 dBA from the project REF). During evening and night works, the number of residential receivers predicted to exceed the NML increases to 219 (all the sensitive receivers within the study area), 218 (up from 214 from the project REF) and 166 (up from 140 from the project REF) for CS01, CS02 and CS03, respectively.

The results from the previous assessment of CS01, CS02 and CS15 included in the Submissions Report are presented in Table 6-5 below in parentheses.

The exceedances of the NMLs is largely due to the low background noise levels during each period of the day. Potential noise impacts would be reduced with the implementation of the mitigation measures outlined in Section 6.3.5.

Table 6-5 Construction noise impacts to residential receivers

Potential noise impacts	CS01	CS02	CS15
<b>Standard construction hours</b>			
Number of exceedances of Noise Management Level	216 (181)	157 (129)	47 (29)
Highest noise level received ( $L_{Aeq,15min}$ ), dBA	88 (80)	84 (80)	75 (71)
Highest exceedance above Noise Management Level, dBA	44 (36)	40 (36)	31 (27)
Worst-affected receiver	R127	R128	R128
<b>OOHW Period 1 (Day)</b>			
Number of exceedances of Noise Management Level	219 (215)	205 (188)	106 (81)
Highest noise level received	88 (80)	84 (80)	75 (71)
Highest exceedance above Noise Management Level	49 (41)	45 (41)	36 (32)
Worst-affected receiver	R127	R128	R128
<b>OOHW Period 1 (Evening) &amp; OOHW Period 2 (Night)</b>			
Number of exceedances of Noise Management Level	219 (219)	218 (214)	166 (140)
Highest noise level received	88 (80)	84 (80)	75 (71)
Highest exceedance above Noise Management Level	53 (45)	49 (35)	40 (36)
Worst-affected receiver	R127	R128	R128
Note: Levels shown in brackets are results from the project REF for these scenarios			

### ***Sleep disturbance impacts***

Table 6-6 presents a summary of the predicted sleep disturbance impacts to residential receivers during the night period. CS01 is predicted to result in the highest number of exceedances of the sleep disturbance criteria. Potential sleep disturbance impacts would be reduced with the implementation of the noise mitigation measures outlined in Section 6.3.5. All exceedances of the sleep disturbance criteria are presented in Appendix G.



The results from the previous assessment of CS01, CS02 and CS15 prior to the change in footprint are presented in Table 6-5 below in parentheses.

Table 6-6 Construction noise impacts to residential receivers – sleep disturbance

Potential noise impacts	CS01	CS02	CS15
Exceedances of sleep disturbance criteria ( $L_{A1,1min}$ ), dBA	34 (8)	9 (6)	4 (3)
Highest internal noise level, ( $L_{A1,1min}$ ), dBA (External level minus 10 dBA)	78 (70)	73 (70)	64 (61)
Worst-affected receiver	R127 (R127/R128)	R127 (R127/R128)	R127 (R127/R128)
Note: Levels shown in brackets are results from the project REF for these scenarios			

### **Construction – commercial receivers**

Table 6-7 presents a summary of the predicted noise impacts to commercial receivers whilst they are in use. CS01 is predicted to result in the highest number of exceedances of the NMLs at commercial receivers. These potential noise impacts are temporary in nature and would be reduced with the implementation of the noise mitigation measures outlined in section 6.3.5.

Table 6-7 Construction noise impacts to commercial receivers

Potential noise impacts	CS01	CS02	CS15
Number of exceedances of Noise Management Level	5 (0)	0 (0)	0 (0)
Highest noise level received ( $L_{Aeq,15min}$ ), dBA	105 (62)	60 (59)	51 (50)
Highest exceedance above Noise Management Level, dBA	35 (-)	- (-)	- (-)
Worst-affected receiver	C05 (-)	- (-)	- (-)

### **Construction vibration impacts**

Section 4.8 of Appendix G of the project REF presents an assessment of potential construction vibration impacts and includes mitigation measures to reduce potential impacts. No further assessment or mitigation measures are required as part of this addendum REF.

### **Operation**

There is no change to the operational noise impacts of the proposal.

### 6.3.5 Safeguards and management measures

The impacts of the proposed modification would be managed through implementation of the safeguards and management measures described in Table 7- 1 of this addendum REF. Additional noise safeguards required for the proposed modification are detailed below.

Impact	Environmental safeguards	Responsibility	Timing	Reference
<u>Construction noise and vibration</u>	<u>The NVMP would include additional noise mitigation measures to be implemented when exceedances of construction noise management levels remain after the implementation of standard noise mitigation measures, which will be implemented where reasonable and feasible. Guidance on suggested additional noise mitigation measures for each receiver are provided in Appendix E of this addendum REF.</u>	<u>Contractor</u>	<u>Construction</u>	<u>Addendum REF</u>



## 6.4 Other impacts

For environmental factors where the incremental impact of the proposed modification was deemed to be negligible to minor, an assessment of the existing environment and potential impacts has been assessed in Table 6-8, comprising:

- Non-Aboriginal heritage
- Landscape and visual amenity
- Hydrology and flooding
- Soil and water
- Traffic and access
- Air quality
- Land use and property
- Socio-economic
- Waste management
- Hazards and risks
- Greenhouse gas and climate change.

Safeguards and management measures identified in the approved project REF and submissions report would be implemented for the project (including the proposed modification) as detailed in section 7 of this Addendum REF and have been considered appropriate to avoid or mitigate the minor impacts. Additional safeguards and management measures are shown Table 6-9.

## 6.4.1 Existing environment and potential impacts

Table 6-8 Other environmental impacts

Environmental factor	Existing environment	Potential impacts
Non-Aboriginal heritage	<p>The non-Aboriginal heritage located in the area surrounding the project site is described in detail in section 6.3 of the project REF. A detailed breakdown of the significance of each locally listed item is located in Appendix F of the project REF.</p> <p>Bushranger's Tree (local heritage item I300) is located within the Clyde River foreshore park off Braidwood Street. The revised project boundary includes this foreshore park and Bushranger's Tree. The heritage significance of Bushrangers Tree is detailed in Appendix F of the project REF.</p> <p>A number of non-Aboriginal heritage items are located near the revised project boundary. Vibration impact to these heritage items are detailed in section 6.3 of the project REF. No further impact to nearby non-Aboriginal heritage is expected to occur as a result of the proposed modification.</p>	<p><b><u>Potential impacts</u></b></p> <p>The Bushranger's Tree is located within 35 metres of the proposed modification and therefore there is potential for vibration impacts to occur on this item.</p> <p><b><u>Operation</u></b></p> <p>There are no expected impacts during operation.</p> <p><b><u>Safeguards and management measures</u></b></p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF. Changes to non-Aboriginal heritage safeguards are shown Table 6-9.</p>



Environmental factor	Existing environment	Potential impacts
Landscape and visual amenity	<p>The landscape and visual environment surrounding the project site is described in detail in section 6.4 of the project REF. The project REF divides the proposed project site into five Landscape Character Zones. The proposed modification is located in:</p> <ul style="list-style-type: none"> <li>• Landscape Character Zone 1 Nelligen Village – Primarily located on the western side of the Clyde River and includes the main component of the Nelligen village. The zone consists of low-density development primarily consisting of residential land uses.</li> <li>• Landscape Character Zone 3 Clyde River Valley – The zone consists of the river which runs north-south through the overall proposal area.</li> <li>• Landscape Character Zone 5 Batemans Bay Cycad Forest – Located on the eastern side of the Kings Highway. The zone consists of the Batemans Bay Cycad Forest community and is characterised by eucalypt woodlands.</li> </ul>	<p><b><u>Construction impacts</u></b></p> <p>During construction, the removal of vegetation in association with Stockpile 4 and the expansion of the approved project REF boundary may result in temporary visual impacts. Stockpile 4 would require some vegetation clearing to allow for temporary hardstands and equipment laydown. Sections of woody vegetation would be removed as part of the proposed modification to relocate an underground utility along the western side of Thule Road. This vegetation contributes to the amenity and character of the local area.</p> <p>The stockpile sites and utility installation locations would be rehabilitated post construction.</p> <p><b><u>Operation impacts</u></b></p> <p>The proposed modification would not result in any operational impacts to landscape or visual amenity.</p> <p><b><u>Safeguards and management measures</u></b></p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>

Environmental factor	Existing environment	Potential impacts
Hydrology and flooding	<p>Local hydrology and flooding are detailed in section 6.6 of the project REF. Flood modelling in the project REF shows that some features of the proposed modification are located within areas that would be inundated during a one per cent annual exceedance probability (AEP) event.</p> <p>Flood modelling and existing emergency evacuation routes are detailed in section 6.6.2 of the project REF.</p>	<p><b><u>Construction impacts</u></b></p> <p>Sections of the proposed modification are located within possible flood affected areas, including Stockpile 4 and utility relocation (underboring and trenching locations) along Thule Road.</p> <p>There is potential for some changes to surface water flows due to the presence of materials or equipment on site which could potentially redirect flows. As materials are not expected to be left on site for prolonged periods such impacts are considered minimal.</p> <p>All other potential construction impacts associated with the proposed modification are consistent with those described in the project REF and as such, no further assessment has been carried out.</p> <p>The stockpile sites and utility relocation (trenching and underboring locations) would be rehabilitated post construction.</p> <p><b><u>Operation impacts</u></b></p> <p>There are no expected impacts during operation.</p> <p><b><u>Safeguards and management measures</u></b></p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF. Changes to hydrology and flooding safeguards are shown Table 6-9.</p>



Environmental factor	Existing environment	Potential impacts
Soil and water	<p>The existing environment in the proposed modification area is consistent with that described in section 6.7 of the project REF, with the site rising quickly about 200 metres on the eastern and western sides of the Clyde River.</p> <p>A review of the Ulladulla Geological Map 1:250,000 (sheet SI/56-13) indicates the project REF proposal area is underlain by unnamed Ordovician metasedimentary rocks, including siltstone, claystone, sandstone, quartzite and chert. Similarly to the approved project REF proposal, sections of the proposed modification are located in areas with high potential for acid sulfate soils.</p>	<p><b><u>Construction impacts</u></b></p> <p>There would be a minor increase in the area of exposed surface from the proposed modification (Stockpile 4 and project REF boundary expansions), including trenching and pits for underboring for the utility relocation. Underboring increases the risks of frac-out events.</p> <p>Other potential construction and operation phase impacts for the proposed modification are consistent with the project REF.</p> <p>Sediment and erosion controls would be required for the revised REF project boundary and rehabilitation following demobilisation of the site compounds would be required to minimise impacts.</p> <p>Construction may require the use of cranes on barges within the Clyde River. It would not be practical to refuel the cranes at the compound.</p> <p><b><u>Operation impacts</u></b></p> <p>There are no expected impacts during operation.</p> <p><b><u>Safeguards and management measures</u></b></p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF. Changes to soil and water safeguards are shown Table 6-9.</p>

Environmental factor	Existing environment	Potential impacts
Traffic and access	<p>Details of the existing road network, pedestrian facilities, car parking, traffic volumes, level of service and crash history for the project site is provided in section 6.8 of the project REF.</p> <p>The proposed modification would increase the extent of the project REF boundary to provided additional ancillary facilities. Traffic would access the new stockpile area via the Kings Highway.</p>	<p><b><u>Construction</u></b></p> <p>Construction phase impacts for the proposed modification would be in accordance with those described in the project REF.</p> <p>Any additional impacts to local traffic from the utility relocation on Thule Road would be managed by the construction traffic management plan to be developed in accordance with the project REF, including:</p> <ul style="list-style-type: none"> <li>• Consultation with local residents</li> <li>• Measures to maintain access to local roads and properties</li> <li>• Site specific traffic control measures (including signage) to manage and regulate traffic movement.</li> </ul> <p>All existing access to the private properties from the proposed modification would be retained and modified as required to suit the revised proposal. The safety of all road users including pedestrians, cyclists and motorists would be improved during operation of the revised proposal. No changes to operational traffic numbers are expected for the proposed modification.</p> <p><b><u>Operation impacts</u></b></p> <p>There are no expected impacts during operation.</p> <p><b><u>Safeguards and management measures</u></b></p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>



Environmental factor	Existing environment	Potential impacts
Air quality	The existing environment is described in detail in section 6.9 of the project REF. Identified sensitive receivers are shown on Figure 6.12 in the project REF.	<p><b><u>Construction</u></b> Activities carried out at Stockpile 4 and utility installation has the potential to result in a minor increased in air quality impacts associated with general construction and stockpiling activities. However, given that the nearest sensitive receiver is 50 metres from the revised project boundary it is not expected to have a significant impact. In accordance with the project REF, all stockpiles will be managed in accordance with the Stockpile Site Management Guideline (RTA, 2015).</p> <p><b><u>Operation</u></b> There are no expected impacts during operation.</p> <p><b><u>Safeguards and management measures</u></b> The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>
Land use and property	<p>Urban Design Report and Landscape Character and Visual Impact Assessment prepared by Spackman Mossop and Michaels for the approved project REF proposal is summarised in section 6.4 of the project REF. The revised project boundary would be extended to the western side of Thule Road, towards the river.</p> <p>The new stockpile and project boundary expansion are located on land that has previously been acquired or leased by Roads and Maritime for the duration of construction.</p> <p>The proposed modification is permitted without consent under ISEPP and the consent requirements of the Eurobodalla LEP do not apply.</p>	<p><b><u>Construction</u></b> No additional property acquisition would be required as part of the proposed modification. Rehabilitation works are to commence as soon as practicable after works are completed in any area.</p> <p><b><u>Operation</u></b> There are no expected impacts during operation.</p> <p><b><u>Safeguards and management measures</u></b> The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>

Environmental factor	Existing environment	Potential impacts
Socio-economic	<p>The existing environment is described in detail in section 6.11 of the project REF.</p>	<p><b><u>Construction</u></b></p> <p>During construction, the potential socio-economic impacts associated with the proposed modification are consistent with those described in the project REF and submissions report.</p> <p>The additional areas required for the proposed modification would be rehabilitated post construction.</p> <p><b><u>Operation</u></b></p> <p>No additional impacts are anticipated for operation of the proposed modification.</p> <p><b><u>Safeguards and management measures</u></b></p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>
Waste management	<p>Roads and Maritime is committed to ensuring responsible management of unavoidable waste and to promoting the reuse of such waste through appropriate measures in accordance with the resource management hierarchy principles embodied in the <i>Waste Avoidance and Resource Recovery Act 2001</i>. The resource management hierarchy principles in order of priority as outlined in the <i>Waste Avoidance and Resource Recovery Act 2001</i> are:</p> <ul style="list-style-type: none"> <li>• Avoidance of unnecessary resource consumption</li> <li>• Resource recovery (including reuse, reprocessing, recycling and energy recovery)</li> <li>• Disposal.</li> </ul> <p>By adopting these principles, Roads and Maritime encourages the most efficient use of resources and reduces cost and environmental harm in accordance with the principles of ecologically sustainable development.</p>	<p><b><u>Construction</u></b></p> <p>Construction of the project would require the use of a number of resources and the generation of a range of waste streams as described in the approved project REF. The impacts and requirements of the proposed modification would be consistent with those stated in section 6.12 of the project REF.</p> <p><b><u>Operation</u></b></p> <p>No additional impacts are anticipated for operation of the proposed modification.</p> <p><b><u>Safeguards and management measures</u></b></p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>



Environmental factor	Existing environment	Potential impacts
Hazards and risks	Existing hazards and risks in the vicinity of the REF proposal area are generally associated with the operation of the existing road network and the deterioration observed within the existing bridge.	<p><b><u>Construction</u></b></p> <p>No additional impacts are anticipated for operation of the proposed modification. Refer to the determined in section 6.13 of the project REF. However, ISEPP consultation carried out for this addendum REF has highlighted potential frac-out risks associated with underboring activities.</p> <p><b><u>Operation</u></b></p> <p>No additional impacts are anticipated for operation of the proposed modification.</p> <p><b><u>Safeguards and management measures</u></b></p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF. Changes to hazards and risks safeguards are shown Table 6-9.</p>
Climate change and Greenhouse gas	A summary of the existing environment and context is included in section 6.14.1 of the project REF.	<p><b><u>Construction</u></b></p> <p>No additional impacts are anticipated for operation of the proposed modification. Refer to in section 6.14.2 of the project REF for potential impacts during construction.</p> <p><b><u>Operation</u></b></p> <p>No additional impacts are anticipated for operation of the proposed modification.</p> <p><b><u>Safeguards and management measures</u></b></p> <p>The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.</p>

## 6.4.2 Safeguards and management measures

The following additional safeguards and management measures are required to address other impacts associated with the proposed modification.

Table 6-9 Other environmental impacts safeguards and mitigation measures

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
NAH3	Non-Aboriginal heritage	<u>Vibration impacts on heritage items</u>	<p><u>Work methods within 35 metres of the Bushrangers Tree would be reviewed to minimise the use of vibration generating equipment where possible. The following safeguard and mitigation measure in accordance with the project REF would also be implemented to minimise the potential impact on this item:</u></p> <ul style="list-style-type: none"> <li>A qualified arborist will be engaged to assess the condition of the Bushrangers Tree and identify any appropriate measures to protect it.</li> </ul>	Contractor	Pre-construction	Project REF
HYF5	Hydrology and flooding	Flooding	<p>As part of the CEMP a flood risk management plan will be prepared that details the processes for monitoring of flood alerts. The plan will specify the steps to be taken in the event a flood warning is issued including removal or securing of loose material in the floodplain and removal or securing of all fuels and chemicals. The plan would incorporate any stockpiles on flood prone land.</p> <p><u>Consultation will be undertaken with SES regarding the flood risk management plan prior to the commencement of the work.</u></p>	RMS and Contractor	Pre-construction and operation	Addendum REF
SW7	Soil and water	Contamination of surface water	<p>All fuels, chemicals, and liquids will be stored at least 50 m away from waterways (including existing stormwater drainage system) and will be stored in an impervious bunded area within the compound site.</p> <p><u>If any fuels, chemicals or liquids need to be kept on barges and jetties, they will be stored within a bunded area.</u></p>	Contractor	Pre-construction	Project REF
SW8	Soil and water	Contamination of surface water	<p><u>The refuelling of plant and maintenance of land-based plant and equipment machinery will be undertaken in designated sealed impervious bunded areas at ancillary facilities or off site. Refuelling of marine-based plant and vessels will be undertaken in a suitably bunded area (through use of silt curtain, booms or equivalent controls) to minimise pollution risk associated with spills in the compound site.</u></p>	RMS and Contractor	Construction	Project REF
SW13	Soil and water	Spills and leaks contamination	<p>An emergency spill kit will be kept on site at all times <u>to enable immediate clean-up of chemical/fuel spills and frac-outs</u>. All staff will be made aware of the location of the spill kit and trained in its use.</p> <p><u>Any contaminated material would be disposed of at a licenced waste facility.</u></p>	<u>Contractor</u>	<u>Construction</u>	<u>Addendum REF</u>



No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
<u>SW24</u>	<u>Soil and water</u>	<u>Management of water contamination</u>	<u>Appropriate containment procedures will be put in place for collecting the drilling fluids at the entry and exit points of underboring works. These procedures will include the collection of the drilling fluids in tanks/drums at the entry and exit points, and their appropriate disposal.</u>	<u>Contractor</u>	<u>Construction</u>	<u>Addendum REF</u>
<u>SW25</u>	<u>Soil and water</u>	<u>Water quality</u>	<u>A general benthic survey will be completed to better assess impacts on the various habitats and assemblages within the footprint area.</u>	<u>RMS</u>	<u>Pre-construction</u>	<u>Addendum REF</u>
<u>SW26</u>	<u>Soil and water</u>	<u>Water quality</u>	<u>Assess water quality management measures against NSW Water Quality Objectives for the Clyde River for construction and operation phases prior to commencement works within the waterway.</u>	<u>RMS</u>	<u>Pre-construction</u>	<u>Addendum REF</u>
HR2	Hazards and risks	Risk management	A pollution incident response management plan (PIRMP) will be developed and implemented in accordance with the POEO Act requirements. The plan will form a sub-plan within CEMP <u>and will include mitigation and management measures for potential frac-out events.</u>	Contractor	Pre-construction and construction	Project REF

## 6.5 Cumulative impacts

Cumulative impacts have the potential to arise from the interaction of individual elements within the project and the additive effects of other external projects. Roads and Maritime is required under Clause 228 (2) of the EP&A Act, to take into account potential cumulative impacts as a result of the project.

There are no additional cumulative impacts, beyond those identified in section 6.15 of the project REF, anticipated as a result of the proposed modification.



## 7. Environmental management

### 7.1 Environmental management plans

A number of safeguards and management measures have been identified to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposed modification. Should the proposed modification proceed, these safeguards and management measures would be incorporated into the Project Environmental Management Plan (PEMP) and Contractors Environmental Management Plan (CEMP) and applied during construction.

## 7.2 Summary of safeguards and management measures

Environmental safeguards and management measures for the Replacement of the Kings Highway bridge over the Clyde River at Nelligen are summarised in Table 7-1. Additional safeguards and management measures identified in this addendum REF are included in bold and italicised font. The safeguards and management measures will be incorporated into the detailed design phase of the proposed modification and the CEMP and implemented during construction and operation of the proposed modification, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed works on the surrounding environment.

Table 7-1 Summary of safeguards and management measures

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
GEN1	General	General – minimise environmental impacts during construction	<p>A CEMP will be prepared and submitted for review and endorsement of the RMS Environment Manager prior to commencement of the activity. As a minimum, the CEMP will address the following:</p> <ul style="list-style-type: none"> <li>Any requirements associated with statutory approvals</li> <li>Details of how the project will implement the identified safeguards outlined in the REF</li> <li>Issue-specific environmental management plans</li> <li>Roles and responsibilities</li> <li>Communication requirements</li> <li>Induction and training requirements</li> <li>Procedures for monitoring and evaluating environmental performance, and for corrective action</li> <li>Reporting requirements and record-keeping</li> <li>Procedures for emergency and incident management</li> <li>Procedures for audit and review.</li> </ul> <p>The endorsed CEMP will be implemented during the undertaking of the activity.</p>	Contractor	Pre-construction	Project REF
GEN2	General	General - notification	All businesses, residential properties and other key stakeholders (eg schools, local councils) affected by the activity will be notified at least five days prior to commencement of the activity.	Contractor RMS	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
GEN3	General	General – environmental awareness	<p>All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular "toolbox" style briefings.</p> <p>Site-specific training will be provided to personnel engaged in activities or areas of higher risk. These include</p> <ul style="list-style-type: none"> <li>• Areas of Aboriginal heritage sensitivity</li> <li>• Threatened species habitat</li> <li>• Area of high biodiversity importance</li> <li>• Construction noise and vibration</li> <li>• Location of non-Aboriginal heritage items</li> <li>• Responsibilities of workers under the POEO Act in regards to pollution</li> <li>• Incident reporting requirements.</li> </ul>	Contractor	Construction	Project REF
GEN4	General	DPI consultation	The CEMP and associated sub-plans, as well as relevant detailed design, will be provided to DPI Fisheries and DPI Water for review and comment.	Contractor RMS	Pre-construction	Submissions Report
BIO1	Biodiversity	General	<p>A Flora and Fauna Management Plan (FFMP) will be prepared in accordance with Roads and Maritime's Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA 2011) and implemented as part of the CEMP. It will include, but not be limited to:</p> <ul style="list-style-type: none"> <li>• Plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas</li> <li>• Requirements set out in the Landscape Guideline (RTA 2008)</li> <li>• Pre-clearing survey requirements</li> <li>• Procedures for unexpected threatened species finds and fauna handling</li> <li>• Procedures addressing relevant matters specified in the Policy and guidelines for fish habitat conservation and management (DPI Fisheries 2013)</li> <li>• Protocols to manage weeds and pathogens.</li> </ul>	Contractor	Pre-construction	Project REF
BIO2	Biodiversity	General	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Contractor	Detailed design	Project REF
BIO3	Biodiversity	Offsetting	Offsetting for the REF proposal is to be undertaken in line with the biodiversity offset strategy outlined in section 4.5 of the submissions report.	RMS	Pre-construction	Project REF and submissions report



No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
BIO4	Biodiversity	Rehabilitation of the site	Disturbed areas are to be progressively stabilised to prevent erosion and weed establishment, in accordance with Roads and Maritime's Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).	Contractor	Construction	Project REF
BIO5	Biodiversity	Rehabilitation of the site	Protocols for the re-establishment of native vegetation is to be developed in accordance with the Roads and Maritime's Biodiversity Guidelines (Guide 3: Re-establishment of native vegetation) (RTA 2011).	Contractor	Construction	Project REF
BIO6	Biodiversity	Vegetation clearance and habitat loss	Exclusion zones are to be identified and demarcated in accordance with the Roads and Maritime's Biodiversity Guidelines (Guide 2: Exclusion zones) (RTA 2011).	Contractor	Construction	Project REF
BIO7	Biodiversity	Vegetation clearance and habitat loss	Protocols for clearing of vegetation will be developed and implemented in accordance with the Roads and Maritime's Biodiversity Guidelines (Guide 4: Clearing of vegetation and removal of bushrock) (RTA 2011). These protocols will also be prepared inline Roads and Maritime's Clearing and Grubbing QA Specification G40.	Contractor	Construction	Project REF
BIO8	Biodiversity	Vegetation clearance and habitat loss	Installation of nest boxes in accordance with Roads and Maritime's Biodiversity Guidelines (Guide 8: Nest boxes) (RTA 2011). Nest boxes should be installed prior to construction to provide a safe location for relocation of fauna during clearing operations. Consideration would be made to the relocation of natural hollows removed as part of the proposal to nearby trees. Consultation on this option would be undertaken with OEH.	Contractor	Construction	Project REF and submissions report
BIO9	Biodiversity	Pre-clearance surveys for threatened species	A pre-clearance procedure will be developed and implemented in accordance with the Roads and Maritime's Biodiversity Guidelines (Guide 1: Pre-clearing process) (RTA 2011) and include (but not limited to) inspection of hollow-bearing trees prior to removal.	Contractor	Construction	Project REF
BIO10	Biodiversity	Pre-clearance surveys for threatened species	A targeted survey of the existing bridge will be undertaken at least six months prior to construction by a qualified bat ecologist to confirm if threatened microbats (eg. Large-footed Myotis) are present in the existing bridge structure. The microbat survey methodology must be approved by an Environment Branch biodiversity specialist prior to it being undertaken. If threatened microbats are identified using the existing bridge for breeding or roosting, a Microbat Management Plan (MMP) must be prepared and implemented prior to construction. The MMP must be developed in consultation with an Environment Branch biodiversity specialist.	Contractor	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
BIO11	Biodiversity	Pre-clearance surveys for threatened species	A management plan will then be developed if seagrasses are confirmed and any offsetting required will be investigated in consultation with DPI Fisheries.	Contractor	Construction	Project REF and submissions report
BIO12	Biodiversity	Pre-clearance surveys for threatened species	Any unexpected threatened species finds will be dealt with in accordance with the Roads and Maritime's Biodiversity Guidelines (RTA 2011).	Contractor	Construction	Project REF
BIO13	Biodiversity	Pre-clearance surveys for threatened species	Fauna handling will be conducted by a licensed fauna ecologist or wildlife carer in accordance with the Roads and Maritime's Biodiversity Guidelines (Guide 9: Fauna handling) (RTA 2011).	Contractor	Construction	Project REF
BIO14	Biodiversity	Pre-clearance surveys for threatened species	Further surveys for the East Lynne Midge Orchid ( <i>Genoplesium vernale</i> ) were undertaken during the species peak flowering period (mid-November to late-December), within potential habitat that is to be removed (in particular Bateman's Bay Cycad Forest), in accordance with the recommendation made in the project REF. These surveys confirmed the species was unlikely to occur in the proposal area. In the event this species is found to occur within the REF proposal area, suitable mitigation measures will need to be developed with input from OEH and a sub-plan to the CEMP will need to be prepared to reduce the potential for adverse impacts on this species as a result of the REF proposal and to manage the species into the future. Surveys will also assist with calculating the offset requirements.	Contractor	Pre-construction	Project REF
BIO15	Biodiversity	Potential for spread of exotic or invasive species, or spread of pathogens that may be harmful to native biota	Protocols for preventing the introduction and/or spread of disease causing agents such as bacteria and fungi will be developed and implemented in accordance with the Roads and Maritime's Biodiversity Guidelines (Guide 7: Pathogen Management) (RTA 2011).	Contractor	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
BIO16	Biodiversity	Potential for spread of exotic or invasive species, or spread of pathogens that may be harmful to native biota	Protocols for preventing or minimising the spread of noxious and environmental weeds will be developed and implemented in accordance with the Roads and Maritime's Biodiversity Guidelines (Guide 6: Weed Management) (RTA 2011).	Contractor	Construction	Project REF
BIO17	Biodiversity	Aquatic habitats and water quality	Protocols for minimising impacts on aquatic habitat will be developed and implemented in accordance with Roads and Maritime's Biodiversity Guidelines (Guide 10: Aquatic habitats and riparian zones) (RTA 2011). This will also include relevant measures from the Office of Water Guidelines for Riparian Corridors on Waterfront Lands and Guidelines for Vegetation Management Plans.	Contractor	Construction	Project REF
BIO18	Biodiversity	Impacts on fish	DPI Fisheries (1800 043 536) is to be immediately notified of any fish kills in the vicinity of the works. In such cases, all works other than emergency response procedures are to cease until the issue is rectified and written approval to proceed is provided by DPI Fisheries.	Contractor	Construction	Submissions report
BIO19	Biodiversity	Impacts to seagrass	Management actions will be developed in accordance with QLD DPI Fisheries Fish Friendly Guidelines (2006), DPI Fisheries Primefact (2007) and DPI Fisheries Policy and guidelines for fish habitat conservation and management (2013).	Contractor	Construction	Submissions report
BIO20	Biodiversity	Preclearance of fauna on existing bridge	Clearing protocols will include rescue of swallow nestlings during demolition of the bridge.	Contractor	Construction	Submissions report
BIO21	Biodiversity	Seagrass impacts	The minimum water depth under construction pontoons will be about two metres at low tide (where reasonable and feasible) to prevent contact with, and disturbance of, the substrate (Burns, 2001).	Contractor	Construction	Submissions report
BIO22	Biodiversity	Seagrass impacts	Limit the area of seagrass requiring disturbance wherever possible.	Contractor	Construction	Submissions report
BIO23	Biodiversity	Seagrass impacts	Restrict vehicular, plant (including watercraft) and pedestrian traffic within seagrass areas to the maximum extent possible.	Contractor	Construction	Submissions report



No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
BIO24	Biodiversity	Seagrass impacts	Temporary structures over aquatic vegetation should allow for light penetration wherever practicable, such as through the use of mesh, grid or grates.	Contractor	Construction	Submissions report
BIO25	Biodiversity	Seagrass impacts	Utilise silt curtains (or similar) during substrate disturbance activities (e.g. pile driving) to minimise the potential for migration of turbid plumes outside of the immediate construction footprint.	Contractor	Construction	Submissions report
BIO26	Biodiversity	Seagrass impacts	Clearing protocols will include rescue of swallow nestlings during demolition of the bridge.	Contractor	Construction	Submissions report
BIO27	Biodiversity	Seagrass impacts	Conduct seagrass and mangrove habitat rehabilitation activities in the area where the existing bridge has been removed, where feasible, and in consultation with DPI Fisheries.	Contractor	Construction	Submissions report
ABH1	Aboriginal heritage	Aboriginal heritage impacts	Works within the area of Roads and Maritime Nelligen Artefact Scatter (AS1) Scatters will <del>not be undertaken until an AHIP is approved for this area</del> be undertaken in accordance with <u>AHIP C0003256</u> .	RMS Contractor	Pre-construction	Project REF
ABH2	Aboriginal heritage	Aboriginal heritage impacts	An Aboriginal Heritage Management Plan (AHMP) will be prepared and implemented as part of the CEMP. The plan would be prepared by a qualified archaeologist in consultation with OEH and the Batemans Bay LALC. The plan will include (but not be limited to) the following: <ul style="list-style-type: none"> <li>• A sensitive areas map which clearly identifies the exclusion zones</li> <li>• Fencing to control access during construction to the exclusion zones</li> <li>• An environmental risk assessment to determine potential risks for discrete work elements or activities likely to affect significant heritage elements</li> <li>• Specific mitigation measures to avoid risk of harm</li> <li>• A process to communicate risk and responsibilities through environmental awareness training</li> <li>• A stop works procedure in the event of actual or suspected potential harm to a heritage feature/place where works are outside of the area covered by the AHIP (if approved)</li> <li>• All measures recommended in the CHAR and AHIP, including notification requirements</li> <li>• Site training and induction.</li> </ul>	Contractor	Construction	Project REF and submissions report

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
ABH3	Aboriginal heritage	Aboriginal cultural heritage item encountered during work	The Standard Management Procedure - Unexpected Heritage Items (Roads and Maritime, 2015b) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Roads and Maritime does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Construction	Project REF
ABH4	Aboriginal heritage	Consultation	Stakeholders will continue to be consulted in accordance with Roads and Maritime's PACHCI procedure.	Contractor	Construction	Project REF
<u>ABH5</u>	<u>Aboriginal heritage</u>	<u>Aboriginal cultural heritage item encountered during work</u>	<u>All persons working on site involved in ground disturbing works will be made aware that it is an offence under Section 86 of the NPW Act to harm or desecrate an Aboriginal object unless that harm or desecration is the subject of an approved Aboriginal Heritage Impact Permit (AHIP).</u>	<u>Contractor</u>	<u>Construction</u>	<u>Addendum REF</u>
NAH1	Non-Aboriginal heritage	Impacts within curtilage of Soldiers Memorial and Ferry Masters Residence	Where required, the reinstatement of vegetation or landscaping in line with the heritage context of the property will be undertaken in consultation with the landowner.	Roads and Maritime	Pre-construction	Project REF
NAH2	Non-Aboriginal heritage	Vibration impacts on heritage items	Condition reports are to be prepared for all heritage items considered likely to be affected by vibration as a result of the REF proposal. This will include but is not limited to the former School House, former Police Station, Mechanics Institute and former Post Office.	Contractor	Pre-construction	Project REF
NAH3	Non-Aboriginal heritage	Vibration impacts on heritage items	<u>Work methods within 35 metres of the Bushrangers Tree would be reviewed to minimise the use of vibration generating equipment where possible. The following safeguard and mitigation measure in accordance with the project REF would also be implemented to minimise the potential impact on this item:</u> <ul style="list-style-type: none"> <li>- A qualified arborist will be engaged to assess the condition of the Bushrangers Tree and identify any appropriate measures to protect it.</li> </ul>	Contractor	Pre-construction	Project REF
NAH4	Non-Aboriginal heritage	Impacts on existing bridge	Interpretative signage of the existing bridge be developed, in consultation with the community and Eurobodalla Shire Council, to document the existing bridge and its location.	RMS Contractor	Pre-construction and Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
NAH5	Non-Aboriginal heritage	Rehabilitation works	Remediation works on the approaches to the existing bridge should be effectively integrated within the landscape and Nelligen Village Development Control Plan (DCP) prepared by Eurobodalla Shire Council. Such works should complement and add amenity to the adjacent open space (eg Wharf Street Foreshore Park on the western side of the river). Continued consultation with Eurobodalla Shire Council and local residents will be undertaken in regards to these remediation works.	RMS Contractor	Pre-Construction and Construction	Project REF
NAH6	Non-Aboriginal heritage	Inductions for workers	Site inductions will include information about the heritage status of all known items which are located in close proximity of the REF proposal area. As part of this briefing, they should also be made aware of Section 139/146 provisions of the Heritage Act, archaeological 'relics' and the statutory obligations applying to their discovery.	Contractor	Construction	Project REF
NAH7	Non-Aboriginal heritage	Discovery of unidentified items	The Standard Management Procedure - Unexpected Heritage Items (Roads and Maritime 2015b) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that procedure have been satisfied.	Contractor	Construction	Project REF
NAH8	Non-Aboriginal heritage	Protection of listed items	The REF proposal area is to be fenced off to ensure inadvertent impacts to adjacent heritage items do not occur.	Contractor	Construction	Project REF



No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
VIS1	Landscape character and visual amenity	General	<p>An Urban Design and Landscape Plan (UDLP) will be prepared to support the final detailed project design and implemented as part of the CEMP. The UDLP will present an integrated urban design for the project, providing practical detail on the application of design principles and objectives identified in the environmental assessment. The Plan will include design treatments for:</p> <ul style="list-style-type: none"> <li>• Location and identification of existing vegetation and proposed landscaped areas, including species to be used</li> <li>• Built elements including retaining walls, bridges and noise walls</li> <li>• Pedestrian and cyclist elements including footpath location, paving types and pedestrian crossings</li> <li>• Fixtures such as seating, lighting, fencing and signs</li> <li>• Details of the staging of landscape works taking account of related environmental controls such as erosion and sedimentation controls and drainage</li> <li>• Procedures for monitoring and maintaining landscaped or rehabilitated areas.</li> </ul> <p>The UDLP will be prepared in accordance with relevant guidelines, including:</p> <ul style="list-style-type: none"> <li>• Beyond the Pavement urban design policy, process and principles (Roads and Maritime 2014c)</li> <li>• Landscape Guideline (RTA 2008)</li> <li>• Bridge Aesthetics (Roads and Maritime 2012c)</li> <li>• Noise Wall Design Guidelines (RTA 2006)</li> <li>• Shotcrete Design Guideline (RTA 2005c).</li> </ul>	RMS	Detailed design	Project REF
VIS2	Landscape character and visual amenity	Quality of structures	The proposed bridge across the Clyde River will be designed in accordance with the Roads and Maritime Bridge Aesthetics guidelines.	RMS	Design	Project REF
VIS3	Landscape character and visual amenity	Quality of structures	Access for maintenance of bridge bearings is to be provided for in accordance with Roads and Maritime requirements. Bridge access is to be well-integrated into the bridge abutments.	Contractor	Maintenance	Project REF
VIS4	Landscape character and visual amenity	Integration of earthworks design with existing landform	The potential visual impact of the earthworks will be minimised by careful design that integrates with adjoining landforms. This will be achieved through rounding of the top of cut batters, tailing-off of cut batters and a gradual flattening of grades at ends of fill embankments in order to avoid sharp transitions at ends.	RMS	Design and Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
VIS5	Landscape character and visual amenity	Integration of earthworks design with existing landform	Retaining walls will be constructed of precast units in order to minimise the construction footprint and removal of existing vegetation. Provide screen planting below walls and utilise visually recessive materials in order to minimise visual dominance.	Contractor	Construction	Project REF
VIS6	Landscape character and visual amenity	Integration of earthworks design with existing landform	Ensure access to the retaining walls is provided so that the structure and materials can be maintained. This will be investigated during detailed design.	Contractor	Detailed design	Project REF
VIS7	Landscape character and visual amenity	Retention of existing vegetation	Design the proposal to avoid impact to prominent trees and vegetation communities where possible. Design water quality structures and drainage lines to avoid existing vegetation where possible.	RMS	Detailed design	Project REF
VIS8	Landscape character and visual amenity	Retention of existing vegetation	Work areas to be clearly defined, managed and supervised to ensure vegetation loss is minimised.	Contractor	Construction	Project REF
VIS9	Landscape character and visual amenity	Retention of existing vegetation	Clear zones to be kept to the minimum required in order to allow regeneration to occur, particularly in parts of the proposal where regeneration will assist with screening.	Contractor	Maintenance	Project REF
VIS10	Landscape character and visual amenity	Revegetation and planting methodologies and contingencies	Existing vegetation, where removed, is to be re-used on the proposal where possible. For example in the form of mulch added to planting and areas, or coarse woody debris used creek lines downstream of structures.	Contractor	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
VIS11	Landscape character and visual amenity	Revegetation and planting methodologies and contingencies	Maintenance will occur in accordance with standard Roads and Maritime roadside maintenance regimes and the UDLP.	Contractor Roads and Maritime	Maintenance	Project REF
VIS12	Landscape character and visual amenity	Minimisation of road furniture and signage	Signage locations are to be coordinated with other roadside elements including structures, furniture, fencing and landscape treatments.	RMS	Detailed design	Project REF
VIS13	Landscape character and visual amenity	Minimisation of road furniture and signage	Maintain signage and other furniture elements in good order so that the road remains well-presented and a reflection of the local community.	RMS	Maintenance	Project REF
VIS14	Landscape character and visual amenity	Use of “soft engineering” and well-integrated drainage facilities	Where possible, visible roadside channels and median channels will be vegetated or rock lined. Where concrete is required, it will be coloured to match the surrounding environment and/or heavily roughened.	RMS	Detailed design	Project REF
VIS15	Landscape character and visual amenity	Use of “soft engineering” and well-integrated drainage facilities	Production of any pre-cast components of the project (bridge sections or culverts) is to be undertaken off-site or in non-visible areas.	Contractor	Construction	Project REF
VIS16	Landscape character and visual amenity	Retention of vistas and visual links between local landmarks and elements	Planting of riverine species in the Clyde River valley will maintain consistent views along the shoreline.	RMS	Detailed design	Project REF



No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
VIS17	Landscape character and visual amenity	Retention of vistas and visual links between local landmarks and elements	Revegetation plans will consider the screening of infrastructure where required and also include minimising the impacts of headlight glare on surrounding residents.	RMS	Detailed design	Project REF
NV1	Noise and vibration	General	<p>A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the <i>Construction Noise and Vibration Guideline</i> (Roads and Maritime 2016) and identify:</p> <ul style="list-style-type: none"> <li>• All potential significant noise and vibration generating activities associated with the activity</li> <li>• Feasible and reasonable mitigation measures to be implemented, taking into account Beyond the Pavement: urban design policy, process and principles (Roads and Maritime, 2014).</li> <li>• A monitoring program to assess performance against relevant noise and vibration criteria</li> <li>• Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures</li> <li>• Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.</li> </ul>	Contractor	Pre-construction	Project REF
NV2	Noise and vibration	Consultation of upcoming noise impacts	<p>Where noise management levels are expected to be exceeded, sensitive receivers will be consulted prior to commencement of construction. The consultation would include notification of:</p> <ul style="list-style-type: none"> <li>• The project</li> <li>• The construction period and construction hours</li> <li>• Proposed mitigation measures</li> <li>• Contact information for project management staff</li> <li>• Complaint and incident reporting procedures</li> <li>• How to obtain further information.</li> </ul>	Contractor	Construction	Project REF
NV3	Noise and vibration	Construction noise and vibration	Where general measures in the <i>Construction Noise and Vibration Guideline</i> (Roads and Maritime 2016) do not adequately reduce noise levels the additional mitigation measures outlined in Table C.1 in Appendix C of the Construction Noise and Vibration Guideline will be implemented where feasible and reasonable. Figures E-1 to Figure E-15 of Appendix H show where particular construction scenarios are likely to trigger these additional mitigation measures.	Contractor	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
NV4	Noise and vibration	Out of hours work	Out of hours works will be undertaken in line with the procedures outlined in the <i>Construction Noise and Vibration Guideline</i> (Roads and Maritime 2016).	Contractor	Construction	Project REF
NV5	Noise and vibration	Noise and vibration impacts and consultation	<p>The local community will be consulted in regards to the proposal in line with Roads and Maritimes ENMM Practice Note 7 requirements. Where possible, this will include:</p> <ul style="list-style-type: none"> <li>• Contact the local community potentially affected by the proposed works (outside of standard construction hours) and inform them by letter of the proposed work, location, type of work days and dates of work and hours involved. The contact should be made five days before works commence</li> <li>• A suitable advertisement should be placed in local papers including a reference to night-time noise impacts</li> <li>• Use variable message signs on the roadside informing of upcoming works</li> <li>• A community liaison phone number and permanent site contact should be provided so that complaints can be received and addressed in a timely manner</li> <li>• Upon receipt of a noise complaint monitoring should be undertaken and reported as soon as possible. If exceedances are detected, the situation should be reviewed in order to identify means to attempt to reduce the impact to acceptable levels.</li> </ul>	Contractor RMS	Pre-construction and construction	Project REF
NV6	Noise and vibration	Construction traffic noise	Truck drivers will be informed of designated vehicle routes, speed limits, parking locations and delivery hours.	Contractor	Construction	Project REF
NV7	Noise and vibration	Construction traffic noise	Use of engine compression brakes will be avoided where possible.	Contractor	Construction	Project REF
NV8	Noise and vibration	Noise and vibration compliance monitoring	Attended compliance noise or vibration monitoring will be undertaken to confirm the predicted noise or vibration levels upon receipt of a complaint from the community. Should an exceedance be identified a review of measures will be undertaken in order to minimise impacts.	Contractor	Construction	Project REF
NV9	Noise and vibration	Construction vibration	Prior to commencement of activities with the potential to cause structural damage, condition reports would be prepared for structures located within 20 metres of the REF proposal area for standard structures (eg 7 Murray Street).	Contractor	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
NV10	Noise and vibration	Construction vibration	<p>Where construction activities generating vibration are to be undertaken at a distance of less than 20 m from a building (eg 7 Murray Street) and 35 m from a heritage building (eg Mechanics Institute, former Post Office, former School House, former Police Station and Bushrangers Tree) initial vibration monitoring trials should be undertaken at the commencement of breaking, rolling and compacting activities. The initial vibration trials should:</p> <ul style="list-style-type: none"> <li>• Determine the frequency dependent DIN 4150-3 vibration criteria from the vibration generating equipment dominant frequencies</li> <li>• Establish safe working buffer distances for that equipment in that work area based on the frequency dependent DIN 4150-3 vibration criteria.</li> <li>• When vibration generating equipment is operating within the above confirmed buffer distances, additional vibration monitoring equipment should be deployed at the building foundation with a trigger level based on the frequency dependent DIN 4150-3 vibration criteria. If the vibration level on the equipment is reached a visual alarm should be triggered to alert the operators that the vibration criteria have been exceeded.</li> </ul>	Contractor	Construction	Project REF
NV11	Noise and vibration	Noise and vibration machinery and equipment	Maximise the offset distance between noisy plant and adjacent sensitive receivers.	Contractor	Construction	Project REF
NV12	Noise and vibration	Noise and vibration machinery and equipment	Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers.	Contractor	Construction	Project REF
NV13	Noise and vibration	Noise and vibration machinery and equipment	All equipment will be selected to minimise noise emissions. Equipment should be fitted with appropriate silencers and be in good working order. Machines found to produce excessive noise compared to normal industry expectations should be removed from the site or stood down until repairs or modifications can be made.	Contractor	Construction	Project REF



No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
NV14	Noise and vibration	Noise compliance monitoring	<p>A noise monitoring program (including simultaneous traffic counts) should be undertaken within 12 months of opening once traffic flows have stabilised. Monitoring locations should be selected along the route at the monitoring locations undertaken in this assessment and at locations where any noise complaints are received.</p> <p>The measured noise levels should be compared to the criteria in the noise and vibration assessment. If the noise level targets are exceeded the ENMM recommends the following action:</p> <ul style="list-style-type: none"> <li>• If the exceedance is less than two dBA, 'the prediction methodology and suitability of noise mitigation measures should be reassessed and the reasons for the marginal exceedance should be identified in the report'</li> <li>• If the exceedance is greater than two dBA, 'the adequacy of the noise mitigation measures needs to be reviewed, and if problems are identified steps need to be taken to rectify the situation. Additional noise treatments may be required to achieve the design noise level, where this is feasible and reasonable.'</li> </ul>	RMS	Operation	Project REF
<u>NV15</u>	<u>Noise and vibration</u>	<u>Construction noise and vibration</u>	<u>The NVMP would include additional noise mitigation measures to be implemented when exceedances of construction noise management levels remain after the implementation of standard noise mitigation measures, which will be implemented where reasonable and feasible. Guidance on suggested additional noise mitigation measures for each receiver are provided in Appendix E of this addendum REF.</u>	<u>Contractor</u>	<u>Construction</u>	<u>Addendum REF</u>
HYF1	Hydrology and flooding	General construction impacts	Construct temporary drainage structures in accordance with the Technical Guideline – Temporary Stormwater Drainage for Road Construction (Roads and Maritime 2011c).	Contractor	Construction	Project REF
HYF2	Hydrology and flooding	Stormwater	Surface water diversions will be installed in accordance with the erosion and sedimentation control plan (ESCP) prior to construction commencing.	Contractor	Construction	Project REF
HYF3	Hydrology and flooding	Stormwater	Ancillary facilities such as compounds and compound buildings will be positioned to minimise impacts on surface water flow lines where possible.	Contractor	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
HYF4	Hydrology and flooding	Flooding	<p>Further flood modelling will be undertaken during detailed design to assess the impact of the design and where possible allow for changes to the design to minimise any flooding impacts to nearby properties. This will include the modelling of smaller flooding events not undertaken as part of the Flooding and Operational Water Quality Specialist Study (Appendix I) to confirm the scouring impacts of the bridge design (e.g. around bridge abutments and piers).</p> <p>Modelling of the five per cent AEP flood level will also be required to ensure the positioning of compounds, stockpiles and sediment control devices is outside this flood level, where possible.</p>	RMS Contractor	Detailed design	Project REF and submissions report
HYF5	Hydrology and flooding	Flooding	<p>As part of the CEMP a flood risk management plan will be prepared that details the processes for monitoring of flood alerts. The plan will specify the steps to be taken in the event a flood warning is issued including removal or securing of loose material in the floodplain and removal or securing of all fuels and chemicals. The plan would incorporate any stockpiles on flood prone land.</p> <p><u>Consultation with SES regarding the flood risk management plan prior to the commencement of the work.</u></p>	Contractor	Pre-construction	Project REF and submissions report
HYF6	Hydrology and flooding	Flooding	A system for daily monitoring of flood alerts will be implemented so that in the event of a flood warning being issued all unsecured material in the floodplain can be removed and other appropriate precautionary measures taken.	Contractor	Construction	Project REF
HYF7	Hydrology and flooding	Flooding	Ancillary facilities such as compounds and compound buildings should be positioned outside of flood prone land where possible.	Contractor	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW1	Soil and water	General	<p>A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction. This will include but not limited to:</p> <ul style="list-style-type: none"> <li>Monitoring of potential high risk events (such as storms)</li> <li>Controls and follow-up measures to be applied in the event of wet weather.</li> </ul> <p>Erosion and sediment controls will be designed and implemented generally in accordance with the Blue Book. The SWMP will be reviewed by a soil conservationist on the Roads and Maritime list of Registered Contractors for Erosion, Sedimentation and Soil Conservation Consultancy Services. The SWMP will then be revised to address the outcomes of the review.</p> <p>The SWMP will further develop the Conceptual Erosion and Sedimentation Management Report located in Appendix J of the <u>project</u> REF.</p>	Contractor	Construction	Project REF and submissions report
SW2	Soil and water	General	A soil conservationist will be engaged and consulted throughout the construction of the overall proposal	Contractor	Construction	Project REF
SW3	Soil and water	General	<p>A site specific Erosion and Sediment Control Plan (ESCP) will be prepared and implemented as part of the SWMP.</p> <p>This ESCP will further develop the Conceptual Erosion and Sedimentation Management Report located in Appendix J of the <u>project</u> REF.</p>	Contractor	Construction	Project REF
SW4	Soil and water	Water quality within Clyde River	The detailed design of the bridge will incorporate appropriate scour protection at piers and abutments to allow for the expected hydraulic forces and scour depths in response to further modelling of flows during detailed design.	RMS	Detailed design	Project REF
SW5	Soil and water	Water quality within Clyde River	The operational water quality devices (e.g spill containment basins) proposed as part of the Flooding and Operational Water Quality Specialist Study (Appendix I of the <u>project</u> REF) are to be further developed during detailed design in line with any changes to the design.	RMS	Detailed design	Project REF
SW6	Soil and water	Rehabilitation	Rehabilitation works are to commence as soon as practicable after works are completed in any area.	Contractor	Construction	Project REF



No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW7	Soil and water	Contamination of surface water	All fuels, chemicals, and liquids will be stored at least 50 m away from waterways (including existing stormwater drainage system) and will be stored in an impervious bunded area within the compound site. <u>If any fuels, chemicals or liquids need to be kept on barges and jetties, they will be stored within a bunded area.</u>	Contractor	Construction	Project REF
SW8	Soil and water	Contamination of surface water	The refuelling of plant and maintenance <del>of land-based plant and equipment machinery</del> will be undertaken in <u>designated sealed impervious bunded areas at ancillary facilities or off site. Refuelling of marine-based plant and vessels will be undertaken in a suitably bunded area (through use of silt curtain, booms or equivalent controls) to minimise pollution risk associated with potential spills in the compound site.</u>	Contractor	Construction	Project REF
SW9	Soil and water	Contamination of surface water	Vehicle wash downs and/or concrete truck washouts will be carried out within a designated bunded area on an impervious surface or carried out off-site. All water would either be treated to appropriate levels for discharge or would be removed from site to an appropriately licenced facility.	Contractor	Construction	Project REF and submissions report
SW10	Soil and water	Contamination of surface water	Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/slicks) will be carried out on a regular basis to identify potential spills or the effects of sediment-laden runoff.	Contractor	Construction	Project REF
SW11	Soil and water	Contaminated land	The CEMP will include a contaminated land management plan prepared in accordance with the <i>Contaminated Land Management Act 1997</i> , Roads and Maritime Contaminated Land Management Guideline, Roads and Maritime Environmental Incident Classification and Reporting Procedure, and EPA guidelines on contaminated land management. The contaminated land management plan will address: <ul style="list-style-type: none"> <li>• Areas of potential contamination</li> <li>• Unexpected contamination finds</li> <li>• Any land contamination caused during construction.</li> </ul>	Contractor	Construction	Project REF
SW12	Soil and water	Spills and leaks	A site specific emergency spill plan will be developed, and include spill management measures in accordance with the Roads and Maritime Code of Practice for Water Management (RTA 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Roads and Maritime and EPA officers).	Contractor	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW13	Soil and water	Spills and leaks	An emergency spill kit will be kept on site at all times <u>to enable immediate clean-up of chemical/fuel spills and frac-outs</u> . All staff will be made aware of the location of the spill kit and trained in its use. <u>Any contaminated material would be disposed of at a licenced waste facility.</u>	Contractor	Construction	Project REF
SW14	Soil and water	Acid sulphate soils	An acid sulfate soils and rock procedure will be developed as part of the CEMP. This procedure will be prepared in accordance with the Roads and Maritime Guidance for the Management of Acid Sulphate Materials 2005.	Contractor	Construction	Project REF
SW15	Soil and water	Dewatering	Dewatering will be carried out in accordance with the Roads and Maritime Technical Guideline – Environmental Management of Construction Site Dewatering.	Contractor	Construction	Project REF
SW16	Soil and water	Groundwater	Roads and Maritime will consult with <del>DPI Water</del> <u>Lands and Water Department of Industry</u> to confirm the need for a licence under the <i>Water Management Act 2000</i> .	RMS	Construction	Project REF
SW17	Soil and water	Groundwater	Further investigations will be required during detailed design to confirm the presence of groundwater in the vicinity of the overall proposal. Should groundwater be encountered or considered likely to be encountered a groundwater management plan will be developed and form part of the CEMP. A licence under the <i>Water Management Act 2000</i> would also be obtained following consultation with <del>DPI Water</del> <u>Lands and Water Department of Industry</u> .	Contractor	Detailed design	Project REF
SW18	Soil and water	Impacts on water quality for reclamation works	Any rock to be used in temporary rock platforms is to be clean and free of fines.	Contractor	Construction	Submissions report
SW19	Soil and water	Water quality	Water to be discharged during operation should comply with the water quality benchmarks for estuaries of the catchments within the Batemans Marine Park (Clyde, Moruya and Tuross rivers) as expressed in the NSW Water Quality Objectives developed in accordance with ANZECC 2000 guidelines on water quality. Discharges from the overall proposal into the river are also to be monitored during operation to ensure compliance.	Contractor RMS	Detailed design Operation	Submissions report
SW20	Soil and water	Extraction of water	Should the extraction of water from either the river or groundwater be required, consultation would be undertaken with <del>DPI Water</del> <u>Lands and Water Department of Industry</u> to confirm the approval requirements.	Contractor RMS	Construction	Submissions report

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW21	Soil and water	Management of stockpiles	Stockpiles would be positioned at least 40 metres from waterways, where possible.	Contractor	Construction	Submissions report
SW22	Soil and water	Management of stockpiles	Stockpiles would be positioned outside flood prone land (ie outside the five per cent AEP event flood level), where possible.	Contractor	Construction	Submissions report
SW23	Soil and water	Management of stockpiles	Stockpiles are to be managed in accordance with Roads and Maritime Stockpile Management Guideline (Roads and Maritime 2015a)	Contractor	Construction	Submissions report
<u>SW24</u>	<u>Soil and water</u>	<u>Management of water contamination</u>	<u>Appropriate containment procedures will be put in place for collecting the drilling fluids at the entry and exit points of underboring works. These procedures will include the collection of the drilling fluids in tanks/drums at the entry and exit points, and their appropriate disposal.</u>	<u>Contractor</u>	<u>Construction</u>	<u>Addendum REF</u>
<u>SW25</u>	<u>Soil and water</u>	<u>Water quality</u>	<u>A general benthic survey will be completed to better assess impacts on the various habitats and assemblages within the footprint area.</u>	<u>RMS</u>	<u>Pre-construction</u>	<u>Addendum REF</u>
<u>SW26</u>	<u>Soil and water</u>	<u>Water quality</u>	<u>Assess water quality management measures against NSW Water Quality Objectives for the Clyde River for construction and operation phases prior to commencement works within the waterway.</u>	<u>RMS</u>	<u>Pre-construction</u>	<u>Addendum REF</u>



No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
TA1	Traffic and access	Construction traffic management	<p>A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Roads and Maritime Traffic Control at Work Sites Manual (RTA 2010) and QA Specification G10 Control of Traffic (Roads and Maritime 2008). The TMP will include:</p> <ul style="list-style-type: none"> <li>• Confirmation of haulage routes</li> <li>• Measures to maintain access to local roads and properties</li> <li>• Site specific traffic control measures (including signage) to manage and regulate traffic movement</li> <li>• Measures to maintain pedestrian and cyclist access</li> <li>• Requirements and methods to consult and inform the local community of impacts on the local road network</li> <li>• Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads</li> <li>• A response plan for any construction traffic incident</li> <li>• Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic</li> <li>• Monitoring, review and amendment mechanisms.</li> </ul>	Contractor	Pre-construction	Project REF
TA2	Traffic and access	Construction traffic management	Consultation will be undertaken with all bus companies which travel through and/or stop in Nelligen before and during construction to confirm bus diversions and bus stop relocation (eg at Maisies Lane).	RMS	Pre-construction and construction	Project REF
TA3	Traffic and access	Construction traffic management	Partial road closures (or any short-term full road closures) will be timed to avoid peak periods such as holiday periods when vehicle traffic is high along the highway.	Contractor	Construction	Project REF
TA4	Traffic and access	Pedestrian and cyclist impacts	Pedestrian and cyclists connectivity across the site will be maintained during construction. The community will be notified of any access changes including alternative routes.	Contractor	Construction	Project REF
TA5	Traffic and access	Congestion and safety	Traffic control will be provided to manage and regulate traffic movements during construction. For example, construction and delivery vehicles entering or leaving the site compound will use arterial roads. These movements will be restricted to non-peak traffic periods wherever possible.	Contractor	Construction	Project REF
TA6	Traffic and access	Congestion and safety	Disruption to all road users during the construction period will be kept to a minimum.	Contractor	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
TA7	Traffic and access	Congestion and safety	Clear signage will be provided if traffic or footpath diversions are required.	Contractor	Construction	Project REF
TA8	Traffic and access	Access to properties	Access to private properties will be maintained at all times during construction. Where changes to access arrangements are necessary, Roads and Maritime will consult with owners and tenants in advance regarding alternative access arrangements.	Contractor RMS	Construction	Project REF
TA9	Traffic and access	Notification	The community will be kept informed about construction and any associated changes to conditions (e.g. detours or lane closures) through advertisements in the local media and by prominently placed advisory notices or variable message signs.	RMS Contractor	Construction	Project REF
TA10	Traffic and access	Construction staging	Traffic control plans will be prepared for the appropriate stage of works and implemented by suitably qualified personnel. Implementation of traffic control plans will be inspected as required for the duration of the construction phase in accordance with the Roads and Maritime Traffic Control at Worksites Manual.	Contractor	Construction	Project REF
TA11	Traffic and access	Retention of local transport connections	Maintain local transport connectivity principles throughout design development.	RMS	Detailed design	Project REF
TA12	Traffic and access	Parking impacts	Impacts to parking along Maisies Lane are to be minimised where possible during detailed design. The loss of parking will be minimised during both the construction and operation phases where possible.	Contractor	Detailed design	Project REF
AQ1	Air quality	General air quality impacts	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include: <ul style="list-style-type: none"> <li>• A map identifying locations of sensitive receivers</li> <li>• Identification of potential risks/impacts due to the work/activities as dust generation activities</li> <li>• Management measures to minimise risk including a progressive stabilisation plan</li> <li>• A process for monitoring dust on-site and weather conditions</li> <li>• A process for altering management measures as required.</li> </ul>	Contractor	Pre-construction	Project REF
AQ2	Air quality	Dust emissions	Surveillance for visible dust generation will occur at all times. Work will cease when levels of airborne dust cannot be controlled.	Contractor	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
AQ3	Air quality	Dust emissions	Works that disturb vegetation, soil or stockpiles will not be carried out during strong winds (over 40 km/h) when this may affect receivers (visibility on roads, dust and debris near recreational areas, residences and commercial premises).	Contractor	Construction	Project REF
AQ4	Air quality	Dust emissions	Stockpiled materials will be covered, stabilised or stored in areas not subject to high wind.	Contractor	Construction	Project REF
AQ5	Air quality	Dust emissions	All trucks will be covered when transporting material to and from the site.	Contractor	Construction	Project REF
AQ6	Air quality	Dust emissions	Work activities will be reprogrammed if the safeguards and management measures are not adequately restricting dust generation.	Contractor	Construction	Project REF
AQ7	Air quality	Dust emissions	Maximum speed limits will be enforced for construction traffic within the site to limit dust generation.	Contractor	Construction	Project REF
AQ8	Air quality	Dust emissions	Use of a water tanker or similar to spray unpaved roads and exposed areas during construction where required.	Contractor	Construction	Project REF
AQ9	Air quality	Exhaust emissions	Construction plant and equipment will be maintained in a good working condition in order to limit impacts on air quality.	Contractor	Construction	Project REF
AQ10	Air quality	Impacts on sensitive receivers	Local residents will be advised of hours of operation and duration of work and supplied with a contact name and number for queries or complaints regarding air quality. The AQMP will also include a procedure for handling any queries or complaints.	Contractor	Construction	Project REF
LUP1	Land use and property	Property acquisition	All land acquisitions will be conducted in accordance with the Roads and Maritime Land Acquisition Policy and the requirements of the <i>Land Acquisition (Just Terms) Compensation Act 1991</i> .	Roads and Maritime	Pre-construction	Project REF
LUP2	Land use and property	Property acquisition	Consultation will be undertaken with the owners of properties to be acquired regarding the potential impacts of the acquisition. Methods to mitigate (e.g. vegetation screening requirements) any acquisition will be discussed as part of the consultation.	RMS	Construction	Project REF
LUP3	Land use and property	Access on river	Access along the Clyde River will be maintained at all times. Where access is to be changed or temporarily removed consultation will be undertaken with Roads and Maritime (Maritime Division) to confirm any requirements.	Contractor RMS	Construction	Project REF
LUP4	Land use and property	Use of residual land	Roads and Maritime will investigate the use of any residual land resulting from the acquisition of land located north of the existing highway.	RMS	Construction	Project REF

#### Replacement of the Kings Highway bridge over the Clyde River at Nelligen – access and construction improvements

Addendum review of environmental factors



No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
SE1	Socio-economic	Construction impacts on the community	<p>A community and stakeholder participation plan (CSPP) will be prepared and implemented as part of the CEMP. The CSPP will include as a minimum:</p> <ul style="list-style-type: none"> <li>• Requirements to provide details and timing of proposed activities to affected residents, the local community and businesses, and local bus operators</li> <li>• Consultation actions in relation to access arrangements and servicing requirements</li> <li>• Complaints handling procedure</li> <li>• Contact name and number for complaints</li> <li>• Procedure to notify adjacent land users for changed conditions during the construction period such as traffic, pedestrian or driveway access.</li> </ul> <p>The CSPP will be prepared in accordance with G36 requirements and Roads and Maritime Community Engagement and Communications Manual 2012.</p>	Contractor	Pre-construction	Project REF
SE2	Socio-economic	Construction impacts on the community	Local residents, businesses and other stakeholders will be notified before work starts in accordance with the CSPP.	Contractor	Pre-construction	Project REF
SE3	Socio-economic	Construction impacts on the community	Local residents, businesses and other stakeholders will be kept regularly informed of construction activities during the construction process through the implementation of the CSPP. The complaints handling procedure will be maintained for the duration of construction.	Contractor	Construction	Project REF
SE4	Socio-economic	Construction impacts on utilities and services	Residents and businesses will be informed before any interruptions to utility services that may be experienced as a result of utilities relocation.	Contractor	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
WM1	Waste management	Waste management	<p>A Waste and Energy Management Plan (WEMP) will be prepared and included in the CEMP. The WEMP will include the following as a minimum:</p> <ul style="list-style-type: none"> <li>• The type, classification and volume of all materials to be generated and used on-site including identification of recyclable and non-recyclable waste in accordance with NSW EPA Waste Classification Guidelines (2014)</li> <li>• Quantity and classification of excavated material generated as a result of the proposal (refer Roads and Maritime Service's Waste Management Fact sheets 1-6, 2012)</li> <li>• Interface strategies for cut and fill on-site to ensure re-use where possible</li> <li>• Strategies to 'avoid', 'reduce', 'reuse' and 'recycle' materials</li> <li>• Classification and disposal strategies for each type of material</li> <li>• Destinations for each resource/waste type either for on-site reuse or recycling, offsite reuse or recycling, or disposal at a licensed waste facility</li> <li>• Details of how material will be stored and treated on-site</li> <li>• Identification of available recycling facilities on and off-site</li> <li>• Identification of suitable methods and routes to transport waste</li> <li>• Procedures and disposal arrangements for unsuitable excavated material or contaminated material including asbestos waste</li> <li>• The types of waste collected, amounts, date/time and details of disposal are to be recorded in a waste register</li> <li>• Site clean-up for each construction stage.</li> </ul>	Contractor	Construction	Project REF
WM2	Waste management	Waste management	Garbage receptacles will be provided and recycling of materials encouraged. Rubbish will be transported to an appropriate waste disposal facility.	Contractor	Construction	Project REF
WM3	Waste management	Waste management	All wastes will be managed in accordance with the POEO Act.	Contractor	Construction	Project REF
WM4	Waste management	Waste management	Portable toilets will be provided for construction workers and will be managed by the service provider to ensure the appropriate disposal of sewage.	Contractor	Construction	Project REF
WM5	Waste management	Waste management	Noxious weeds removed during work will be managed in accordance with DPI requirements that relate to its classification status.	Contractor	Construction	Project REF
WM6	Waste management	Waste management	Site inductions will occur and be recorded by a Site Supervisor to ensure staff are aware of waste disposal protocols.	Contractor	Construction	Project REF
WM7	Waste management	Fill material	Excavated material will be reused on-site for fill where feasible to reduce demand on resources.	Contractor	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
WM8	Waste management	Fill material	Any additional fill material required will be sourced from appropriately licensed facilities and/or other Roads and Maritime projects wherever possible.	Contractor RMS	Construction	Project REF
WM9	Waste management	Waste minimisation	The following resource management hierarchy principles will be followed: <ul style="list-style-type: none"> <li>• Avoid unnecessary resource consumption as a priority</li> <li>• Avoidance will be followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery)</li> <li>• Disposal will be undertaken as a last resort (in accordance with the <i>Waste Avoidance and Resource Recovery Act 2001</i>).</li> </ul>	Contractor	Construction	Project REF
WM10	Waste management	Management of green waste	Clearing and grubbing, including mulching, will be undertaken in accordance with Roads and Maritime QA specification G40 Clearing and Grubbing Rev1. Where possible, mulch will be used on-site.	Contractor	Construction	Project REF
WM11	Waste management	Spoil management	Excavated material will be reused on adjoining projects where feasible to reduce waste.	Contractor	Construction	Project REF
WM12	Waste management	Spoil management	Excess excavated material will be disposed of at an appropriate facility or reused appropriately for fill on the proposal area.	Contractor	Construction	Project REF
WM13	Waste management	Spoil management	Excess soil requiring waste disposal will first be assessed against the Waste Classification Guidelines- Part 1: Classifying Waste (EPA 2014). Soil samples will be taken from stockpiled material and analysed. Transportation will be undertaken by a licensed contractor capable of transporting the waste and waste will be disposed of to an appropriately licensed waste facility with supporting waste classification documentation.	Contractor	Construction	Project REF
WM14	Waste management	Wastewater contamination of soils and water	A dedicated concrete washout facility will be provided during construction so that run-off from the washing of concrete machinery and equipment can be collected and disposed of at an appropriate waste facility.	Contractor	Construction	Project REF
HR1	Hazards and risks	Risk management	Emergency response plans will be incorporated into the CEMP including a flood evacuation plan.	Contractor	Pre-construction and construction	Project REF
HR2	Hazards and risks	Risk management	A pollution incident response management plan (PIRMP) will be developed and implemented in accordance with the POEO Act requirements. The plan will form a sub-plan within CEMP <u>and will include mitigation and management measures for potential frac-out events.</u>	Contractor	Pre-construction and construction	Project REF



No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
HR3	Hazards and risks	Risk management	Hazards and risks associated with construction activities will be identified prior to construction. Management measures for each identified hazard/risk will also be developed. A process for regularly reviewing work practices/procedures will be implemented throughout construction to identify, report and respond to any new environmental hazards/risks.	Contractor	Pre-construction	Project REF
HR4	Hazards and risks	Risk management	Site-specific safety management plans and safe work method statements will be developed and implemented in accordance with work health and safety requirements.	Contractor	Pre-construction	Project REF
HR5	Hazards and risks	Flood management	A flood evacuation plan will be prepared prior to works commencing on site and incorporated into the CEMP.	Contractor	Pre-construction	Project REF
CCG1	Climate change and greenhouse gases	Greenhouse gas emissions	The use of alternative fuels and power sources for construction plant and equipment will be investigated and implemented, where appropriate.	Contractor	Pre-construction	Project REF
CCG2	Climate change and greenhouse gases	Greenhouse gas emissions	The energy efficiency and related carbon emissions will be considered in the selection of vehicle and plant equipment.	Contractor	Pre-construction	Project REF
CCG3	Climate change and greenhouse gases	Greenhouse gas emissions	Materials will be delivered as full loads and local suppliers will be used where possible.	Contractor	Construction	Project REF
CCG4	Climate change and greenhouse gases	Greenhouse gas emissions	Construction equipment, plant and vehicles will be appropriately sized for the task.	Contractor	Construction	Project REF
CCG5	Climate change and greenhouse gases	Greenhouse gas emissions	Equipment will be serviced frequently to ensure they are operating efficiently.	Contractor	Construction	Project REF

No.	Aspect	Impact	Environmental safeguards	Responsibility	Timing	Reference
CCG6	Climate change and greenhouse gases	Greenhouse gas emissions	Clearing of vegetation will be minimised where possible.	Contractor	Construction	Project REF
CI1	Cumulative impacts	Cumulative impacts	Ongoing coordination and consultation will be undertaken with the contractor to ensure cumulative noise and traffic impacts are appropriately assessed and managed.	RMS Contractor	Detailed design and construction	Project REF
CI2	Cumulative impacts	Cumulative impacts	The construction environmental management plan (CEMP) will be revised to consider potential cumulative impacts from surrounding development activities as they become known.	Contractor	Pre-construction	Project REF

## 7.3 Licensing and approvals

All relevant licenses, permits, notifications and approvals needed for the Replacement of the Kings Highway bridge over the Clyde River at Nelligen and when they need to be obtained are listed in Table 7-2. There are no additional or changed licenses and approval requirements identified in this addendum REF due to the proposed modification.

Table 7-2 Summary of licensing and approval required

Instrument	Requirement	Timing
<i>Fisheries Management Act 1994 (s205)</i>	Permit to harm marine vegetation from the Minister for Primary Industries.	Prior to start of the activity.
<i>National Parks and Wildlife Act 1974 (s90)</i>	Aboriginal heritage impact permit from the Chief Executive of Office of Heritage and Environment.	Prior to start of the activity.
<i>Water Management Act 2000 (s91F)</i>	Aquifer interference approval from Lands and Water Department of Industry	Prior to start of the activity if aquifer interference is confirmed.
<i>Water Management Act 2000 (s91B)</i>	Water supply work approval from Department of Industry - Water	Prior to start of the activity but only if water is to be sourced from the Clyde River
<i>Protection of the Environment Operations Act 1997 (s43)</i>	Environment protection licence (EPL) for scheduled activities (extractive activities resulting in the excavation of more than 30,000 tonnes) from the Environment Protection Authority.	Prior to start of the activity.
<i>Crown Lands Act 1989 (s6)</i>	Licence to occupy areas of Crown land.	Prior to start of the activity
<i>Marine Estate Management (Management Rules) Regulation 1999 (CI1.16(2)(a))</i>	Marine Park permit for works within the habitat protection zone within the Batemans Marine Park.	Prior to start of the activity



## 8. Conclusion

### 8.1 Justification

The proposed modification would assist the construction of a new bridge over the Clyde River which will ensure the long-term viability of the regionally important link for both passenger and freight traffic between the NSW south coast and Canberra regions. The Kings Highway is of regional importance as it is a critical link for both passenger and freight traffic between the NSW south coast and Canberra regions. The new bridge will ensure the long-term viability of the strategic transport network between the NSW south coast and the Canberra region and a key east-west freight route.

The proposed modification is considered to be justified as it would provide:

- Safe and practical areas to store construction equipment and materials for the project
- Allow for safe vehicle and plant access during construction
- Safe and efficient operation of the construction site
- Improve water quality.

While there would be environmental impacts as a consequence of the proposed modification, they have been avoided or minimised wherever possible through design and site-specific safeguards summarised in Section 7.

The adverse impact on the environment is expected to be minor. The benefits of the proposed modification are considered to outweigh any minor impact on the environment. Additional safeguards have been recommended to minimise the potential impact on the environment.

### 8.2 Objects of the EP&A Act

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The design for the project, including the proposed modification, safeguards and management measures detailed in the project REF and this addendum REF allow for the proper management, development and conservation of natural and artificial resources.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	The proposed modification would comply with the principles of ecologically sustainable development.
1.3(c) To promote the orderly and economic use and development of land.	The proposed modification is required to cater for the safe and efficient movement of people and goods along the Kings Highway.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the project.
1.3(e) To protect the environment, including the conservation of threatened and other species of	Construction of the proposed modification would require the clearing or permanent modification of

Object	Comment
native animals and plants, ecological communities and their habitats.	<p>existing vegetation. The vegetation within the proposed modification is highly modified and although it includes TECs, it is unlikely to have a significant impact.</p> <p>The proposed modification would not have a significant impact on biological diversity and ecological integrity. Any potential direct and indirect impacts would be managed through the environmental safeguards identified in the submissions report and section 7 of this addendum REF.</p>
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	<p>The proposed modification has the potential to impact on a local heritage item, the Bushranger's Tree (refer to safeguard NAH 3 in Table 7-1). The sustainable management of built and cultural heritage is also considered in sections 6.2 and 6.4 of this addendum REF and sections 6.2 to 6.3 of the project REF.</p> <p>The proposed modification would not have the potential to impact on other existing cultural heritage.</p>
1.3(g) To promote good design and amenity of the built environment.	<p>The design of the project, including the proposed modification, has been developed with the consideration to minimise the social and environmental impacts, including consideration of safety of the workers and motorist during the construction and maintenance, property impact, visibility and noise impact.</p>
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	<p>Not relevant to the proposed modification.</p>
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	<p>At the completion of the project, the proposed modification would consist of a mix of clear and level sites and rehabilitated areas with minimal ongoing maintenance issues; some of which would be returned to Eurobodalla Shire Council and allow for flexibility for future land use options.</p>
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	<p>Consultation with the community and relevant government agencies was carried out during the development of the project. Details of this consultation are provided in the project REF and submissions report. Further consultation of the community for the proposed modification was not required as per section 5 of this addendum REF.</p>

## 8.2.1 The precautionary principle

This principle states ‘if there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation’.

Evaluation and assessment of alternative locations for the proposed modification have aimed to reduce the risk of serious and irreversible impacts on the environment. A range of specialist studies were carried out for key issues to provide accurate and impartial information to assist in the development process.

The proposed modification has sought to minimise impacts where possible. A number of safeguards have been proposed to minimise potential impacts. These safeguards would be implemented during construction and operation of the project. No safeguards have been postponed as a result of lack of scientific certainty.

A CEMP would be prepared before construction starts. This requirement would ensure the project achieves a high-level of environmental performance. No mitigation measures or management mechanisms would be postponed as a result of a lack of information.

## 8.2.2 Intergenerational equity

This principle states, ‘the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations’.

The proposed modification would result in some impacts to local amenity however would not result in any impacts that are likely to adversely impact on the health, diversity or productivity of the environment for future generations. Additionally, some of the design changes have been proposed to reduce the potential impacts of the overall project on the environment with the addition of water quality/spill containment basin.

The revised proposal, including the proposed modification, would benefit future generations by ensuring road safety is improved, with this being a positive benefit for all road users. Should the revised proposal not proceed, the principle of intergenerational equity may be compromised, as public safety may be affected by future traffic incidents associated with the existing Kings Highway and associated bridge over the Clyde river at Nelligen.

## 8.2.3 Conservation of biological diversity and ecological integrity

This principle states the ‘diversity of genes, species, populations and communities, as well as the ecosystems and habitats to which they belong, must be maintained and improved to ensure their survival’.

The environment in which the proposed modification would be located comprises exotic and/or potential derived native grasslands. A desktop assessment and field survey of the existing local environment was carried out to identify and manage any potential impacts of the project on local biodiversity. The revised proposal, including the proposed modification, would not have a significant impact on biological diversity and ecological integrity. A biodiversity assessment and appropriate site-specific safeguards are provided in sections 6.1 and 7.2.

## 8.2.4 Improved valuation, pricing and incentive mechanisms

This principle requires ‘costs to the environment should be factored into the economic costs of a project’.

This addendum REF along with the project REF, project EIS and submissions report has examined the environmental impacts and benefits of the project and identified mitigation measures to manage the potential for adverse impacts. The requirement to implement these mitigation measures would result in an economic cost to Roads and Maritime. The implementation of mitigation measures would increase both the



capital and operating costs of the project. This signifies that environmental resources have been given appropriate valuation.

## 8.3 Conclusion

This addendum REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration where relevant, of conservation agreements and plans of management under the NPW Act, biodiversity stewardship sites under the BC Act, wilderness areas, areas of outstanding value, impacts on threatened species, populations and ecological communities and their habitats and other protected fauna and native plants. It has also considered potential impacts to matters of national environmental significance listed under the Federal EPBC Act.

A number of potential environmental impacts from the proposed modification have been avoided or reduced during the design development and options assessment. The proposed modification as described in the addendum REF best meets the project objectives and will result in minor impacts on biodiversity, noise and vibration and local heritage. Safeguards and management measures as detailed in this addendum REF would ameliorate or minimise these expected impacts. The proposed modification would also improve safety and design quality. On balance, the proposed modification is considered justified and the following conclusions are made.

### ***Significance of impact under NSW legislation***

The proposed modification would not result in a change to the findings of the project REF and submissions report and would be unlikely to cause a significant impact on the environment. Therefore it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces under Division 5.2 of the EP&A Act. A Biodiversity Development Assessment Report or Species Impact Statement is not required. The proposed modification is subject to assessment under Division 5.1 of the EP&A Act. Consent from Council is not required.

### ***Significance of impact under Australian legislation***

The proposed modification would not likely cause a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the EPBC Act. A referral to the Australian Government Department of the Environment and Energy is not required.

## 9. Certification

This addendum review of environmental factors provides a true and fair review of the proposed modification in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposed modification.



Lucy Bourne

Senior Environmental Scientist

GHD Pty Ltd

Date:

I have examined this addendum review of environmental factors and accept it on behalf of Roads and Maritime Services.



Luke Brodie

Project Manager

Technical & Project Services – Regional Project Office

Date: 06/06/2019

## 10. References

- Department of Environment and Climate Change (DECC). 2009. *Interim Construction Noise Guideline (ICNG)*. July 2009
- Department of Primary Industries (DPI). 2013. *Policy and guidelines for fish habitat conservation and management*. June 2013
- Department of Urban Affairs and Planning (DUAP). 1996. *Roads and Related Facilities: EIS Guideline*. October 1996.
- Department of Urban Affairs and Planning (DUAP). 1995. *Is an EIS required? best practice guidelines for part 5 of the Environmental Planning and Assessment Act 1979*.
- GHD (2016). *Biodiversity Impact Assessment – Replacement of the Kings Highway bridge of the Clyde River at Nelligen, Draft Report*. Draft report prepared for the Environmental Impact Statement for NSW Roads and Maritime Services. June 2016.
- OEH (2014). *BioBanking Assessment Methodology 2014*. September 2014.  
<http://www.environment.nsw.gov.au/resources/biobanking/140661BBAM.pdf>
- OEH (2014b). Framework for Biodiversity Assessment. Published by: Office of Environment and Heritage for the NSW Government, September 2014.
- OEH (2017). *Biodiversity Assessment Method*. August 2017.
- Roads and Maritime. 2011. *Roads and Maritime Services Biodiversity Guidelines*.
- Roads and Maritime Services Procedure for Aboriginal Cultural Heritage Consultation and Investigation*. November 2011.
- Roads and Maritime. 2011b. *Guideline for Biodiversity Offsets*. November 2011.
- Roads and Maritime. 2011c. *Technical Guideline – Temporary Stormwater Drainage for Road Construction*.
- Roads and Maritime. 2012a. *Environmental Assessment Practice Note: Biodiversity Assessment EIA-N06*.
- Roads and Maritime. 2012b. *RMS Delineation Manual*.
- Roads and Maritime. 2012c. *Bridge Aesthetics – Design Guidelines to Improve the Appearance of Bridges in NSW*.
- Roads and Maritime. 2014a. *Noise Criteria Guideline*
- Roads and Maritime. 2014b. *Noise Mitigation Guideline*
- Roads and Maritime. 2014c. *Beyond the Pavement urban design policy, process and principles*.
- Roads and Maritime. 2015a. *Stockpile Site Management Guideline*.
- Roads and Maritime. 2015b. *Standard Management Procedure - Unexpected heritage items*. March 2015
- Roads and Maritime. 2016. *Construction Noise and Vibration Guideline*. April 2016.
- Roads and Maritime 2016b. *Guideline for Biodiversity Offsets*. Roads and Maritime Services, 11 November 2016.
- Roads and Maritime 2017. *Replacement of the Kings Highway bridge over the Clyde River at Nelligen – Review of Environmental Factors Submissions Report*. February 2017.
- Roads and Traffic Authority (RTA). 2005c. *Shotcrete Design Guideline*
- Roads & Traffic Authority (RTA). 2006. *Noise Wall Design Guideline*.
- Roads & Traffic Authority (RTA). 2008. *Landscape Guideline*



Roads & Traffic Authority (RTA). 2009. *Beyond the Pavement - Roads and Traffic Authority of NSW urban design policy, procedure and design principles*.

Roads & Traffic Authority (RTA) 2010. *Traffic Control at Work Sites Manual Version 4*.

Roads & Traffic Authority (RTA). 2011. *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects*. September 2011.

Roads and Traffic Authority (RTA) 2015. *Stockpile Site Management Guideline*.

Transport for NSW. 2012a. *Construction Noise Strategy*.

WBM Oceanics. 2005. *Batemans Bay and Clyde River Estuary Management Plan*. February 2015. Prepared for Eurobodalla Shire Council

## Terms and acronyms used in this addendum REF

Term / Acronym	Description
BAM	Biodiversity Assessment Method
BBAM	BioBanking Assessment Methodology
BC Act	<i>Biodiversity Conservation Act 2016 (NSW).</i>
CEMP	Construction / Contractor's environmental management plan
EIA	Environmental impact assessment
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW).</i> Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth).</i> Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
Heritage Act	<i>Heritage Act 1977 (NSW)</i>
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
NES	Matters of national environmental significance under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999.</i>
RMS	NSW Roads and Maritime Services
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
SEPP 14	State Environmental Planning Policy No.14 – Coastal Wetlands
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>

## Appendix A

### Consideration of clause 228(2) factors and matters of national environmental significance



## Clause 228(2) Checklist

In addition to the requirements of the *Is an EIS required?* (1995/1996) guideline and the *Roads and Related Facilities EIS Guideline* (DUAP, 1996) as detailed in the addendum REF, the following factors, listed in clause 228(2) of the Environmental Planning and Assessment Regulation 2000, have also been considered to assess the likely impacts of the proposed modification, on the natural and built environment.

Factor	Impact
<p>a. Any environmental impact on a community?</p> <p>During the construction of the proposed modification, there would be impacts to the community associated with noise, air quality, heritage and visual amenity. These impacts are likely to occur throughout the construction period and would be managed by implementation of the safeguards listed in Section 7 of this addendum REF.</p> <p>The long term benefits of the revised proposal would include improved road safety, improved travel times and improved safety for pedestrians and cyclists.</p>	<p>Short-term negative</p> <p>Long-term positive</p>
<p>b. Any transformation of a locality?</p> <p>The proposed modification would result in changes to the locality through utility upgrades and vegetation removal. These impacts would be managed by implementation of the safeguards listed in Section 7 of this addendum REF, including rehabilitation and landscaping of disturbed areas.</p>	Long-term negative
<p>c. Any environmental impact on the ecosystems of the locality?</p> <p>The environment in which the proposed modification would be located comprises exotic and/or potential derived native grasslands. A desktop assessment and field survey of the existing local environment was carried out to identify and manage any potential impacts of the project on local biodiversity. The proposed modification would not have a significant impact on biological diversity and ecological integrity. A biodiversity assessment and appropriate site-specific safeguards are provided in section 6.1 and 7.2.</p>	Long-term negative
<p>d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?</p> <p>The revised proposal, including the proposed modification, would result in changes to the locality through the construction of a new bridge, utility upgrades and vegetation removal. These impacts would be managed by implementation of the safeguards listed in Section 7 including rehabilitation and landscaping of disturbed areas.</p> <p>The revised proposal is also considered to be for the purpose of public safety as the existing bridge which is to be replaced is showing signs of deterioration and therefore is considered a safety risk in the next five to ten years. The new bridge and associated roadways would benefit the wider south coast region.</p>	<p>Long-term negative</p> <p>Long-term positive</p>
<p>e. Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?</p> <p>The proposed modification is unlikely to affect a locality, place or buildings within the area.</p>	Nil
<p>f. Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks and Wildlife Act 1974</i>)?</p> <p>The proposed modification involves the clearing of NSW endangered or vulnerable ecological community. These impacts would be managed by implementation of the</p>	Long-term negative

Factor	Impact
safeguards listed in Section 7 including rehabilitation and landscaping of disturbed areas.	
g. Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposed modification is unlikely to endanger any species of animal, plant or other form of life, whether living on land, in water or in the air	Nil
h. Any long-term effects on the environment? The proposed modification is unlikely to cause any long-term effects on the environment.	Nil
i. Any degradation of the quality of the environment? The proposed modification is unlikely to cause long term degradation of the quality of the environment.	Nil
j. Any risk to the safety of the environment? The proposed modification would not pose any risk to the safety of the environment. All chemicals and fuels used during construction and maintenance activities would be stored within bunded areas to ensure that spills are not released to the environment.	Nil
k. Any reduction in the range of beneficial uses of the environment? The proposed modification would not result in any reduction in beneficial uses of the environment. The long-term benefits of the project, including the proposed modification, would include improved road safety, improved travel times, and improved safety for pedestrians and cyclists.	Nil Long-term positive
l. Any pollution of the environment? The proposed modification would not involve the generation of any waste streams that would be problematic for disposal. There is the potential for accidental spills of chemicals during the construction period which could affect surrounding land and the Clyde River. Air quality would be reduced during construction activities. Erosion and sedimentation if not controlled would result in impact on water quality within the Clyde River. There is expected to be minimal change in air quality and noise during operation of the new bridge compared to the existing.	Nil Short-term negative Nil
m. Any environmental problems associated with the disposal of waste? Waste would be managed in accordance with the Waste Avoidance and Resource Recovery Act 2001 and recycled where possible. It is not anticipated that there would be issues encountered with the disposal of waste.	Nil
n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? All resources required for the proposed modification are readily available and are not in short supply.	Nil
o. Any cumulative environmental effect with other existing or likely future activities? The proposed modification would not result in any additional adverse impacts beyond those assessed in the project REF.	Nil
p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposed modification would not result in any additional adverse impacts	Nil

Factor	Impact
beyond those assessed in the project REF.	

## Matters of National Environmental Significance

Under the environmental assessment provisions of the EPBC Act, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposed modification should be referred to the Australian Government Department of the Environment.

Under the EPBC Act strategic assessment approval a referral is not required for proposed road actions that may affect nationally listed threatened species, populations, endangered ecological communities and migratory species. Impacts on these matters are assessed in detail as part of this addendum REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Factor	Impact
a. Any impact on a World Heritage property? The proposed modification will not impact on a World Heritage property.	Nil
b. Any impact on a National Heritage place? The proposed modification will not impact on a National Heritage place.	Nil
c. Any impact on a wetland of international importance? The proposed modification will not impact on a wetland of international importance (listed under the RAMSAR Convention).	Nil
d. Any impact on a listed threatened species or communities? The proposed modification would result in additional impacts to two EBPC Listed vegetation communities: Lowland Grassy Woodland and Swamp Oak Floodplain Forest. The proposed modification would also result on additional impacts to River-flat Eucalypt Forest which is currently under assessment for listing as a critically endangered ecological community under the EPBC Act. Impacts on these communities would be minimal. Assessments of significance concluded that no significant impacts are considered likely.	Minor short-term negative
e. Any impacts on listed migratory species? The proposed modification would not have a significant impact on listed migratory species. Refer to section 6.1.3 for further details.	Minor short-term negative
f. Any impact on a Commonwealth marine area? The proposed modification would not impact on a Commonwealth marine area.	Nil
g. Does the proposed modification involve a nuclear action (including uranium mining)? The proposed modification would not involve a nuclear action.	Nil
Additionally, any impact (direct or indirect) on Commonwealth land? The proposed modification would no impact (either directly or indirectly) on Commonwealth land.	Nil



## Appendix B

### Statutory consultation checklists

# ISEPP

## Council related infrastructure or services

Issue	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	ISEPP clause
Stormwater	Are the works likely to have a <i>substantial</i> impact on the stormwater management services which are provided by council?	No	Eurobodalla Shire Council	ISEPP cl.13(1)(a)
Traffic	Are the works likely to generate traffic to an extent that will <i>strain</i> the capacity of the existing road system in a local government area?	No	Eurobodalla Shire Council	ISEPP cl.13(1)(b)
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will this connection have a <i>substantial</i> impact on the capacity of any part of the system?	No	Eurobodalla Shire Council	ISEPP cl.13(1)(c)
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a <i>substantial</i> volume of water?	No	Eurobodalla Shire Council	ISEPP cl.13(1)(d)
Temporary structures	Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a <i>minor</i> or <i>inconsequential</i> disruption to pedestrian or vehicular flow?	No	Eurobodalla Shire Council	ISEPP cl.13(1)(e)
Road & footpath excavation	Will the works involve more than <i>minor</i> or <i>inconsequential</i> excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	No	Eurobodalla Shire Council	ISEPP cl.13(1)(f)

## Local heritage items

Issue	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s)	ISEPP clause
Local heritage	Is there is a local heritage item (that is not	No	Eurobodalla Shire	ISEPP

Issue	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s)	ISEPP clause
	also a State heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the heritage significance of the item/area are more than <i>minor</i> or <i>inconsequential</i> ?		Council	cl.14

### ***Flood liable land***

Issue	Potential impact	Yes / No	If 'yes' consult with local Council(s)	ISEPP clause
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a <i>minor</i> extent?	No, works are located on flood liable land but will not change flood patterns to more than a minor extent.	Eurobodalla Shire Council	ISEPP cl.15 cl.15AA

### ***Public authorities other than councils***

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the <i>National Parks and Wildlife Act 1974</i> , or on land acquired under that Act?	No new development would be carried out adjacent to the Clyde River National Park.	Office of Environment and Heritage	ISEPP cl.16(2)(a)
National parks and reserves	Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No	Office of Environment and Heritage	ISEPP cl. 16(2)(b)
Aquatic reserves and marine parks	Are the works adjacent to an aquatic reserve or a marine park declared under the <i>Marine Estate Management Act 2014</i> ?	Yes	Department of Industry	ISEPP cl.16(2)(c)

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the <i>Sydney Harbour Foreshore Authority Act 1998</i> ?	No	Sydney Harbour Foreshore Authority	ISEPP cl.16(2)(d)
Bush fire prone land	Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional centre or group home in bush fire prone land?	No	Rural Fire Service	ISEPP cl.16(2)(f)
Artificial light	Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	No	Director of the Siding Spring Observatory	ISEPP cl. 16(2)(g)
Defence communications buffer land	Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhardt LEP 2012, Narrandera LEP 2013 and Urana LEP 2011).	No	Secretary of the Commonwealth Department of Defence	ISEPP cl. 16(2)(h)
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the <i>Mine Subsidence Compensation Act 1961</i> ?	No	Mine Subsidence Board	ISEPP cl. 16(2)(i)



## Growth Centres SEPP

Issue	Potential impact	Yes / No	If 'yes' consult with	SEPP clause
Clearing native vegetation	Do the works involve clearing native vegetation (as defined in the <i>Local Land Services Act 2013</i> ) on land that is not <b>subject land</b> (as defined in cl 17 of schedule 7 of the <i>Threatened Species Conservation Act 1995</i> )?	No	Department of Planning and Environment	SEPP cl.18A

## Appendix C

### Biodiversity impact assessment – Addendum



# Roads and Maritime Services

## Nelligen Bridge

### Biodiversity Impact Assessment - Addendum

June 2019

### **Scope and limitations**

*This report: has been prepared by GHD for Roads and Maritime Services and may only be used and relied on by Roads and Maritime Services for the purpose agreed between GHD and the Roads and Maritime Services as set out in section 1.3 of this report.*

*GHD otherwise disclaims responsibility to any person other than Roads and Maritime Services arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.*

*The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.*

*The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.*

*The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.5 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.*

*The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.*

*Investigations undertaken in respect of this report are constrained by the particular site conditions. As a result, not all relevant site features and conditions may have been identified in this report.*

*Site conditions may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.*



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## Appendices

- Appendix A – Survey results
- Appendix B – Assessments of significance (EP&A ACT)
- Appendix C – Assessments of significance (EPBC Act)

# 1. Introduction

## 1.1 Background

In 2016, GHD prepared two Biodiversity Impact Assessments (BIA) (GHD 2016a/b) to assess a Roads and Maritime Services (Roads and Maritime) proposal for construction of a new bridge to carry the Kings Highway over the Clyde River at Nelligen (the proposal). The proposal's impacts upon biodiversity were split into: aspects of the proposal that impacted areas mapped as the then in-force *State Environmental Planning Policy No. 14 – Coastal Wetlands* (SEPP 14) (to inform environmental impact assessment under the proposal Environmental Impact Statement [project EIS]), and all remaining areas (to inform environmental impact assessment assessed under the proposal Review of Environmental Factors [project REF]). Following minor design changes resulting in small increases in the quantum of impact of the proposal upon biodiversity values, which are documented in the *Review of Environmental Factors Submissions Report* (Roads and Maritime 2017), the proposal EIS and proposal REF were approved. All references herein to the 'approved' REF proposal are inclusive of the boundary changes reported in the submissions report (Roads and Maritime 2017).

Roads and Maritime proposes to modify the approved proposal by expanding the proposal boundary for design purposes and inclusion of an additional ancillary site (proposed modification). The proposed modification only apply to the REF proposal. The location of key features of the proposed modification is shown in the addendum REF Figures 1-1 and 1-2.

This addendum BIA has been prepared by GHD as part of the updated environmental assessment capturing the proposed modification, to support an addendum proposal REF. The eastern extent of the proposed modification is to be utilised as a vehicle turning bay only with no impacts upon native vegetation to occur. This area has not been included in the addendum BIA REF study area. The combined area of the approved REF proposal site and proposed modification requiring direct impacts upon native vegetation are referred to as the 'revised REF proposal site' hereafter. This addendum BIA must consider this combined area in its entirety in order to appropriately assess impacts of the proposal upon biodiversity. The eastern extent of the proposed modification, where there will be no impacts upon native vegetation, is referred to as the 'revised REF proposal site (Eastern extension)' hereafter (see Figure 1.3). Indirect impacts of short-term vehicle movements in the Eastern extension are addressed in Section 5.2 of this addendum BIA.

In the time since the original biodiversity impact assessment, SEPP 14 has been repealed and replaced with *State Environmental Planning Policy – Coastal Management (2018)* (Coastal Management SEPP). The proposed modification does not impact upon the Coastal Management SEPP areas. As a result, the approved project EIS does not require updating. Consistent with the parent BIA to inform the project REF (GHD 2016b), these areas have been considered as a cumulative impact under this addendum BIA, but otherwise excluded from this assessment.

Following completion of the BIA (GHD 2016b) to support the project REF, additional survey was undertaken by GHD to determine the presence of two protected entities within the project REF study area – the East Lynne Midge Orchid (*Genoplesium vernale*) and aquatic seagrasses. The outcomes of these additional surveys and boundary changes are documented in the Submissions Report (Roads and Maritime 2017). Following two targeted seasonal surveys, it was concluded that the East Lynne Midge Orchid is not present within the REF study area. This species has not been considered further within this addendum BIA. Seagrass surveys indicated that seagrass meadows were present within the approved REF proposal site. Additional impacts upon seagrass meadows associated with the proposed modification, including required

offsetting, have been included in this addendum BIA. In addition, in 2018 EcoLogical Australia undertook targeted microbat surveys of Nelligen Bridge to determine the presence of roosts and/or breeding habitat (ELA 2018). No visual or acoustic evidence of microbat habitation of Nelligen Bridge was recorded and potential roosting habitat available within the bridge is reported as sub-optimal.

**N.B.** This addendum BIA addresses only parts of the BIA prepared for the project REF (GHD 2016b) that require update in accordance with the proposed modification. Sections in this addendum BIA have been numbered in accordance with the parent BIA for the project REF such that updated information can be referred and compared directly with the parent document. For all contextual information, supporting data and associated information please refer to GHD (2016b) and Roads and Maritime (2017).

## 1.2 The REF proposal

Key features of the proposed modification are shown in Figure 1-2.

## 1.3 Terms and definitions

The following terms and definitions are used in this addendum BIA and are consistent with the parent BIA report (GHD 2016b) (see Figure 1.3). Alternate terminology has been utilised in the addendum REF for some of the below terms and definitions. Equivalent naming for terms and definitions that differ between these two documents is as follows.

The proposal: the Roads and Maritime proposal for construction of a new bridge to carry the Kings Highway over the Clyde River at Nelligen.

Proposal site: the area to be directly impacted by the proposal. This comprises the future construction footprint of the proposed Nelligen bridge and associated Kings Highway upgrade, including all roadside cut and fill, stockpile sites and compound areas.

Approved REF proposal site: the portion of the proposal site that does not impact upon areas of the now repealed *State Environmental Planning Policy No. 14 – Coastal Wetlands* (SEPP 14) and that was determined by Roads and Maritime in March 2017 following minor boundary changes documented in the Submissions Report (Roads and Maritime 2017). Referred to in the addendum REF as the “approved project REF boundary”.

Approved EIS proposal site: the portion of the proposal site that impacts upon areas of the now repealed *State Environmental Planning Policy No. 14 – Coastal Wetlands* (SEPP 14) and that was approved by Eurobodalla Shire Council in March 2017 (DA 204/17) Referred to in the addendum REF as the “project EIS proposal”.

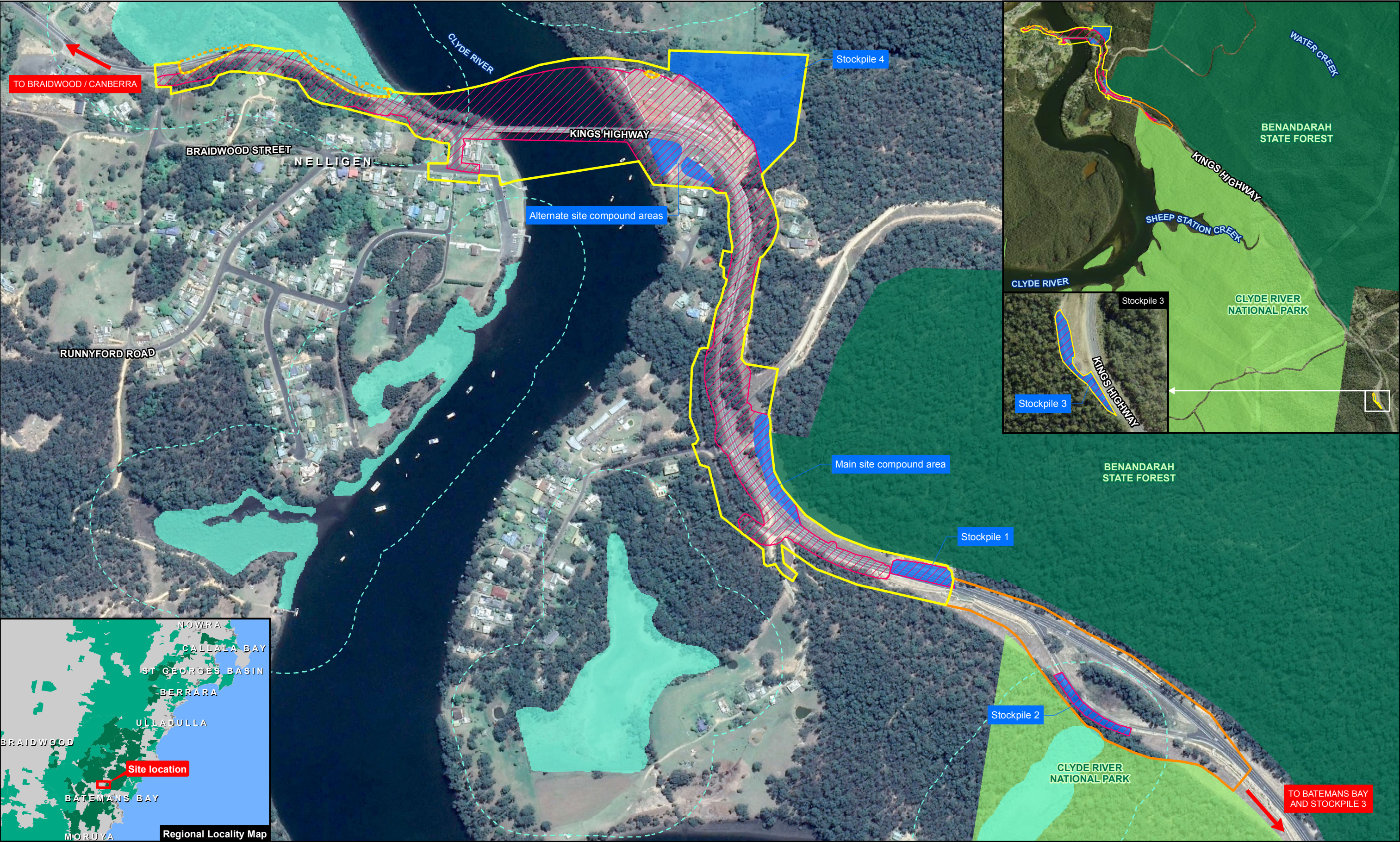
Proposed modification: proposed expansion of the approved REF proposal site for design purposes and inclusion of additional ancillary sites.

Revised REF proposal site: the combined area of the approved REF proposal site and the proposed modification. Referred to in the addendum REF as the “revised REF proposal”.

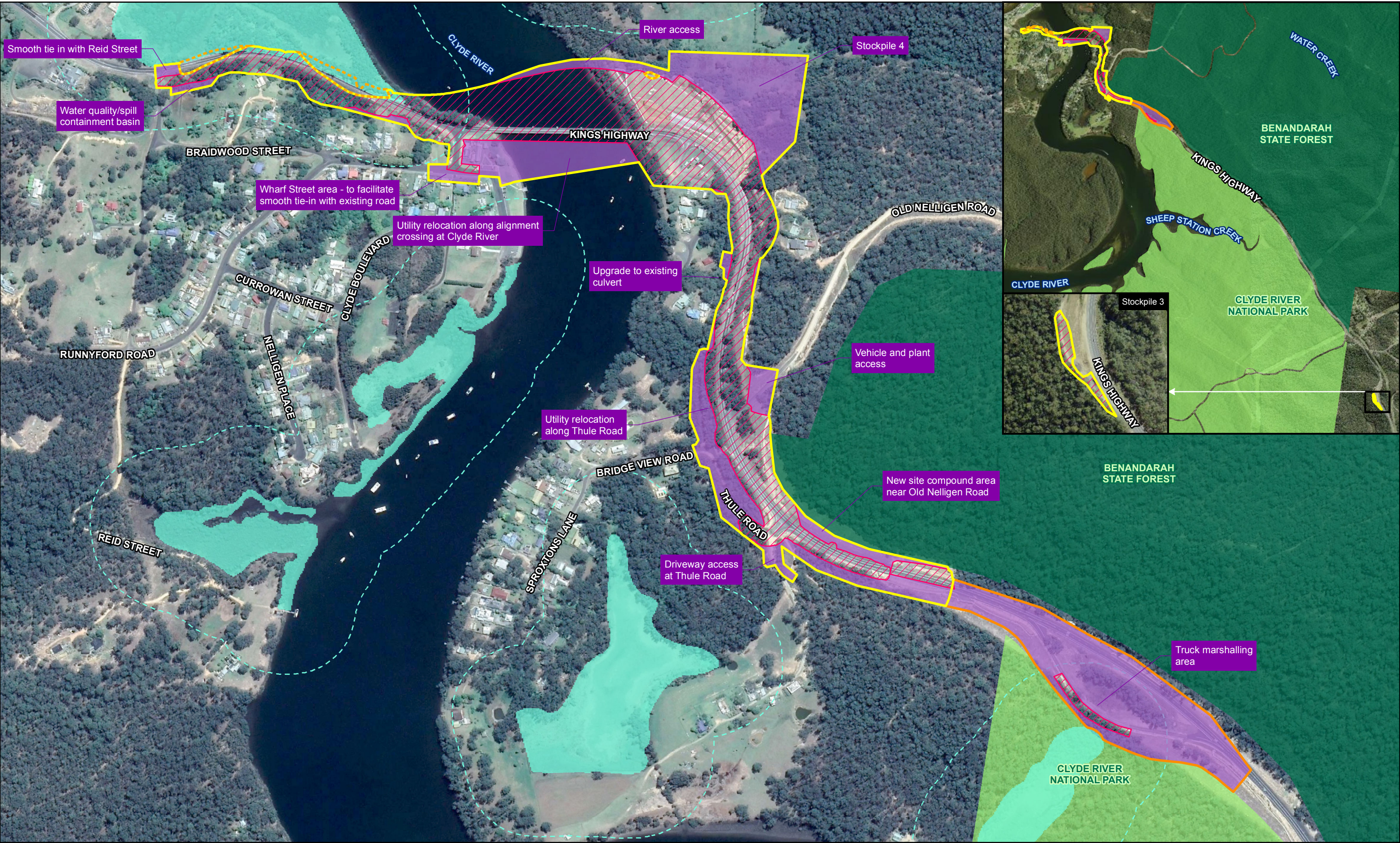
Revised REF proposal site (Eastern extension): the eastern extent of the proposed modification, where there will be no impacts upon native vegetation. This area is excluded from the REF study area. Additional assessment would be required if any vegetation removal is required within this area.

REF study area: the approved REF proposal site and additional areas that are likely to be affected by the proposal, either directly or indirectly. In this study, this comprises a 100 metre buffer around the entire approved REF proposal site. The REF study area has not changed as a result of the proposed modification.

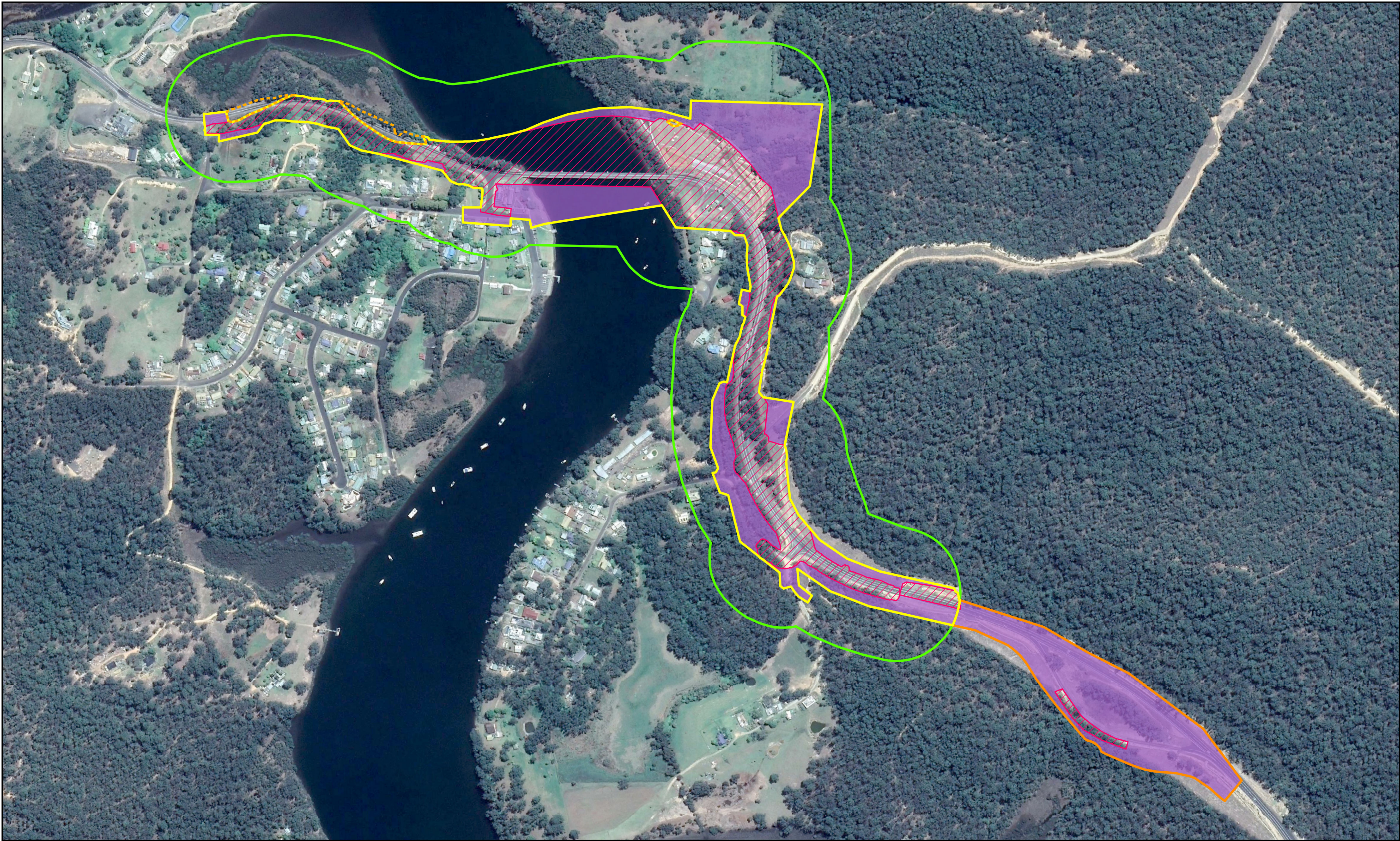






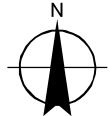






Paper Size A3  
0 50 100 200  
Metres

Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



#### LEGEND

- Revised REF proposal site (2018)
- Revised REF proposal site (2018) (Eastern extension)
- REF study area
- Approved REF proposal site (2017)
- Approved EIS proposal site (2017)
- Proposed modification areas

Roads and Maritime Services  
Replacement of the Kings Highway  
Bridge over the Clyde River at Nelligen

Job Number	21-25173
Revision	A
Date	15 Feb 2019

REF proposal site

Figure 1.3



## 2. Legislative context

### 2.1 NSW State legislation

#### 2.1.2 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) was passed by the NSW Parliament in November 2016 and came into effect on 25 August 2017. The *Threatened Species Conservation Act 1995* (TSC Act), *Native Vegetation Act 2003* (NV Act) and some parts of the *National Parks and Wildlife Act 1974* (NPW Act) were repealed on 25 August 2017. As a result, the matters relating to the listing of threatened species, biodiversity impact assessment, offsetting and related offences are now contained within the BC Act.

The BC Act, together with the *Biodiversity Conservation Regulation 2017*, provide a mechanism to address impacts on biodiversity from land clearing associated with development. Under this legislation, there are provisions for a Biodiversity Offsets Scheme (BOS), which includes a framework to avoid, minimise and offset impacts of development on biodiversity.

Under Section 7.3 of the BC Act, proponents of Part 5 activities (under the *Environmental Planning and Assessment Act 1979*) must apply the test of significance (5-part test) to determine whether the proposed activity is likely to significantly affect upon threatened species or ecological communities, or their habitats. If the activity is likely to have a significant impact, or will be carried out in a declared area of outstanding biodiversity value, the proponent must either apply the Biodiversity Offsets Scheme or prepare a species impact statement (SIS). The environmental impact of activities that will not have a significant impact on threatened species will continue to be assessed under s.111 of the *Environmental Planning and Assessment Act 1979*.

The *Biodiversity Conservation (Savings and Transitional) Regulation 2017* (BC[ST] Reg) provides for transitional arrangements related to biodiversity assessment for the various categories of development consent or approval that are underway or have already been made at the time the BC Act came into effect. The proposal is unlikely to fall within the transitional arrangements under the BC(ST) Reg. As a result, all matters relating to biodiversity impacts under the proposed modification are to be assessed under the BC Act. In particular, assessments of significance for threatened biota impacted or potentially impacted by the proposal are to follow Section 7.3 of the BC Act ('5-part test'), not the '7-part test' required under Section 5A of the EPA Act.

#### 2.1.4 Biosecurity Act 2015

The *Biosecurity Act 2015* (Biosecurity Act) repealed the *Noxious Weeds Act 1993* on 1 July 2017. The Biosecurity Act specifies the duties of public and private landholders as to the control of priority weeds. Under the Act, priority weeds have been identified for Local Government Areas and assigned duties of control. Under Part 3 of the Biosecurity Act any person who deals with biosecurity matters (e.g. listed weed species) and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by biosecurity matters has the duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated and minimised.

Priority weed species identified within the revised REF proposal site will be managed in accordance with the requirements of the Biosecurity Act.



## 3. Methods

### 3.1 Field survey

Additional field survey was conducted by an ecologist on Friday 12 October 2018, to assess areas additional to the approved REF proposal site associated with the proposed modification. Survey effort included:

- Broad-scale vegetation survey, vegetation mapping and opportunistic threatened flora observations
- Three 20 metre x 50 metre BAM / BioBanking plot-transects (BAM 2017 and BBAM 2014 data collected) (plots 6, 7 and 8).

Additional flora survey was restricted to Stockpile 4 to confirm previous classifications of native vegetation in this area (GHD 2016) and quantify additional impacts of the proposed modification. The locations of survey sites are shown in Figure 3-1.

Weather conditions during the additional field survey are summarised in Table 3-1 below (BOM 2016b).

Table 3-1 Weather conditions during the field survey (station 069023: Nelligen, Thule Road)

Date	Minimum temperature	Maximum temperature	Rainfall in preceding 24 hours	Weather conditions
12 Oct 2018	10.4°C	16.4°C	3.6 mm	Mild temperatures and partly overcast. Moderate humidity.

#### 3.1.1 Flora sampling

Three plots (plots 6, 7 and 8) were sampled within the proposed modification area during the field survey to assess additional areas of impact (see Figure 3.1). Plots were sampled in accordance with existing stratification of the approved REF proposal site. BAM (OEH 2017) and BBAM (OEH 2014) survey data was recorded within each additional plot to ensure that datasets were sufficient to satisfy the requirements of multiple potential biodiversity offsetting scenarios under the Roads and Maritime internal policy (see section 7).

#### 3.1.2 Vegetation mapping

Vegetation mapping undertaken for the BIA (GHD 2016) was updated in accordance with data collected within the additional three flora survey plots.

#### 3.1.3 Aquatic habitat assessment

Methods and results of aquatic seagrass surveys within the approved REF proposal site are detailed in Section 3.1 of the Nelligen Bridge REF Submissions Report (Roads and Maritime 2017). The outcomes of the impacts of the proposal upon aquatic seagrass, according to Roads and Maritime (2017) and the proposed modification, have been included in sections 5, 6 and 7 of this addendum BIA.

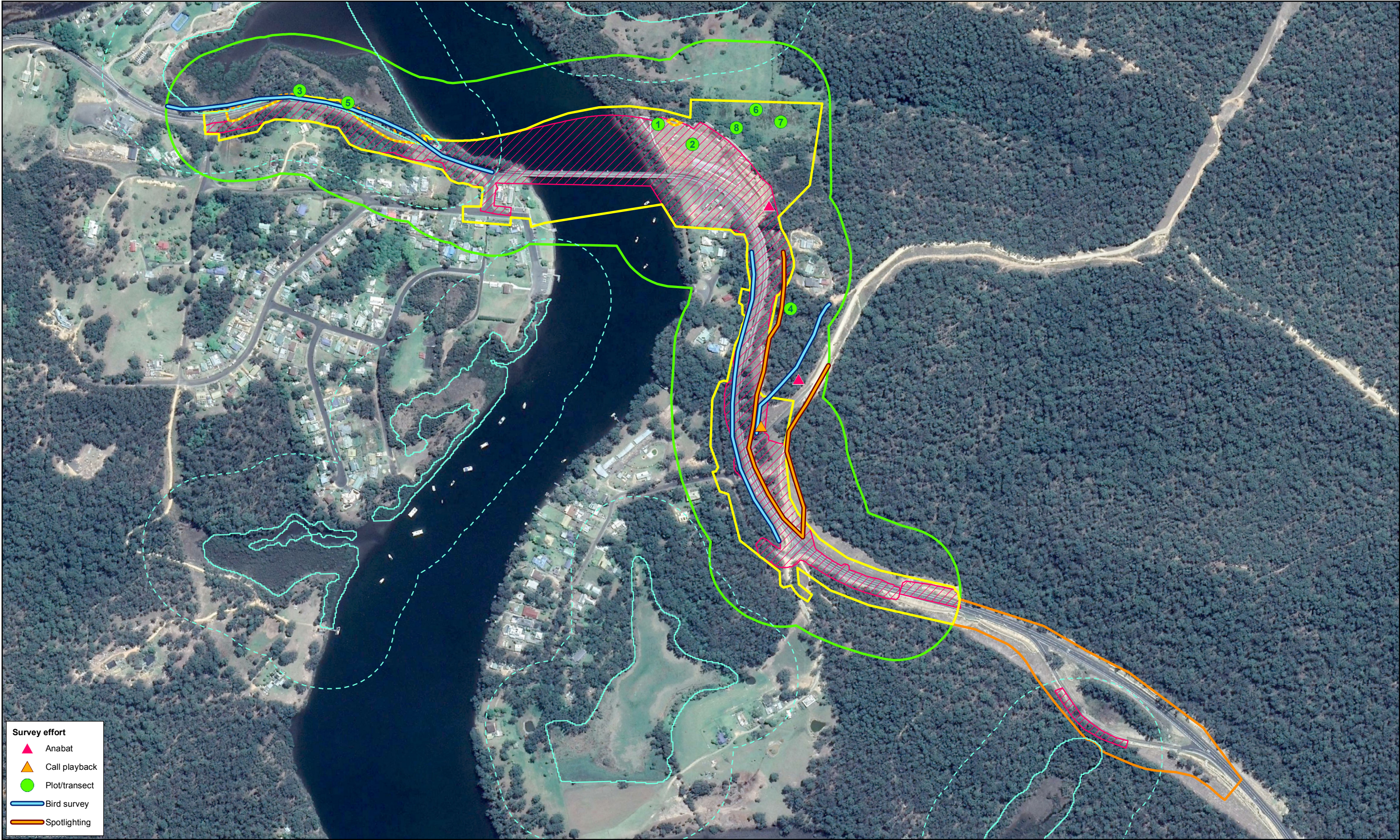
#### 3.1.4 Survey effort

A summary of survey effort undertaken for the addendum BIA is provided in Table 3-2

Table 3-2 Survey effort

Method	Effort	Person hours
Vegetation mapping / plot-transects	3 plot / transects	4 person-hours

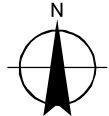




- Survey effort**
- ▲ Anabat
  - ▲ Call playback
  - Plot/transect
  - Bird survey
  - Spotlighting

Paper Size A3  
0 50 100 200  
Metres

Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



**LEGEND**

- Revised REF proposal site (2018)
- Revised REF proposal site (2018) (Eastern extension)
- REF study area
- Approved REF proposal site (2017)
- Approved EIS proposal site (2017)
- Proximity Area for SEPP Coastal Management (2018)\*
- SEPP Coastal Management (2018)\*

\*The SEPP Coastal Management layer was provided by DPE via SEED as a raster dataset, and converted to vector format by GHD for display purposes, which may make it subject to slight inaccuracies. The proximity area is a 100m buffer of these mapped wetlands, based on the description provided on SEED. As such, it is only an estimate of the proximity area.

N.B. Habitat assessment was undertaken throughout study area

Roads and Maritime Services  
Replacement of the Kings Highway  
Bridge over the Clyde River at Nelligen

Job Number	21-25173
Revision	A
Date	15 Feb 2019

Survey Effort

Figure 3.1



## 4. Existing environment

### 4.1 Flora

#### 4.1.1 Flora species

An additional 14 flora species from an additional 5 families were recorded within the proposed modification area, comprising 7 indigenous and 7 exotic or non-indigenous species.

In total, across the entire revised REF proposal site, one-hundred-and-twenty-three species of flora from 56 families were recorded, comprising 98 indigenous native and 25 exotic or non-indigenous native species. The Poaceae (grasses: 19 species, 12 native), Fabaceae (peas and Acacias - scramblers, climbers and woody shrubs: 12 species, 10 native) and Myrtaceae (Eucalypts and other 'gums': eight native species) were the most diverse families recorded. No threatened flora species were recorded. The full list of species recorded is presented in Appendix A. Species recorded are discussed below in relation to the plant community types occurring within the REF study area.

#### 4.1.2 Plant community types and vegetation zones

No additional Plant Community Types (PCTs) were recorded during additional flora survey within the proposed modification area. One additional native vegetation zone was recorded in the form of Low condition South Coast River-flat Forest (Vegetation Zone 13 / plot 6). Plots 7 and 8 were located within areas of Moderate/Good-*poor* condition South Coast River-flat Forest (Vegetation Zone 5). Low condition South Coast River-flat Forest is contiguous with Moderate/Good-*poor* and Moderate/Good-*medium* patches of this PCT present within the eastern floodplains of the REF study area. Within the REF study area, medium condition areas of South Coast River-flat Forest occur adjacent to areas of Floodplain Swamp Forest along the river bank. This vegetation zone ranges in condition, with poor condition vegetation adjacent and inland and Low condition South Coast River-flat Forest comprising paddock within the north-east of the REF study area (Stockpile 4).

Following the addition of Low condition South Coast River-flat Forest (Vegetation Zone 13), thirteen vegetation zones, reflecting each PCT and non-native vegetation were recorded and mapped within the REF study area (see Figure 4-1). Attributes of the two vegetation zones within which additional flora plots were surveyed (Vegetation Zones 6 and 13) are summarised and described in Table 4-6 and 4-13. Data from BioBanking/BAM plot/transects are included in Appendix A along with benchmark values for each PCT.

Table 4-1 Vegetation zones identified within the REF study area

Zone No.	Tozer et al (2010) map unit (unit ID)	Plant Community Type Common Name (OEH 2016c)	PCT ID	Condition class (DECC 2009)	Status	Area within REF study area (ha)	Area within approved REF proposal site (ha)	Proposed modification area (ha)	Area within the revised REF proposal site (ha)
1	Batemans Bay Cycad Forest (WSF p90)	Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion	1220	Moderate/good-high	Not listed	14.95	0.87	1.91	2.78
2	Batemans Bay Cycad Forest (WSF p90)	Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion	1220	Moderate/good-poor	Not listed	1.44	1.22	0.13	1.35
3	Floodplain Swamp Forest (FoW p105)	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	1232	Moderate/good	Swamp Oak Floodplain Forest EEC (BC Act). Coastal Swamp Oak ( <i>Casuarina glauca</i> ) Forest EEC (EPBC Act)	1.80	0.42	0.10	0.52

Zone No.	Tozer et al (2010) map unit (unit ID)	Plant Community Type Common Name (OEH 2016c)	PCT ID	Condition class (DECC 2009)	Status	Area within REF study area (ha)	Area within approved REF proposal site (ha)	Proposed modification area (ha)	Area within the revised REF proposal site (ha)
4	South Coast River-flat Forest (FoW p30)	River Peppermint - Rough-barked Apple - River Oak herb/grass riparian forest of coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	1108	Moderate/good-medium	River-flat Eucalypt Forest on Coastal Floodplains EEC (BC Act)	1.05	0.82	0.13	0.95
5	South Coast River-flat Forest (FoW p30)	River Peppermint - Rough-barked Apple - River Oak herb/grass riparian forest of coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	1108	Moderate/good-poor	River-flat Eucalypt Forest on Coastal Floodplains EEC (BC Act)	2.66 (reduced following introduction of Low condition South Coast River-flat Forest)	0.41	1.59	2.00
6	Estuarine Mangrove Forest (SL p109)	Mangrove Forests in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion	920	Moderate/good	Key fish habitat, protected marine vegetation (FM Act)	1.33	0.13	0.00	0.13
7	Estuarine Saltmarsh (SL p509)	Saltmarsh in estuaries of the Sydney Basin Bioregion and	1126	Moderate/good	Coastal Saltmarsh EEC (BC Act). Subtropical and	0.79	0.03	0.00	0.03



Zone No.	Tozer et al (2010) map unit (unit ID)	Plant Community Type Common Name (OEH 2016c)	PCT ID	Condition class (DECC 2009)	Status	Area within REF study area (ha)	Area within approved REF proposal site (ha)	Proposed modification area (ha)	Area within the revised REF proposal site (ha)
		South East Corner Bioregion			temperate Coastal Saltmarsh VEC (EPBC Act). Protected marine vegetation (FM Act)				
8	Southeast Floodplain Wetlands (FoW e60)	Floodplain wetlands of the coastal lowlands, southern South East Corner Bioregion	828	Moderate/good	Freshwater Wetlands on Coastal Floodplains (BC Act)	0.15	0.00	0.00	0.00
9	Murrumurang-Bega Lowlands Forest (WSF p86)	Spotted Gum – Grey Ironbark – Woolbutt grassy open forest on coastal flats, southern Sydney Basin Bioregion and South East Corner Bioregion	1212	Moderate/good	Not listed	1.14	0.49	0.02	0.51
10	Southeast Lowland Grassy Woodland (GW e20p229)	Forest Red Gum – Rough Barked Apple – White Stringybark grassy woodlands on hills in dry valleys, southern	834	Moderate/good	Lowland Grassy Woodland of the South east Corner EEC (BC Act) / CEEC (EPBC Act)	1.28	0.25	0.06	0.31

Zone No.	Tozer et al (2010) map unit (unit ID)	Plant Community Type Common Name (OEH 2016c)	PCT ID	Condition class (DECC 2009)	Status	Area within REF study area (ha)	Area within approved REF proposal site (ha)	Proposed modification area (ha)	Area within the revised REF proposal site (ha)
		South East Corner Bioregion							
11	Seagrass Meadows (Zostera) (SL e70) (GHD 2016 / Creese <i>et al</i> 2009)	Seagrass meadows of the estuaries and lagoons of the New South Wales coast	1913	n/a	Key fish habitat. protected marine vegetation (FM Act)	0.95	0.18	0.07	0.25
12	n/a	Urban exotic/native	n/a	n/a	n/a	0.06	0.01	0.00	0.01
13	South Coast River-flat Forest (FoW p30)	River Peppermint - Rough-barked Apple - River Oak herb/grass riparian forest of coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	1108	Low	n/a	2.08 (newly introduced following additional 2018 flora survey)	n/a	0.30	0.30
-	Cleared land		n/a	n/a	n/a	13.65	4.35	1.64	5.99

Key: CEEC – critically endangered ecological community; EEC – endangered ecological community; VEC – vulnerable ecological community



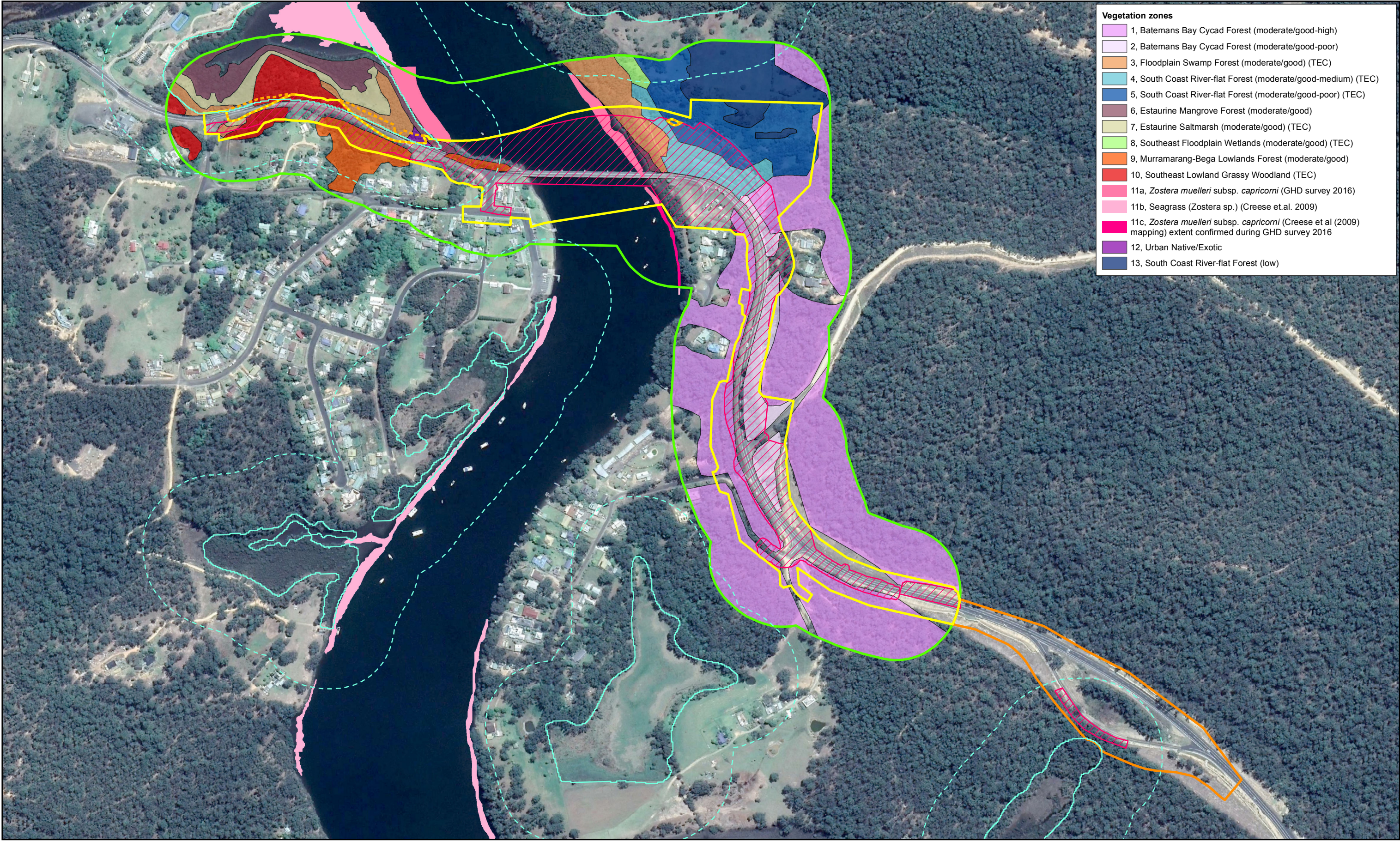




Table 4-2 South Coast River-flat Forest (moderate/good-poor condition)

Vegetation Zone 5. Moderate/good-poor condition South Coast River-flat Forest	
<b>Plant community type (OEH 2016c)</b>	SR608 – River Peppermint – Rough-barked Apple – River Oak herb/grass riparian forest of coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion.
<b>Equivalent Map Units</b>	South Coast River-flat Forest (FoW p30) (Tozer <i>et al</i> 2010)
<b>Area</b>	2.66 ha (REF study area); 2.00 ha (Revised REF proposal site – increase of 1.59 ha compared to approved REF proposal site)
<b>Survey effort</b>	Plots 7, 8
<b>Condition</b>	Moderate/good – <i>poor</i> (DECC 2009)  Predominately cleared of canopy and mid-storey vegetation for agricultural grazing, with woody individuals regenerating along the edges of better condition vegetation.  Understorey comprises a mix of native and exotic perennial grass species, intermixed with a moderate diversity of native sedge and forb species. In general, native species are dominant throughout the understorey.  Localised depressions and drainage lines tend to contain a greater density of native sedges.
<b>Conservation significance</b>	Forms a local occurrence of <i>River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i> , which is listed as an endangered ecological community under the BC Act.
<b>Landscape position</b>	Sandy loam alluvial flats on the margins of Clyde River floodplain.
<b>Structure</b>	Mixed exotic-native grass, and native sedgeland and herbfields. Patchy regenerating canopy and mid-storey species cover to 5-10 m.
<b>Over-storey</b>	Established mature canopy absent. Patchy regeneration of Forest Red Gum ( <i>Eucalyptus tereticornis</i> ) and <i>E. saligna</i> x <i>botryoides</i> at the fringes of better condition vegetation.
<b>Mid-storey</b>	Patches of mature regenerating Black Wattle ( <i>Acacia mearnsii</i> ) and Swamp Oak ( <i>Casuarina glauca</i> ) present along the fringes of better condition vegetation.
<b>Groundcover</b>	Native groundcover dominant but intermixed with exotic species throughout. Species tend to be common, widespread and tolerant of cattle grazing. Frequent species include Weeping Grass ( <i>Microlaena stipoides</i> ), Couch ( <i>Cynodon dactylon</i> ), Basket Grass ( <i>Oplismenus aemulus</i> ), Bracken ( <i>Pteridium esculentum</i> ), Tall Sedge ( <i>Carex appressa</i> ), <i>Glycine</i> spp., <i>Geranium homeanum</i> and Swamp Dock ( <i>Rumex browni</i> ).  In addition, forbs and sedges, including <i>Juncus usitatus</i> , <i>Carex appressa</i> and Spiny-headed Mat-rush ( <i>Lomandra longifolia</i> ) tend to increase within local depressions.
<b>Exotic species</b>	Annual and perennial exotic pasture species including <i>Anthoxanthum odoratum</i> (Sweet Vernal Grass), <i>Aira</i> sp. (Hairgrass) and <i>Paspalum dilatatum</i> (Paspalum).



**Vegetation Zone 5. Moderate/good-poor condition South Coast River-flat Forest**

**Plate 8:** Poor condition South Coast River-flat Forest, image taken from 0 m point of Plot 8. Facing east.



**Plate 9:** Poor condition South Coast River-flat Forest, image taken from 0 m point of Plot 7, facing east.





Table 4-3 South Coast River-flat Forest (Low condition)

Vegetation Zone 13. Low condition South Coast River-flat Forest	
<b>Plant community type (OEH 2016c)</b>	SR608 - River Peppermint - Rough-barked Apple - River Oak herb/grass riparian forest of coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion.
<b>Equivalent Map Units</b>	South Coast River-flat Forest (FoW p30) (Tozer <i>et al</i> 2010)
<b>Area</b>	2.08 ha (REF study area); 0.30 ha (Revised REF proposal site – increase of 0.30 ha compared to approved REF proposal site)
<b>Survey effort</b>	Plot 6
<b>Condition</b>	Low (DECC 2009) Predominately cleared of canopy and mid-storey vegetation for agricultural grazing. Understorey comprises a mix of native and exotic perennial grass species, intermixed with native sedge and forb species.
<b>Conservation significance</b>	Does not form a local occurrence of any listed threatened ecological community due to absence of indicative over- and mid-storey structure as well as presence of only common native understorey species amongst dominant exotic understorey cover.
<b>Landscape position</b>	Sandy loam alluvial flats on the margins of Clyde River floodplain.
<b>Structure</b>	Mixed exotic-native grass, sedgeland and herbfields.
<b>Over-storey</b>	Over-storey absent.
<b>Mid-storey</b>	Scattered regeneration of Black Wattle ( <i>Acacia mearnsii</i> ) along fringes of better condition vegetation.
<b>Groundcover</b>	Native groundcover intermixed with exotic species throughout. Species tend to be common, widespread and tolerant of cattle grazing. Frequent species include Couch ( <i>Cynodon dactylon</i> ), Indian Pennywort ( <i>Centella asiatica</i> ) and Tall Sedge ( <i>Carex appressa</i> ). Other species include Weeping Grass ( <i>Microlaena stipoides</i> ), <i>Juncus usitatus</i> , River Buttercup ( <i>Ranunculus inundatus</i> ), Ivy-leaved Violet ( <i>Viola hederacea</i> ), Whiteroot ( <i>Pratia purpurascens</i> ) and <i>Hydrocotyle sibthorpioides</i> .
<b>Exotic species</b>	Annual and perennial exotic pasture species, including <i>Anthoxanthum odoratum</i> (Sweet Vernal Grass) and <i>Aira</i> sp. (Hairgrass).



### Vegetation Zone 13. Low condition South Coast River-flat Forest

**Plate 17:** Low condition South Coast River-flat Forest, image taken from 0 m point of Plot 6, facing west.



**Plate 18:** Low condition South Coast River-flat Forest, image taken from 0 m point of Plot 6, facing south.



#### 4.1.3 Priority weeds

The revised REF proposal site contains two species declared as priority weeds in the Eurobodalla LGA, as shown in Table 4-4. Principal infestation locations are also noted in Table 4-14. These weed species occur at low density within the zones described.

Table 4-4 Declared priority weeds recorded during field survey

Scientific Name	Common Name	Zone	Duty
<i>Asparagus aethiopicus</i>	Asparagus Fern	South-east Lowland Grassy Woodland - Plot 3 Floodplain Swamp Forest – east of Plot 5	Prohibition on dealings. Must not be imported into the State or sold.
<i>Rubus fruticosus</i> species aggregate	Blackberry	South-east Lowland Grassy Woodland - Plot 3 South Coast River-flat Forest - Plot 8	Prohibition on dealings. Must not be imported into the State or sold. All species in the <i>Rubus fruticosus</i> species aggregate have this requirement, except for the varieties Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree.

## 4.2 Fauna

### 4.2.1 Fauna species

No additional fauna species were recorded within the proposed modification area compared to the BIA (GHD 2016). A total of 64 fauna species were recorded within the revised REF proposal site during the original field surveys carried out for the project REF. Refer to section 4.3.1 of the parent BIA for more detail.

### 4.2.2 Fauna habitat

The fauna habitat within the proposed modification is consistent with those present within the approved REF proposal site. The REF study area generally has good fauna habitat values, due to moderate habitat complexity, allowing for a moderate diversity of fauna species. Species recorded included those that require large tracts of native vegetation to persist, as well as generalist species able to utilise disturbed areas. Refer to section 4.3.2 of the parent BIA for more detail.

### 4.2.3 Threatened fauna species

No additional threatened fauna species were recorded within the proposed modification area compared to the BIA (GHD 2016). Figure 4-2 shows threatened species records and habitat features within the revised REF proposal site. Two threatened fauna species were recorded within or near the project REF study area. Three individuals of the Varied Sittella were recorded foraging in the canopy of Batemans Bay Cycad Forest and evidence of the Glossy Black Cockatoo was recorded at many locations in woodland patches on the eastern side of the Clyde River.

Refer to section 4.6.3 of the parent BIA for more detail.



## 4.3 Conservation significance

### 4.3.1 Threatened ecological communities

Five threatened ecological communities occur within the REF study area (see Table 4-1 and Figure 4-2). Of these, four will be impacted by the revised proposal, with the quantum of impact increasing as a result of the proposed modification on three of these TECs.

Floodplain Swamp Forest (FoW p105, Tozer *et al* 2010) in the REF study area comprises a local occurrence of *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (Swamp Oak Floodplain Forest), which is listed as an endangered ecological community under the NSW BC Act (NSW Scientific Committee 2004). Floodplain Swamp Forest also forms a local occurrence of *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland* which was listed as an endangered ecological community under the Commonwealth EPBC Act in March 2018. A total of 0.52 hectares of Swamp Oak Floodplain Forest is present within the revised REF proposal site (increase of 0.10 ha compared to the approved REF proposal site).

Moderate/Good-medium and Moderate/Good-poor condition occurrences of South Coast River-flat Forest (FoW p30, Tozer *et al* 2010) in the REF study area comprise a local occurrence of *River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (River-flat Eucalypt Forest), which is listed as an endangered ecological community under the NSW BC Act (NSW Scientific Committee 2011). A total of 2.95 hectares of River-flat Eucalypt Forest is present within the revised REF proposal site (increase of 1.72 ha compared to the approved REF proposal site). About 0.95 hectares of this area comprises partially canopied remnant vegetation in moderate/good-*medium* condition (increase of 0.13 ha compared to the approved REF proposal site), with the remaining 2.00 ha occurring in poor condition (increase of 1.59 ha compared to the approved REF proposal site). The remaining 0.30 ha of South Coast River-flat Forest within the revised REF proposal site occurs in Low condition and does not comprise a local occurrence of River-flat Eucalypt Forest.

River-flat Eucalypt Forest is currently under assessment for listing as a critically endangered ecological community under the EPBC Act, with the assessment timeframe for this ecological community has been extended from 30 April 2019 to 31 October 2019 to allow adequate time to undertake further consultation and finalise the assessment. If River-flat Eucalypt Forest is listed under the EPBC Act, the impacts of the proposal upon this community must be considered under the Act. The implications of this prospective listing upon Roads and Maritime policy and guidelines relating to offsetting of biodiversity impacts would also require consideration (see section 7.1).

Estuarine Saltmarsh (SL p509, Tozer *et al* 2010) in the REF study area comprises a local occurrence of *Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (Coastal Saltmarsh), which is listed as an endangered ecological community under the NSW BC Act (NSW Scientific Committee 2004a) and as a vulnerable ecological community under the Commonwealth EPBC Act (*Subtropical and Temperate Coastal Saltmarsh*, Threatened Species Scientific Committee, 2013). A total of 0.03 hectares of Coastal Saltmarsh is present within the revised REF proposal site with no increase in the area of this EEC impacted due to the proposed modification.

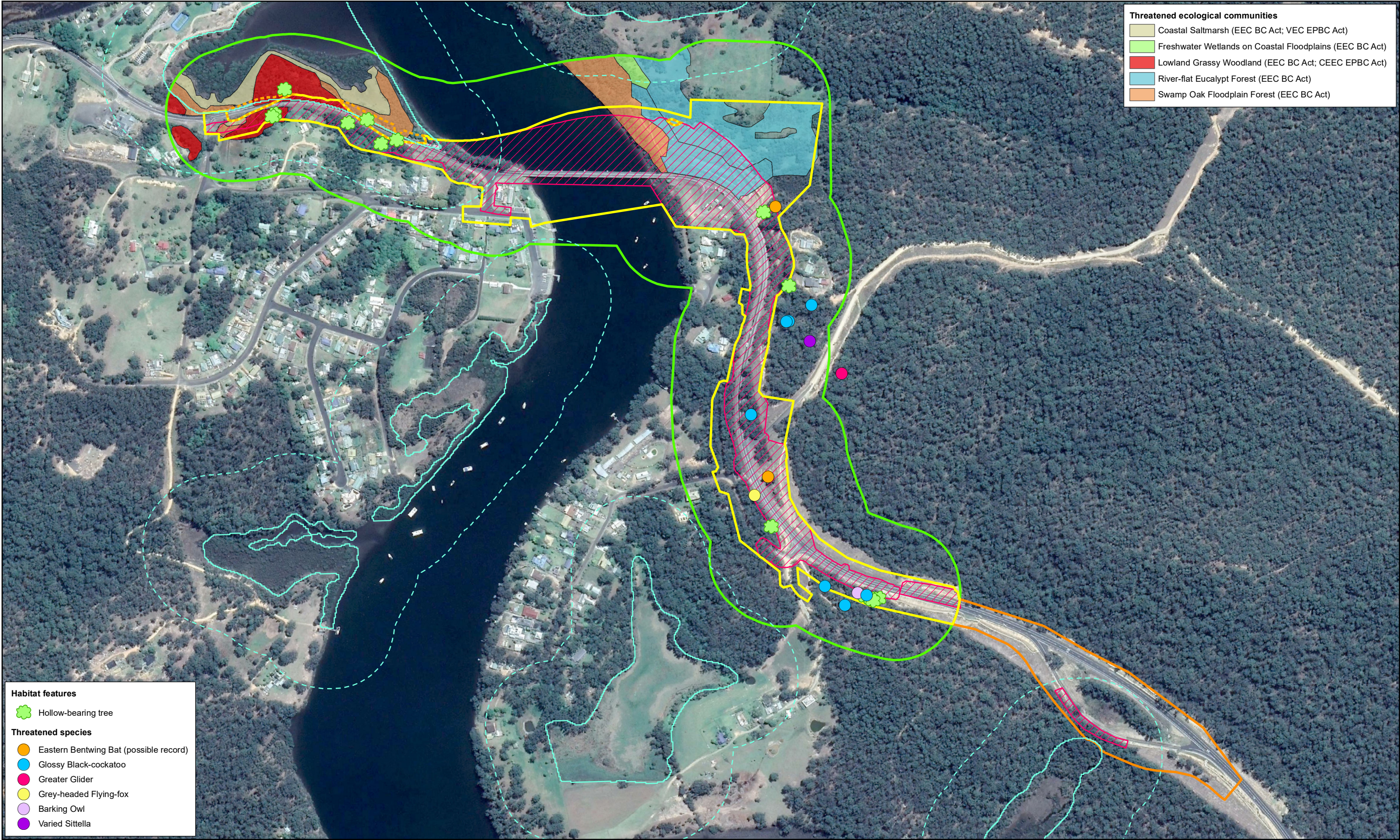
Southeast Lowland Grassy Woodland (GW e20p229, Tozer *et al* 2010) in the REF study area comprises a local occurrence of *Lowland Grassy Woodland of the South East Corner Bioregion* (Lowland Grassy Woodland), which is listed as an endangered ecological community under the NSW BC Act (NSW Scientific Committee, 2007) and as a critically endangered ecological community under the Commonwealth EPBC Act (Threatened Species Scientific Committee,



2013a). A total of 0.31 hectares of Lowland Grassy Woodland is present within the revised REF proposal site (increase of 0.06 ha compared to the approved REF proposal site).

The distribution of TECs is mapped on Figure 4-2. The significance of impacts of the proposal on threatened ecological communities is discussed in section 6.







## 5. Potential impacts

### 5.1 Direct impacts

#### 5.1.1 Removal of native vegetation

Construction of the revised REF proposal would result in the permanent removal of up to 9.13 ha of native vegetation, including marine vegetation (an increase of 4.31 ha compared to the approved REF proposal) (see Table 5-1).

This includes removal of a proportion of four TECs present within the proposal site, which is discussed further in Section 6. It is assumed that there will be no works or impacts outside the revised REF proposal site boundary, as shown in Figure 1-2. For the purposes of this Biodiversity Impact Assessment, it has been assumed that all of the existing vegetation within the revised REF proposal site will be removed, with the exception of the revised REF proposal site (Eastern extension). Accordingly, areas of native vegetation to be cleared (see Table 5-1) may be overestimates, as the revised REF proposal site is considered as an outer boundary of the construction footprint and areas for compound sites (refer to Figure 1-2).

Clearing of native vegetation occurs mainly along the edges of the existing highway, and would involve removal of a moderate diversity of non-threatened native plants, including mature trees. Mature trees have value within plant populations as sources of seed. However, given the presence of extensive areas of these vegetation communities and species within the surrounding State Forest and National Park estate, removal of a small proportion of mature individuals would not threaten the persistence of local populations. It is likely that flora populations would persist in the soil seed bank and within existing habitats beyond (and adjoining) the REF study area. Reproduction within local native plant populations is unlikely to be adversely affected in the long term by the small-scale removal of (or damage to) individual plants.

About 5.99 hectares of the revised REF proposal site is composed of previously cleared and developed land (an increase of 1.64 ha compared to the approved REF proposal site). These areas contain little native vegetation cover and have limited habitat value for native plants. Any vegetation clearing required in these areas would principally remove pasture grasses, a small number of individuals of non-threatened native plants and noxious and environmental weeds.

The extent of impacts within the revised REF proposal site, including clearing of native vegetation is summarised in Table 5-1.

Table 5-1 Direct impacts within the revised proposal site

Vegetation Zone No.	Tozer et al (2010) map unit (unit ID)	Status	Area in the revised REF proposal site(ha)
1	Batemans Bay Cycad Forest (WSF p90) (mod-good – high)	Not listed	2.78
2	Batemans Bay Cycad Forest (WSF p90) (mod-good – poor)	Not listed	1.35
3	Floodplain Swamp Forest (FoW p105) (mod-good)	Swamp Oak Floodplain Forest EEC (BC Act)	0.52



Vegetation Zone No.	Tozer et al (2010) map unit (unit ID)	Status	Area in the revised REF proposal site(ha)
4	South Coast River-flat Forest (FoW p30) (mod-good – med)	River-flat Eucalypt Forest on Coastal Floodplains EEC (BC Act)	0.95
5	South Coast River-flat Forest (FoW p30) (mod-good – poor)	River-flat Eucalypt Forest on Coastal Floodplains EEC (BC Act)	2.00
6	Estuarine Mangrove Forest (SL p109) (mod-good)	Protected marine vegetation (FM Act) Key fish habitat (FM Act)	0.13
7	Estuarine Saltmarsh (SL p509) (mod-good)	Coastal Saltmarsh EEC (BC Act) and VEC (EPBC Act) Protected marine vegetation (FM Act)	0.03
8	Southeast Floodplain Wetlands (FoW e60) (mod-good)	Freshwater Wetlands on Coastal Floodplains (BC Act)	0.00
9	Murramurang-Bega Lowlands Forest (WSF p86) (mod-good)	Not listed	0.51
10	Southeast Lowland Grassy Woodland (GW e20p229) (mod-good)	Lowland Grassy Woodland of the South east Corner EEC (BC Act) / CEEC (EPBC Act)	0.31
11	Seagrass Meadows (Zostera) (SL e70)	Key fish habitat (FM Act) Protected marine vegetation (FM Act)	0.25
12	Urban native/exotic	n/a	0.01
13	South Coast River-flat Forest (FoW p30) (low)	Not listed	0.30
-	Cleared land	n/a	5.99
<b>Total area</b>			<b>15.13</b>
<b>Total native vegetation</b>			<b>9.13</b>
<b>Total canopied eucalypt forest</b>			<b>4.55</b>

Environmental safeguards to prevent clearing of native vegetation additional to that identified above, such as marking native vegetation outside the revised REF proposal site, will be included in the proposal Construction Environment Management Plan (CEMP) as well as in accordance with the Roads and Maritime Service Biodiversity Guidelines (RMS 2011).

#### 5.1.2 Removal of terrestrial fauna habitats

The revised REF proposal would impact up to 5.99 hectares of highly modified land, comprising cleared areas, exotic grassland and garden vegetation (an increase of 1.64 ha compared to the approved REF proposal site). These modified landscapes have limited value for native fauna given the degree of historic and ongoing fragmentation and disturbance; lack of habitat complexity; and the presence of aggressive native and introduced fauna species.

The revised REF proposal would remove up to 9.13 ha of native vegetation, including marine vegetation such as Seagrass Meadows (increase of 4.31 ha compared to the approved REF proposal site). Of this native vegetation, 8.72 ha form terrestrial fauna habitat. The majority of vegetation that would be removed is located along the already disturbed edge of the existing

highway, or is adjacent to partially cleared agricultural land. The native vegetation that would be removed does, however, provide habitat for a range of fauna species. Clearing of this vegetation would permanently remove foraging and breeding resources for native fauna, particularly in forest and woodland habitats, which comprise a canopy of eucalypt trees of varying age classes. Eucalyptus and other native canopy species provide nectar resources as well as foraging substrate for a diverse range of arboreal species, such as birds and arboreal mammals, as well as bats.

No additional hollow-bearing trees would be removed due to the proposed modification. In total, up to 14 hollow-bearing trees would be removed within the revised REF proposal site. However, it is likely that some of these hollow-bearing trees may be able to be retained as a result of detailed design. Hollow-bearing trees are critical habitat components for many tree-dwelling fauna species, including arboreal mammals, microchiropteran bats and woodland birds that rely on hollows for shelter and breeding habitat. Due to the long timeframe it takes for hollows to form in eucalypts (usually greater than 150 years) (Gibbons et al 2000), the loss of these hollows represents a long-term reduction in habitat resources for fauna.

Shrub layers and leaf litter would also be removed within the revised REF proposal site as a result of construction. This would result in the loss of habitat for small woodland birds that rely on these resources for foraging and breeding. In addition, loss of leaf litter would remove habitat for small reptiles and gastropods that rely on this feature for shelter, breeding and foraging.

There would be no additional direct impact on wetland habitats due to the proposed modification. Overall, construction would have a minor direct impact on wetland habitats, comprising the removal of 0.13 hectares of mangroves and 0.03 hectares of saltmarsh following. These provide a small area of habitat for small birds and waders, as well as a range of reptiles and invertebrates such as crabs.

Demolition of the bridge would disrupt potential roosting habitat of the Large-footed Myotis and the Eastern Bentwing Bat, however, a targeted survey in 2018 (ELA 2018) found no evidence of microbat habitation of Nelligen Bridge and concluded that potential roosting habitat available within the bridge is sub-optimal.

Impacts on threatened species resulting from the revised REF proposal are discussed in more detail in Sections 6.1 and 6.2.

#### 5.1.3 Impacts on aquatic habitats

Impacts on riparian vegetation and in-stream flora would be limited to the area immediately adjacent to the existing bridge and the location of the new bridge. The revised proposal will result in the removal of riparian vegetation, including 0.52 ha of Floodplain Swamp Forest (0.1 ha increase compared to the approved REF proposal site).

Mangroves, saltmarsh and seagrasses are protected as 'marine vegetation' under the New South Wales *Fisheries Management Act* 1994 as they are key fish habitat. Following the proposed modification, construction of the revised REF proposal would have a minor direct impact on aquatic habitats, comprising the removal of 0.13 hectares of mangroves, 0.03 hectares of saltmarsh and 0.25 ha of seagrasses (0.07 ha increase compared to the approved REF proposal site, no increase for mangroves and saltmarsh). Marine vegetation provides important habitat for aquatic fauna, including refuge areas for fish and foraging habitat for a range of species.

## 5.2 Indirect impacts

### 5.2.1 Wildlife connectivity and habitat fragmentation

The revised REF proposal would further fragment habitat in the locality by increasing the width of the gap created by the highway in some locations. It would clear up to 9.13 hectares of native vegetation primarily from alongside the existing highway following the proposed modification (increase of 4.31 ha compared to the approved REF proposal site). The revised REF proposal would have a negligible impact on the primary habitat corridor mapped along both sides of Nelligen Creek (see Figure 1.1 approved proposal REF BIA) as much of the corridor at this location is cleared land. The revised REF proposal would not sever this corridor or isolate stands of habitat.

### 5.2.2 Noise, light and vibration

The proposed modification would not increase the quantum of impact upon native fauna due to noise, light and vibration compared with the approved REF proposal. The REF study area currently experiences ongoing noise and vibration, primarily from heavy traffic flows along the Kings Highway, as well to a lesser degree water craft along the Clyde River. The revised REF proposal would increase noise levels and vibration within native habitats surrounding the revised REF proposal site and Eastern extension area during construction, through plant and machinery operation and earth moving activities. Native fauna may temporarily vacate or avoid areas disturbed by construction activities but no substantial impacts on native fauna are anticipated as a result of noise and vibration generated by the revised REF proposal. Given the existing noise and vibration levels in the REF study area and surrounding the Eastern extension area, the increase in noise levels as a result of construction is unlikely to substantially impact native biota.

## 5.3 Cumulative impacts

The total extent of clearing from the revised proposal (i.e. revised REF proposal site plus the EIS proposal site) is shown in Table 5-2.

The revised REF proposal would increase the extent of vegetation clearing in the locality, and increase the removal of habitats for flora and fauna species, including threatened species. Other developments in the locality would also lead to a reduction in vegetation and habitats. Given the small area of the revised proposal, and large areas of native vegetation present in the locality, cumulative impacts of the revised REF proposal are expected to be negligible overall.

Table 5-2 Total extent of impact from the proposal (revised REF proposal site and EIS proposal site)

Tozer et al (2010) map unit (unit ID)	Status	Revised REF proposal site(ha)	EIS proposal site (ha)	Total cumulative area to be cleared (ha)
Batemans Bay Cycad Forest (WSF p90) (mod-good – high)	Not listed	2.78	0.00	2.78
Batemans Bay Cycad Forest (WSF p90) (mod-good – poor)	Not listed	1.35	0.00	1.35



Tozer et al (2010) map unit (unit ID)	Status	Revised REF proposal site(ha)	EIS proposal site (ha)	Total cumulative area to be cleared (ha)
Floodplain Swamp Forest (FoW p105) (mod-good)	Swamp Oak Floodplain Forest EEC (BC Act)	0.52	0.15	0.82
South Coast River-flat Forest (FoW p30) (mod-good – med)	River-flat Eucalypt Forest on Coastal Floodplains EEC (BC Act)	0.95	0.00	0.95
South Coast River-flat Forest (FoW p30) (mod-good – poor)	River-flat Eucalypt Forest on Coastal Floodplains EEC (BC Act)	2.00	0.01	2.01
South Coast River-flat Forest (FoW p30) (low)	Not listed	0.30	0.00	0.30
Estuarine Mangrove Forest (SL p109) (mod-good)	Key fish habitat (FM Act)	0.13	0.001	0.13
Estuarine Saltmarsh (SL p509) (mod-good)	Coastal Saltmarsh EEC (BC Act) and VEC (EPBC Act)	0.03	0.002	0.03
Murramurang-Bega Lowlands Forest (WSF p86) (mod-good)	Not listed	0.51	0.00	0.51
Southeast Lowland Grassy Woodland (GW e20p229) (mod-good)	Lowland Grassy Woodland of the South east Corner EEC (BC Act) / CEEC (EPBC Act)	0.31	0.05	0.36
Urban native/exotic	n/a	0.01	0.04	0.01
Cleared land	n/a	5.99	0.16	6.15
<b>Total native vegetation</b>		<b>9.13</b>	<b>0.21</b>	<b>9.61</b>

## 6. Impacts on threatened biota and MNES

### 6.1 Impact on State-listed threatened biota

Table 6-1 Summary of potential impacts within revised REF proposal site on threatened biota and assessment of whether a significant impact is likely

Biota type	Communities/Species	Potential impacts within revised REF proposal site	Level of impact	AoS* prepared	Significant impact likely?
Threatened ecological communities	Swamp Oak Floodplain Forest (EEC - BC Act, EEC - EPBC Act)	Removal of 0.52 ha	Low	Yes <sup>1 2</sup>	No
	River-flat Eucalypt Forest (EEC - BC Act)	Removal of 2.95 ha	Moderate	Yes <sup>1</sup>	No
	Coastal Saltmarsh (EEC - BC Act)	Removal of 0.03 ha	Low	Yes <sup>1</sup>	No
	Lowland Grassy Woodland (EEC - BC Act, CEEC - EPBC Act)	Removal of 0.31 ha	Low	Yes <sup>1 2</sup>	No
Woodland birds	Varied Sittella (vulnerable - BC Act)	Removal of known foraging habitat Removal of potential breeding habitat Three individuals recorded in the REF study area	Moderate	Yes <sup>1</sup>	No
Hollow-dependent birds	Glossy Black-cockatoo (vulnerable - BC Act)	Removal of known foraging habitat Removal of potential breeding habitat	Moderate	Yes <sup>1</sup>	No
	Little Lorikeet (vulnerable - BC Act) Gang-gang Cockatoo (vulnerable - BC Act) Powerful Owl (vulnerable - BC Act) Masked Owl (vulnerable - BC Act)	Removal of potential foraging habitat Breeding habitat unlikely to be impacted	Low	No	No
Grey-headed Flying-fox	Grey-headed Flying-fox (vulnerable - BC Act; vulnerable - EPBC Act)	Removal of very small area of known foraging habitat No breeding habitat present	Low	No	No
Hollow-breeding/roosting bats	Eastern False Pipistrelle (vulnerable - BC Act)	Removal of very small area of potential foraging habitat	Moderate	Yes <sup>1</sup>	No
	Eastern Freetail Bat (vulnerable - BC Act)	Removal of potential breeding habitat			

Biota type	Communities/Species	Potential impacts within revised REF proposal site	Level of impact	AoS* prepared	Significant impact likely?
	Greater Broad-nosed Bat (vulnerable - BC Act) Large-footed Myotis (vulnerable - BC Act) Yellow-bellied Sheath-tail-bat (vulnerable - BC Act)				
Cave-breeding bats	Eastern Bentwing Bat (vulnerable - BC Act) Large-footed Myotis (vulnerable - BC Act)	Removal of very small area of known foraging habitat No breeding habitat present Removal of potential roosting habitat	Moderate	No	No
Hollow-dependent arboreal mammals	Brush-tailed Phascogale (vulnerable - BC Act) Greater Glider (vulnerable - EPBC Act) Squirrel Glider (vulnerable - BC Act) Yellow-bellied Glider (vulnerable - BC Act)	Removal of potential foraging habitat Removal of potential breeding habitat Potential reduction in habitat connectivity	Moderate	Yes <sup>1 2</sup>	No
Fish	Australian Grayling (FM Act; vulnerable - EPBC Act)	Impact on migration habitat	Moderate	Yes <sup>2</sup>	No

<sup>1</sup> Assessment of significance under the BC Act (see Appendix B)

<sup>2</sup> Assessment of significance under the BC Act (see Appendix C)



### 6.1.1 Threatened ecological communities

The revised REF proposal would have an impact on four threatened ecological communities:

- Swamp Oak Floodplain Forest (EEC - BC Act, EEC – EPBC Act);
- River-flat Eucalypt Forest (EEC - BC Act);
- Coastal Saltmarsh (EEC - BC Act, VEC – EPBC Act);
- Lowland Grassy Woodland (EEC - BC Act, CEEC - EPBC Act).

The area of each EEC that would be impacted within the revised REF proposal site is provided in Table 6-2. As a precautionary approach, it is assumed that all vegetation present within the revised REF proposal site would be removed in association with the proposal (N.B. excluding the revised REF proposal site [Eastern extension]).

**Table 6-2 Area of threatened ecological communities present within the REF study area and revised REF proposal site.**

Threatened ecological community	Area within REF study area (ha)	Area within approved REF proposal site (ha)	Proposed modification area (ha)	Area within revised REF proposal site
Swamp Oak Floodplain Forest (BC/EPBC Act)	1.80	0.42	0.10	0.52
River-flat Eucalypt Forest (BC Act)	3.71	1.23	1.72	2.95
Coastal Saltmarsh (BC/EPBC Act)	0.79	0.03	0.00	0.03
Lowland Grassy Woodland (BC/EPBC Act)	1.28	0.25	0.06	0.31
<b>Total area of TEC</b>	<b>7.58</b>	<b>1.93</b>	<b>1.88</b>	<b>3.81</b>

Swamp Oak Floodplain Forest occurs on both sides of the Clyde River. The proposal would remove up to 0.52 hectares of this community within the revised REF proposal site (increase of 0.10 ha compared to the approved REF proposal site), mainly for the construction of the eastern bridge approach.

The proposal would remove 2.95 hectares of River-flat Eucalypt Forest within the revised REF proposal site (increase of 1.72 ha compared to the approved REF proposal site) for construction of the eastern bridge approach and for use as a compound site. A large proportion of this River-flat Eucalypt Forest vegetation is in *poor* condition, having been previously cleared for cattle grazing. The remaining area is in *medium* condition, containing a more established regenerating native mid- and over-storey cover, having also been previously cleared for grazing.

The proposed modification will not result in additional impacts upon Coastal Saltmarsh. About 0.03 hectares of Coastal Saltmarsh would be removed within the revised REF proposal site. The affected area forms a portion of a small, isolated and poor condition patch of Coastal Saltmarsh that has been fragmented from the Clyde River estuary by the Kings Highway, but still retains a small degree of tidal influence. Up to 0.31 hectares of Lowland Grassy Woodland would be removed within the revised REF proposal site (increase of 0.06 ha compared to the approved REF proposal site). A large proportion of Lowland Grassy Woodland to be removed, present along the immediate northern roadside verge, is composed of derived grassland with no canopy trees.

Construction activities could also potentially indirectly affect these communities outside of the revised REF proposal site due to weed invasion and edge effects (see Section 5.2.2) as well as areas downstream from erosion and sedimentation (i.e. in the absence of appropriate controls). The impact amelioration measures presented in section 7 of the parent REF BIA report should mitigate against the spread of weeds, sedimentation or other indirect impacts on these EECs. The proposal would remove a relatively minor area of habitat for these EECs within the revised REF proposal site and would not isolate any area of habitat from presently interconnected areas. Based on the consideration of the factors presented in the 5-part test provided in Appendix B, the revised REF proposal is highly unlikely to have a significant adverse effect on the local occurrence of any of these communities.

#### 6.1.2 Threatened fauna species

The proposal would remove known foraging and potential breeding habitat for five threatened species within the revised REF proposal site, and may also remove potential foraging and breeding habitat for a number of other threatened species. The most sensitive fauna species (i.e. focal species) include threatened birds recorded in the REF study area, gliders and the Brush-tailed Phascogale, and threatened bats (see Table 6-1).

The revised REF proposal would remove up to 9.13 hectares of native vegetation (an increase of 4.31 ha compared to the approved REF proposal site), including 4.55 ha of canopied Eucalypt forest (an increase of 2.12 ha compared to the approved REF proposal site) that is foraging habitat for these species. Foraging habitat that would be removed includes stands of *Allocasuarina*, foraging habitat for the Glossy Black-cockatoo, as well as eucalypt forest, which is potential foraging habitat for the Varied Sittella. Both these species were recorded at the revised REF proposal site. Eucalypt forest at the revised REF proposal site also forms potential habitat for gliders, the Brush-tailed Phascogale and a variety of microchiropteran bats. For the Large-footed Myotis, potential habitat includes all areas of canopied Eucalypt forest that occur within 200 m of waterbodies with pools / stretches 3 m or wider, as defined in the OEH Threatened Species Data Collection (OEH 2016c). The revised REF proposal would remove 3.67 ha of canopied Eucalypt forest within 200 m of waterbodies forming potential foraging habitat for the Large-footed (Southern) Myotis. Foraging resources for threatened fauna that would be affected by the revised REF proposal are likely to be only a small proportion of the foraging habitat used by these species in the locality. Large areas of forest are present in adjacent areas, including within Clyde River National Park.

No additional hollow-bearing trees would be removed due to the proposed modification. In total, up to 14 hollow-bearing trees within the revised REF proposal site that may provide roosting or denning habitat for a variety of threatened fauna. These include species such as microchiropteran bats, gliders and the Brush-tailed phascogale. Large forest owls and cockatoos are unlikely to breed in the revised REF proposal site given disturbance levels from the adjacent highway (these species are more likely to desert their nests as a result of noise). Gliders, the Brush-tailed Phascogale and microchiropteran bats are all known to use multiple den/roost sites, and would likely also use hollows outside the revised REF proposal site. Large

areas of forest containing hollow-bearing trees are present in adjacent areas, including within Clyde River National Park. There is a risk, however of mortality of any individuals that may be present at the time of vegetation removal.

The proposal is likely to impact connectivity for gliding mammals (eg Greater Glider, Squirrel Glider and Yellow-bellied Glider), with the proposed modification causing minor increases in this impact due to widening of the proposal site. As described in Section 5.2.1, the Yellow-bellied Glider and Greater Glider can glide about 100 metres, while the Squirrel Glider has a maximum glide of about 50 metres. The existing highway and other nearby roads create a partial barrier to the movement of gliders in the REF study area and surrounds. The realignment of the highway would create a new gap and widen the gap in some locations, such as where the length of the cuttings near the eastern approach to the bridge have been extended. As such, the revised REF proposal would reduce opportunities for gliders to cross the highway. Some gliders may be deterred from attempting to cross the highway, affecting behaviour, and potentially isolating some individuals, while others may be killed attempting to cross the highway. Connectivity may be maintained in locations where the revised REF proposal site narrows, and at the very eastern end of the revised REF proposal site. No population of any of these threatened glider species is likely to become entirely isolated, however some family groups may have their home ranges reduced, and there could be impacts on genetic exchange in some locations.

ELA (2018) found no visual or acoustic evidence of microbat habitation of Nelligen Bridge during their 2018 study and concluded that potential roosting habitat available within the bridge is poor. Demolition of the bridge is unlikely to disrupt potential roosting habitat of the Large-footed Myotis and the Eastern Bentwing Bat. The Eastern Bentwing Bat only breeds in specific caves and no breeding habitat would be impacted.

Assessments of significance pursuant to s73 of the BC Act have been prepared for the species described above (Appendix B). Given the large areas of foraging and/or breeding habitat present in the locality and immediately adjacent to the REF study area, significant impacts are unlikely for these species. A range of mitigation measures are proposed to minimise impacts on these species (see section 7.1 of the parent REF BIA report).

The proposed modification is unlikely to increase impacts on habitat for the Australian Grayling with respect to those previously assessed. Overall, the proposal could have an impact on habitat for the Australian Grayling, which is known to migrate along the Clyde River between cooler upland streams and the ocean. Construction of barriers to fish movement is a major threat to this species. Construction of the new piers and demolition of the old piers would result in local barriers, although the entire width of the river would not be blocked. Construction may increase turbulence and reduce water quality in the short-term which could also create a temporary obstruction to the movement or health of individuals of the species. Construction activities including removal of riparian vegetation would lead to increased siltation or sedimentation, and potentially introduction of pollutants, which may reduce habitat quality for this species. The Australian Grayling spends the majority of its life cycle in upland streams, where there would be no impacts. Impacts would only occur if construction was to occur during the migration of larvae to the ocean (autumn) and juveniles back up to the cooler streams (spring). Individuals are unlikely to spend substantial amount of time in the revised REF proposal site and impacts are thus likely to be temporary. An assessment of significance pursuant to s73 of the BC Act has been prepared for this species (Appendix B). Given that there would be no impact on breeding habitat, impacts are likely to be temporary, and there would be no permanent blockage of fish passage, the proposal is unlikely to have a significant impact on this species. A range of mitigation measures are proposed to minimise impacts of the approved REF proposal on this species (see section 7.1 of the parent REF BIA report).



## 6.2 Impacts on Commonwealth-listed threatened biota

### 6.2.1 Threatened ecological communities

Up to 0.52 hectares of Coastal Swamp Oak (*Casuarina glauca*) Forest (CSOF) would be removed within the revised REF proposal site (an increase of 0.10 ha compared to the approved REF proposal site). This corresponds to <1% of the estimated area of CSOF in the locality based on GIS analysis of Tozer *et al* (2010) mapping and substantial occurrences of CSOF (up to 80 ha) occur within the locality and beyond. The minor proportion of the local occurrence of CSOF that is contained within the revised REF proposal site is unlikely to contain an ecologically significant proportion of any of the individual species that comprise the TEC. There is potential for indirect impacts upon CSOF adjacent to the revised REF proposal site from erosion and sedimentation. Mitigation measures are proposed in section 7 of the parent REF BIA report to minimise the potential for indirect impacts of the proposal (see parent BIA report). Based on the consideration of the factors presented in the EPBC Act assessment of significance provided in Appendix C, the proposal is unlikely to have a significant adverse effect on the community.

No additional impacts on Coastal Saltmarsh will result from the proposed modification. About 0.03 hectares of Coastal Saltmarsh would be removed within the revised REF proposal site (no increase compared to the approved REF proposal site). The affected area forms a portion of a small, isolated and poor condition patch of Coastal Saltmarsh that has been fragmented from the Clyde River estuary by the Kings Highway, but still retains a small degree of tidal influence. Construction works are likely to result in some erosion and sedimentation, which have the potential to affect adjacent downstream areas of this community. Mitigation measures have been proposed in section 7 of the parent REF BIA report to minimise the potential for indirect downstream impacts. Substantially larger areas of the community are to be retained in the REF study area (see Table 6-2). As Coastal Saltmarsh is listed as a vulnerable ecological community under the EPBC Act, the preparation of an assessment of significance pursuant to the EPBC Act significant impact guidelines is not required (DoT 2013).

Up to 0.31 hectares of Lowland Grassy Woodland would be removed within the revised REF proposal site (an increase of 0.06 ha compared to the approved REF proposal site). A large proportion of the Lowland Grassy Woodland to be removed, present along the immediate northern roadside verge, is composed of derived grassland and absent of canopy trees. Better quality vegetation is located adjacent to the revised REF proposal site. There is potential for indirect impacts upon Lowland Grassy Woodland adjacent to the revised REF proposal site from erosion and sedimentation. Mitigation measures are proposed in section 7 of the parent REF BIA report to minimise the potential for indirect impacts of the proposal. Based on the consideration of the factors presented in the EPBC Act assessment of significance provided in Appendix C, the proposal is unlikely to have a significant adverse effect on the community.

River-flat Eucalypt Forest is currently under assessment for listing as a critically endangered ecological community (CEEC) under the EPBC Act. If the River-flat Eucalypt Forest is listed under the EPBC Act, then implications of this prospective listing upon Roads and Maritime policy and guidelines relating to offsetting of biodiversity impacts would also require consideration (see section 7.1).

### 6.2.2 Threatened species

The Greater Glider, recently listed as a vulnerable species under the EPBC Act, was recorded immediately adjacent to the REF study area. This species was assessed in Table 6-1 as having a moderate level of impact, due to the loss of hollow-bearing trees in combination with the loss of a small area of foraging habitat, as well as impacts on connectivity (see discussion on gliders in section 6.1.2). An assessment of significance has been prepared pursuant to the EPBC Act

significant impact criteria (see Appendix C) and determined that the proposal is unlikely to have a significant impact on this species within the revised REF proposal site. A range of mitigation measures are proposed to minimise impacts of the proposal on hollow-dependent fauna.

The likely significance of impacts on the Australian Grayling has been assessed with regard to the EPBC Act Significant Impact Guidelines 1.1 (DotE 2013) (Appendix C). Based on the results of that assessment the proposal is unlikely to have a significant impact on this threatened species.

## 7. Avoid, minimise and mitigate impacts

### 7.1 Biodiversity offset strategy

#### 7.1.1 Offset requirements

The Roads and Maritime *Guideline for Biodiversity Offsets* (2011) was superseded in November 2016 by an updated guideline document (Roads and Maritime 2016). Following advice from Roads and Maritime, the updated offset guideline document is to be utilised to assess offsets required for the revised proposal, and has been applied in Table 7-1 below. It should be noted that, due to changes to the criteria applied under the updated Roads and Maritime offsets guidelines, biodiversity offsets that Roads and Maritime must consider under the proposed modification differ to those previously required under the 2011 offsets policy. Comparisons between offsets required under the two iterations of guidelines is provided in Table 7-1.

In accordance with the guidelines (Roads and Maritime 2016) consideration must be given to providing offsets for the impacts upon:

- Lowland Grassy Woodland,
- 4.55 ha of canopied Eucalypt forest that provides habitat for Commonwealth-listed threatened species (comprising 2.78 ha of Batemans Bay Cycad Forest; 0.95 ha of South Coast River-flat Forest; 0.51 ha of Murramarang-Bega Lowlands Forest; 0.32 ha Southeast Lowland Grassy Woodland), and
- the removal of key fish habitat in the form of mangroves, saltmarsh and seagrasses.

In accordance with the Roads and Maritime (2016) guidelines, a Biodiversity Offset Strategy should be developed for the project when the detailed design has been finalised and final impact areas are known.

As previously noted, River-flat Eucalypt Forest (of which South Coast River-flat Forest forms a component) is currently under assessment for listing as a critically endangered ecological community under the EPBC Act. If the proposal has not been completed, and River-flat Eucalypt Forest is listed under the EPBC Act within that time, then impacts of the proposal upon this vegetation community must be considered under the Act. The implications of this prospective listing would also need to be considered in relation to Roads and Maritime policy and guidelines relating to offsetting of biodiversity impacts. If River-flat Eucalypt Forest is listed as CEEC, impacts at the proposal site would also require offset under part 4 of the 2016 Roads and Maritime offset guidelines (see Table 7-1).

In September 2015, a 'strategic assessment' approval was granted by the Australian Minister for the Environment in accordance with the EPBC Act. Under the strategic assessment, if a significant impact is considered likely on a MNES, impacts must be offset using an endorsed method (e.g. the Framework for Biodiversity Assessment (FBA) (OEH, 2014b)). As discussed in Section 6.2, the revised REF proposal is unlikely to have a significant impact on any MNES.



Table 7-1 Offset requirements, in accordance with the Guideline for Biodiversity Offsets (Roads and Maritime 2016)

Description of activity or proposal	Consider offsets or supplementary measures:	Vegetation / habitat to be impacted (revised REF proposal site)	Offsets or supplementary measures to be considered	Comparison with outcomes under Roads and Maritime (2011) (approved REF proposal site)
1. Activities in accordance with Roads and Maritime Services Environmental assessment procedure: Routine and Minor Works (RTA 2011).	No	n/a	n/a	n/a
2. Works on cleared land, plantations, exotic vegetation where there are no threatened species or habitat present.	No	n/a	n/a	n/a
3. Works involving clearing of vegetation planted as part of a road corridor landscaping program (this includes where threatened species or species comprising listed ecological communities have been used for landscaping purposes)	No	n/a	n/a	n/a
4. Works involving clearing of national or NSW listed critically endangered ecological communities (CEEC)	Where there is any clearing of a CEEC in moderate to good condition	Southeast Lowland Grassy Woodland is listed as <i>Lowland Grassy Woodland in the South East Corner Bioregion</i> EEC under the BC Act and is a CEEC under the EPBC Act. The revised REF proposal would remove 0.31 ha of Moderate-good condition Southeast Lowland Grassy Woodland (increase of 0.06 ha compared to the	Offset or supplementary measures should be considered for the removal of 0.31 ha of Moderate-good condition Southeast Lowland Grassy Woodland CEEC.	Offset previously not required as the patch-size threshold (>4 ha) for the patch of Southeast Lowland Grassy Woodland being impacted was not exceeded.

Description of activity or proposal	Consider offsets or supplementary measures:	Vegetation / habitat to be impacted (revised REF proposal site)	Offsets or supplementary measures to be considered	Comparison with outcomes under Roads and Maritime (2011) (approved REF proposal site)
		approved REF proposal site).		
5. Works involving clearing of nationally listed threatened ecological community (TEC) or nationally listed threatened species habitat	Where clearing >1 ha of a TEC or habitat in moderate to good condition	<p>The Greater Glider and Grey-headed Flying-fox are both listed as vulnerable species under the Commonwealth EPBC Act. Both species were recorded at the REF study area during field survey. Foraging (both species) and breeding (Greater Glider) habitat for these species at the REF study area comprises canopied Eucalypt forest. The revised REF proposal would remove 4.55 ha of canopied Eucalypt forest in Moderate-good condition including 2.78 ha of Batemans Bay Cycad Forest; 0.95 ha of South Coast River-flat Forest; 0.51 ha of Murramarang-Bega Lowlands Forest; 0.32 ha Southeast Lowland Grassy Woodland (increase of 2.18 ha compared to the approved REF proposal site).</p> <p>In addition, the Australian Grayling is listed as a vulnerable species under the Commonwealth EPBC Act. Impacts of the proposal will</p>	<p>Offsets or supplementary measures should be considered for the removal of 4.55 ha of Moderate-good condition canopied Eucalypt forest comprising occupied habitat for the Greater Glider and Grey-headed Flying-fox, as &gt;1 ha of potential habitat is being removed.</p> <p>No habitat offsets for Australian Grayling require consideration. Offset of direct impacts to aquatic habitat is considered under part 9 of the Roads and Maritime offset guidelines below.</p> <p>Offsets for impacts on Coastal Swamp Oak Forest do not require consideration as less than 1 ha of the EEC is to be removed.</p> <p>Offsets for impacts on Coastal Saltmarsh do not require consideration as less than 1 ha of the VEC is to be removed.</p>	Offsets previously not required as the clearing threshold (>5 ha) for the potential threatened species habitat being impacted was not exceeded, nor were the candidate threatened species listed as 'unable to withstand any loss' in the Catchment Management Authority region as defined in the OEH Threatened Species Profile database..

Description of activity or proposal	Consider offsets or supplementary measures:	Vegetation / habitat to be impacted (revised REF proposal site)	Offsets or supplementary measures to be considered	Comparison with outcomes under Roads and Maritime (2011) (approved REF proposal site)
		<p>comprise temporary impacts to fish passage, rather than removal of specific habitat of this species.</p> <p>Floodplain Swamp Forest is listed as <i>Coastal Swamp Oak (Casuarina glauca) Forest</i> EEC under the EPBC Act. The revised REF proposal would remove 0.52 ha of Moderate-good condition Floodplain Swamp Forest (increase of 0.10 ha compared to the approved REF proposal site).</p> <p>Estuarine Saltmarsh is listed as <i>Subtropical and temperate Coastal Saltmarsh</i> VEC under the EPBC Act. The revised REF proposal would remove 0.03 ha of Moderate-good condition Estuarine Saltmarsh (no increase compared to the approved REF proposal site).</p>		
6. Works involving clearing of NSW endangered or vulnerable ecological community	Where clearing > 5 ha or where the ecological community is subject to an SIS	<p>The revised REF proposal would remove:</p> <ul style="list-style-type: none"> <li>0.52 ha of Floodplain Swamp Forest (Swamp Oak Floodplain Forest EEC)</li> </ul>	<p>No consideration of offsets or supplementary measures required as removal of subject TECs does not exceed the 5 ha clearing threshold.</p> <p>Offsets for impacts on these TECs do not require</p>	<p>Consideration of offset previously required for the removal of 1.21 ha of South Coast River-flat Forest EEC as 'threatened ecological communities in moderate to good condition'. Under the proposed modification, 2.95 ha of South Coast River-flat</p>



Description of activity or proposal	Consider offsets or supplementary measures:	Vegetation / habitat to be impacted (revised REF proposal site)	Offsets or supplementary measures to be considered	Comparison with outcomes under Roads and Maritime (2011) (approved REF proposal site)
		<ul style="list-style-type: none"> <li>• 2.95 ha of South Coast River-flat Forest (River-flat Eucalypt Forest EEC)</li> <li>• 0.31 ha of Southeast Lowland Grassy Woodland (Lowland Grassy Woodland CEEC)</li> <li>• 0.03 ha of Estuarine Saltmarsh (Coastal Saltmarsh).</li> </ul>	consideration as less than 5 ha of each TEC (and all TECs combined) is to be removed and none of these ecological communities are subject to an SIS as a result of the proposal.	Forest EEC would require offset if applying Roads and Maritime (2011).
7. Works involving clearing of NSW listed threatened species habitat where the species is a species credit species as defined in the OEH Threatened Species Profile Database (TSPD)	Where clearing > 1ha or where the species is the subject of an SIS	No species credit species were recorded or are presumed present within the proposal site.	No consideration of offsets or supplementary measures required as no species credit species occur.	Offsets not previously required.
8. Works involving clearing of NSW listed threatened species habitat and the species is an ecosystem credit species as defined in OEH's Threatened Species Profile Database (TSPD)	Where clearing > 5ha or where the species is the subject of an SIS	The revised REF proposal would remove 4.55 ha of canopied Eucalypt forest (increase of 2.18 ha compared to the approved REF proposal site).	No consideration of offsets or supplementary measures required as removal of subject habitat does not exceed the 5 ha clearing threshold.	Offsets not previously required.
9. Type 1 or Type 2 key fish habitats (as defined by NSW Fisheries)	Where there is any net loss of habitat	The revised REF proposal would remove about 0.13 ha of Estuarine Mangrove Forest, 0.03 ha of Estuarine Saltmarsh and 0.25 ha of Seagrass Meadows in the revised REF proposal site (increase of 0.07 ha of	Offsets should be considered in relation to the removal of 0.41 ha of key fish habitat in the form of mangroves, saltmarsh and seagrass.	Consideration of offsets previously required for the removal of 0.34 ha of key fish habitat in the form of mangroves, saltmarsh and seagrasses (Roads and Maritime 2017).

Description of activity or proposal	Consider offsets or supplementary measures:	Vegetation / habitat to be impacted (revised REF proposal site)	Offsets or supplementary measures to be considered	Comparison with outcomes under Roads and Maritime (2011) (approved REF proposal site)
		<p>seagrass meadows respectively compared to the approved REF proposal site, no increase for mangroves or saltmarsh).</p> <p>Saltmarsh and seagrass are classified by NSW Fisheries as Type 1 (highly sensitive key fish habitat) and mangroves as Type 2 'key fish habitat' (moderately sensitive key fish habitat) (DPI 2013).</p>	<p>The most appropriate method of calculating any required key fish habitat offset is to be determined in consultation with the Department of Primary Industry (DPI) with reference to DPI (2013).</p>	

## 8. Conclusion

Roads and Maritime proposes to modify a proposal for construction of a new bridge to carry the Kings Highway over the Clyde River at Nelligen by expanding the previously assessed and approved REF proposal site for design purposes and inclusion of an additional ancillary site (proposed modification). Impacts upon biodiversity will increase as a result of the proposed modification. This addendum BIA has been prepared as part of the updated environmental assessment capturing the proposed modification, to support an addendum REF. The approved REF proposal site and proposed modification causing direct impacts upon biodiversity are referred to as the 'revised REF proposal site'. As a result of the revised REF proposal, up to 9.13 hectares of native vegetation would be removed within the revised REF proposal site (increase of 4.31 ha compared to the approved REF proposal site). The majority of this is located along the already disturbed edge of the existing highway, or is adjacent to partially cleared agricultural land. About 5.99 hectares of the revised REF proposal site is developed / cleared land (an increase of 1.64 ha compared to the approved REF proposal site), with vegetation comprising exotic lawn and horticultural species and environmental weeds. These areas contain little native vegetation cover and have limited habitat value for native plants.

The proposal would require the removal of a number of small areas of four TECs listed under the BC Act and/or EPBC Act within the revised REF proposal site (Swamp Oak Floodplain Forest, River-flat Eucalypt Forest, Lowland Grassy Woodland and Coastal Saltmarsh) along the alignment of the new bridge and road approaches, as well as along disturbed edges of the existing Kings Highway. Areas of TEC that will be impacted within the revised REF proposal site are generally small, fragmented and/or heavily modified due to agricultural development. The total area of each TEC impacted under the revised REF proposal, and the increase in impact area under the proposed modification, are documented in section 4.1.2 of this addendum REF BIA.

The proposal would affect potential habitat of 11 threatened fauna species within the revised REF proposal site. Up to 9.13 hectares of native vegetation (an increase of 4.31 ha compared to the approved REF proposal site) that is potential foraging habitat for threatened fauna species such as the Glossy Black-cockatoo, Greater Glider and Eastern Bentwing Bat (among others), and up to 14 hollow-bearing trees (no additional trees compared to approved REF proposal site) that may provide roosting or denning habitat for some species would be removed. Demolition of the bridge is unlikely to remove temporary roosting habitat for some bats as potential resident species were not found roosting or nesting within the bridge during recent targeted surveys.

Assessments of significance pursuant to s7.3 of the BC Act and EPBC Act Significant Impact Guidelines 1.1 have been prepared for the above threatened biota. Given the small area of impact within the revised REF proposal site and large areas of habitat present in the locality and/or immediately adjacent to the REF study area, the proposal is unlikely to have a significant impact on any threatened biota. As such, a species impact statement is not required and no further assessment or approval under the EPBC Act is likely to be required.

In addition, the proposal would have a small direct impact upon protected marine vegetation as listed under the FM Act, including Estuarine Mangrove Forest, Coastal Saltmarsh and Seagrass Meadows within the revised REF proposal site. The total area of each protected marine vegetation type impacted under the revised REF proposal, and the increase in impact area under the proposed modification, are documented in section 4.1.2 of this addendum REF BIA. Potential impacts of the proposal upon biodiversity values within areas of SEPP 14 wetlands have been assessed in a separate biodiversity assessment which informed the approved



proposal EIS (GHD 2016a). There are no additional impacts on coastal wetlands protected under Coastal Management SEPP 2018 due to the proposed modification. Offset requirements associated with removal of marine vegetation (/key fish habitat) are to be considered under the Roads and Maritime *Guideline for Biodiversity Offsets* (RMS 2016).

The proposal would also impact potential habitat for the Australian Grayling, which is known to migrate along the Clyde River between cooler upland streams and the ocean. The proposed modification is unlikely to increase impacts on habitat for the Australian Grayling beyond those previously assessed. The Australian Grayling spends the majority of its life cycle in upland streams, where there would be no impacts. An assessment of significance pursuant to s7.3 of the BC Act and EPBC Act Significant Impact Guidelines 1.1 has been prepared for the Australian Grayling. The revised REF proposal is unlikely to have a significant impact on this species. As such, a species impact statement is not required and no further assessment or approval under the EPBC Act is likely to be required.

A range of mitigation measures have been proposed in section 7 of the parent REF BIA report to ameliorate potential impacts of the proposal on habitat throughout the REF study area, as well as downstream reaches of the Clyde River from erosion and sedimentation (see GHD 2016b). These include provision of no-go zones to protect native vegetation, minimising removal of hollow-bearing trees where possible, fauna management protocols, site-specific erosion and sedimentation management strategies and revegetation following construction.

Roads and Maritime would complete a biodiversity offset strategy to comply with the requirements of the Roads and Maritime offset guidelines (Roads and Maritime 2016) and the DPI (2013) *Policy and guidelines for fish habitat conservation and management*. Roads and Maritime will further liaise with DPI with regard to determining suitable rehabilitation works required to offset impacts on key fish habitat, and whether additional environmental contributions are required.

## 9. References

- Adam P., Urwin N., Weiner P & Sim I. (1985). Coastal Wetlands of New South Wales: A survey and report prepared for the Coastal Council of New South Wales. Coastal Council of NSW. Sydney
- Backhouse, G., Jackson, J. and O'Connor, J. (2008). National Recovery Plan for the Australian Grayling *Prototroctes maraena*. Department of Sustainability and Environment, Melbourne. <https://www.environment.gov.au/resource/national-recovery-plan-australian-grayling-prototroctes-maraena>
- Bamford M, Watkins D, Bancroft W, Tischler G and J Wahl. (2008). Migratory Shorebirds of the East Asian – Australasian Flyway; Population Estimates and Internationally Important Sites. Wetlands International – Oceania. Canberra, Australia.
- BOM (2016a). *Atlas of Groundwater Dependent Ecosystems*, Bureau of Meteorology. <http://www.bom.gov.au/water/groundwater/gde/map.shtml>
- BOM (2016b). Climate Data Online. Bateman's Bay (Catalina Country Club) weather station (069134). Bureau of Meteorology. Accessed at <http://www.bom.gov.au/climate/data/?ref=fr>
- Biosis (2014). Nelligen Bridge Replacement. Preliminary Flora and Fauna Assessment Final Report. Report for URS Australia. Author: B Morrissey Biosis Pty Ltd. Wollongong
- Biosis (2015). Coastal wetland ground 45gglomer for Nelligen River Bridge replacement project in relation to SEPP14 wetlands. Letter to Roads and Maritime Authority, dated 28 October 2015.
- Breen, DA, Avery, RP and Otway, NM (2005). Broadscale biodiversity assessment of marine protected areas in the Batemans Shelf and Twofold Shelf marine bioregions, final report for the NSW Marine Parks Authority.
- Creese RG, Glasby TM, West G and Gallen C (2009). Mapping the habitats of NSW estuaries. Industry & Investment NSW Fisheries Final Report Series 113. Port Stephens, NSW, Australia. <http://www.dpi.nsw.gov.au/research/areas/aquatic-ecosystems/estuarine-habitats-maps>
- Cropper, S.C. (1993). Management of Endangered Plants. Result of a cooperative project between the Department of Conservation, Forests and Lands, Victoria (now the Department of Conservation and Natural Resources) and the Australian Nature Conservation Agency. CSIRO, Victoria.
- DeLacey, Clair., Bell, Stephen., Chamberlain, Steven. And Bossard, Karl. (unknown). *Am I missing critical plant species? – Predicting the likely occurrence of the Leafless Tongue Orchid *Cryptostylis hunteriana**. Funded by the NSW Environmental Trust. Grantee: Australasian Native Orchid Society (ANOS).
- DEC (2004). *Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft)*. New South Wales Department of Environment and Conservation, Hurstville, NSW.
- DECC (2008). NSW Mitchell Landscapes Version 3. NSW Department of Climate Change. Hurstville, NSW.
- DECCW (2010). South Coast Regional Conservation Plan, Department of Environment, Climate Change and Water, Sydney.
- DotE (2010). Directory of Important Wetlands in Australia – Information sheet: Clyde River Estuary – NSW059. Department of the Environment. <http://www.environment.gov.au/cgi-bin/wetlands/report.pl>

DotE (2015a)., Referral guideline for 14 birds listed as migratory species under the EPBC Act. <http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds>

DotE (2015b). EPBC Act Policy Statement 3.21 Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species. <http://www.environment.gov.au/epbc/publications/shorebirds-guidelines>

DotE (2016a). Protected Matters Search Tool. Department of the Environment. Accessed at <http://www.environment.gov.au/arcgis-framework/apps/pmst/pmst.jsf>

DotE (2016b). Species profiles and threats database (SPRAT). Department of the Environment. Accessed at <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

DotE (2016c). Key threatening processes under the EPBC Act. Accessed at <http://www.environment.gov.au/biodiversity/threatened/key-threatening-processes>

DotE (2016d). Directory of Australian Wetlands. Department of the Environment.

DotE (2013). Matters of National Environmental Significance significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia.

DoM (1974). *Metallogenic Map Sheet, 1:250,000 Ulladulla (S1 56-13)*. Published by Geological Survey of NSW, NSW Department of Mines. Compiles by G. McIlveen. First Edition 1974.

DPI (2007). Key fish habitat maps. Department of Primary Industries. Accessed by: <http://www.dpi.nsw.gov.au/fisheries/habitat/publications/protection/key-fish-habitat-maps>

DPI (2013). Policy and guidelines for fish habitat conservation and management, update 2013. Department of Primary Industries. Accessed by: [http://www.dpi.nsw.gov.au/\\_\\_\\_data/assets/pdf\\_file/0009/468927/Policy-and-guidelines-for-fish-habitat.pdf](http://www.dpi.nsw.gov.au/___data/assets/pdf_file/0009/468927/Policy-and-guidelines-for-fish-habitat.pdf)

DPI (2016a). Threatened and protected species records viewer- Sydney Metro CMA. Department of Primary Industries. Accessed by: <http://www.dpi.nsw.gov.au/fisheries/species-protection/records/viewer>

DPI (2016b). Listed threatened species, populations and communities. Department of Primary Industries. <http://www.dpi.nsw.gov.au/fisheries/species-protection/conservation/what-current>

DPI (2016c). NSW WeedWise- Liverpool LGA. Department of Primary Industries. Accessed by: <http://weeds.dpi.nsw.gov.au/>

DPI (2016d). Estuarine habitats. <http://www.dpi.nsw.gov.au/fisheries/habitat/aquatic-habitats/estuarine>

ELA (2018). *Nelligen Bridge Targeted Microbat Surveys*. Prepared for NSW Roads and Maritime Services. Ecological Australia, 7<sup>th</sup> November 2018.

Eyre, T. J. (2002). Habitat preferences and management of large gliding possums in southern Queensland. Ph.D. thesis, Southern Cross University, Lismore.

Forman, R. T. T. and Alexander, L. E. (1998). Roads and their major ecological effects. *Annual Review of Ecology and Systematics* 29: 207-231.

GHD (2016a). *Biodiversity Impact Assessment – Replacement of the Kings Highway bridge of the Clyde River at Nelligen, Draft Report*. Draft report prepared for the Environmental Impact Statement for NSW Roads and Maritime Services. June 2016.

GHD (2016b). *Biodiversity Impact Assessment – Replacement of the Kings Highway bridge of the Clyde River at Nelligen, Draft Report*. Report prepared for the Review of Environmental Factors for NSW Roads and Maritime Services. September 2016.



- GHD (2016c). *Flooding and Operational Water Quality Technical Specialist Study – Replacement of the Kings Highway bridge of the Clyde River at Nelligen, Draft Report*. Draft report produced for NSW Roads and Maritime Services. June 2016.
- Kuginis L., Byrne G., Serov P., Williams J.P., (June 2012). *Risk assessment guidelines for groundwater dependent ecosystems, Volume 3 – Identification of high probability groundwater dependent ecosystems on the coastal plains of NSW and their ecological value*, NSW Department of Primary Industries, Office of Water, Sydney. Accessed at <http://www.water.nsw.gov.au/Water-management/Water-availability/Risk-assessment/Groundwater-dependent-ecosystems/Risk-assessment-guidelines-for-groundwater-dependent-ecosystems>
- Marshall, C (2007). Investigation of the success of artificial roosts for *Myotis macropus* at Koala Beach NSW. The Australasian Bat Society Newsletter 28: 41.
- NPWS (2001). Fauna Key Habitats and Habitat Linkages of Eurobodalla Local Government Area – A Preliminary Investigation. A report commissioned by Eurobodalla Shire Council as part of the Natural Heritage Trust – Coast and Clean Seas Coastal and Marine Planning Program – Eurobodalla Coastal Environment Capacity Planning Project.
- NPWS (2002). *Recovery Plan for the East Lynn Midge Orchid (Genoplesium vernale)*. NSW National Parks and Wildlife Service, Hurstville NSW.
- NSW Scientific Committee (2011). *River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions – endangered ecological community listing, Final Determination*. Proposed Gazettal date: 08/07/11.
- NSW Scientific Committee (2010). *Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions – endangered ecological community listing, Final Determination*. Proposed Gazettal date: 17/12/10.
- NSW Scientific Committee (2007). *Lowland Grassy Woodland in the South East Corner Bioregions – endangered ecological community listing, Final Determination*. Proposed Gazettal date: 10/08/07.
- NSW Scientific Committee (2004). *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions – endangered ecological community listing, Final Determination*. Proposed Gazettal date: 17/12/04.
- NSW Scientific Committee (2004a). *Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions – endangered ecological community listing, Final Determination*. Proposed Gazettal date: 04/06/04.
- OEH (2014a). BioBanking Assessment Methodology 2014. Published by: Office of Environment and Heritage for the NSW Government. September 2014.  
<http://www.environment.nsw.gov.au/resources/biobanking/140661BBAM.pdf>
- OEH (2014b). Framework for Biodiversity Assessment. Published by: Office of Environment and Heritage for the NSW Government, September 2014.
- OEH (2016a). NSW Bionet. The website for the atlas of NSW wildlife, Office of Environment and Heritage. Accessed at <http://www.bionet.nsw.gov.au/>
- OEH (2016b). Threatened Species Profiles. Office of Environment and Heritage. Accessed at <http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx>.
- OEH (2016c). *NSW Vegetation Information System: Classification*. Office of Environment and Heritage, NSW Government. Accessed on 1<sup>st</sup> March 2016 at <http://www.environment.nsw.gov.au/NSWVCA20Prapp/default.aspx>

OEH (2016d). Credit Calculator for Major Projects and Biobanking Operational Manual. Office of Environment and Heritage.

OEH (2017). *Biodiversity Assessment Method*. Published by: Office of Environment and Heritage for the NSW Government. August 2017.

Pennay, M, Law, B, Reinhold, L (2004). Bat calls of New South Wales: Region based guide to the echolocation calls of Microchiropteran bats, NSW Department of Environment and Climate Change, Hurstville.

Pennay, M., Law, B., and Lunney, D. (2011). Review of the Distribution and status of the bat fauna of NSW and the ACT. Pp. 226-256 in *The Biology and Conservation of Australian Bats*, edited by Law., B Eby., P, Lunney., D.

RTA (2009). Use of fauna passage structures on RTA roads. NSW Roads and Traffic Authority.

RTA (2011). Biodiversity Guidelines; Protecting and managing biodiversity on RTA projects. Roads and Traffic Authority, September 2011.

RMS (2011b). Guideline for Biodiversity Offsets, Roads and Maritime Services, November 2011

RMS (2015). Nelligen Bridge Preferred Option Report.

Roads and Maritime (2016). *Guideline for Biodiversity Offsets*. Roads and Maritime Services, 11 November 2016.

Roads and Maritime (2017). *Replacement of the Kings Highway bridge over the Clyde River at Nelligen – Review of Environmental Factors Submissions Report*. February 2017.

SEEC (2016). *Erosion and Sediment Management Report – Replacement of the Kings Highway bridge over the Clyde River at Nelligen*. Prepared on behalf of NSW Roads and Maritime Services by Strategic Environmental and Engineering Consulting, 6 June 2013.

Serov P, Kuginis L, Williams J.P., (May 2012). Risk assessment guidelines for groundwater dependent ecosystems, Volume 1 – The conceptual framework, NSW Department of Primary Industries, Office of Water, Sydney. <http://www.water.nsw.gov.au/Water-management/Water-availability/Risk-assessment/Groundwater-dependent-ecosystems/Risk-assessment-guidelines-for-groundwater-dependent-ecosystems>

Soanes, K., and R. van der Ree. (2009). Highway impacts on arboreal mammals and the use and effectiveness of novel mitigation techniques. Pages 441-451 in P. J. Wagner, D. Nelson, and E. Murray, editors. International Conference on Ecology and Transportation. Duluth, Minnesota, USA.

Soderquist, T. (2008). Brush-tailed Phascogale *Phascogale tapoafata*. Pp 104-106 in *The Mammals of Australia*. Ed R. Strahan. Australian Museum/Reed Books.

Specht, R. L. (1970). Vegetation. Pages 44-67 in Leeper, G.W. (ed.), "Australian Environment", 4<sup>th</sup> edition. Melbourne University Press, Melbourne.

State Environmental Planning Policy No 14—Coastal Wetlands (Amendment No 13)—maps 33 and 38

Taylor, B.D. and Goldingay, R.L. (2009). Can road-crossing structures improve population viability of an urban gliding mammal? *Ecology and Society* 14: 13.

Threatened Species Scientific Committee (2013a). *Commonwealth Conservation Advice for Lowland Grassy Woodland in the South East Corner Bioregion*.

Threatened Species Scientific Committee (2013b). *Commonwealth Conservation Advice for Subtropical and Temperate Coastal Saltmarsh*.

Threatened Species Scientific Committee (2016). *Commonwealth Conservation Advice for Petauroides volans Greater Glider*.

Tozer M, Turner K, Keith D, Tindall D, Pennay C, Simpson C MacKenzie B, Beukers P, and Cox S (2010). Native vegetation of southeast NSW: A revised classification and map for the coast and eastern tablelands.

Traill B and Coates TD (1993). Field observations on the brush-tailed phascogale *Phascogale tapoatafa* (Marsupialia: Dasyuridae), *Australian Mammalogy*, 16, 61-65.

URS (2014). Nelligen Bridge Preliminary Environmental Investigation. Report prepared for Roads and Maritime Services.

WBM Oceanics Australia (2004). Batemans Bay & Clyde River Estuary Management Study. Report prepared for Eurobodalla Shire Council.

Winning G. (1991). Some problems in determining the boundaries of SEPP 14 wetlands. *Wetlands (Australia)* (11)



## Appendices

## Appendix A – Survey results

*Flora species recorded during surveys*

Family	Exotic (*)	Scientific Name	Common Name	Plot (% cover)		
				1	2	3
Apiaceae		<i>Centella asiatica</i>	Indian Pennywort	10	2	2
		<i>Hydrocotyle sibthorpioides</i>		0.5	0.5	0.5
Asteraceae	*	<i>Cirsium vulgare</i>	Spear Thistle		0.5	0.1
		<i>Hypochaeris radicata</i>	Catsear	1	0.5	0.5
Casuarinaceae		<i>Casuarina glauca</i>	Swamp Oak			1
Convolvulaceae		<i>Convolvulus erubescens</i>	Pink Bindweed			0.1
Cyperaceae		<i>Carex appressa</i>	Tall Sedge	3	30	5
		<i>Gahnia melanocarpa</i>	Black Fruit Saw-sedge			3
Dennstaedtiaceae		<i>Hypolepis muelleri</i>	Harsh Ground Fern	1		
		<i>Pteridium esculentum</i>	Bracken	1		25
Fabaceae (Faboideae)		<i>Glycine clandestina</i>	Twining glycine			0.1
		<i>Glycine tabacina</i>	Variable Glycine			0.5
	*	<i>Trifolium repens</i>	White Clover	0.5		
Fabaceae (Mimosoideae)		<i>Acacia mearnsii</i>	Black Wattle	5		25
Geraniaceae		<i>Geranium homeanum</i>				0.5
Juncaceae		<i>Juncus usitatus</i>		5	60	4
Lobeliaceae		<i>Pratia purpurascens</i>	Whiteroot	0.5		1
Lomandraceae		<i>Lomandra longifolia</i>	Spiny-headed Mat-rush			1
Poaceae		<i>Entolasia marginata</i>	Bordered Panic			2
		<i>Microlaena stipoides</i>	Weeping Grass	1	5	20
		<i>Oplismenus aemulus</i>				15
		<i>Cynodon dactylon</i>	Common Couch	65		4
	*	<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	10		15



Family	Exotic (*)	Scientific Name	Common Name	Plot (% cover)		
				1	2	3
		<i>Axonopus fissifolius</i>	Narrow-leafed Carpet Grass	1		
		<i>Aira</i> sp.	A Hairgrass	1	1	
		<i>Paspalum dilatatum</i>	Paspalum		0.1	
		<i>Festuca</i> sp.			0.1	
		<i>Lolium perenne</i>	Perennial Ryegrass			0.1
Polygonaceae		<i>Rumex brownii</i>	Swamp Dock	0.5	3	
Ranunculaceae		<i>Ranunculus inundatus</i>	River Buttercup	1	4	0.5
Rosaceae	*	<i>Rubus fruticosus</i> sp. agg.	Blackberry complex			2
Violaceae		<i>Viola hederacea</i>	Ivy-leaved Violet	1	1	
Oxalidaceae		<i>Oxalis perennans</i>		0.5	0.5	1

## Plot/transect data

### BBAM plot/transect

Vegetation Zone	Veg Type ID	Plot ID	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Exotic plant cover	Number of trees with hollows	Over storey regeneration	Total length of fallen logs
5	SR608	Benchmark	12	15-60	5-20	5-50	2-10	10-80	0	> = 0.2	1	> = 15
		7	8	0	0	12	0	92	5	0	0	0
		9	20	0	24.5	84	0	74	30	0	0	3
13		6	14	0	0	70	0	64	74	0	0	0

### BAM plot

				Composition (species richness)							Structure (% cover)						Function																	
Veg Zone	PCT	Condition	Plot	TG	SG	GG	FG	EG	OG	Total	TG	SG	GG	FG	EG	OG	Large trees	Hollow trees	Litter cover (%)	Fallen logs (m)	Tree DBH 5-10 (cm)	Tree DBH 10-20 (cm)	Tree DBH 20-30 (cm)	Tree DBH 30-50 (cm)	Tree DBH 50-80 (cm)	Tree regen	HTE cover (total)	Zone	Easting	Northing	Bearing			
			Benchmark	4	9	8	9	3	4	37	23	11	36	5	1	1	5		24	36														
5	1108	Mod-good	7	0	0	3	6	0	0	9	0	0	12	11	0	92	0	0	5.4	0.0	N	N	N	N	N	N	2.2	56	241665	6051484	90			
	1108	Mod-good	8	1	1	8	6	1	3	20	1	25	54	5.5	25	0.7	0	0	8.2	3.0	Y	Y	Y	N	N	Y	17.7	56	241591	6051474	90			
13	1108	Low	6	0	1	4	7	2	0	14	0	5	74	14	2	0	0	0	17.8	2.0	N	Y	N	N	N	N	13.5	56	241623	6051504	270			

\*TG=Tree; SG=Shrub; GG=Grass and grass-like; FG=forb; EG=Fern; OG=Other; HTE=High Threat Exotic

## Appendix B – Assessments of significance (EP&A ACT)



### ***Legislative context***

Section 7.3 of the BC Act lists five factors that must be taken into account in the determination of whether a proposed development or activity is likely to significantly affect threatened species or ecological communities (or their habitats) listed under the BC Act. The '5-part test' is used to determine whether an activity is 'likely' to impose 'a significant effect' on threatened biota and thus whether a species impact statement (SIS) is required. Should the 5-part test conclude that a significant effect is likely, an SIS must be prepared.

An assessment of the likely significance of impacts has been prepared for the following biota listed under the BC Act:

#### **Threatened ecological communities**

Lowland Grassy Woodland

Swamp Oak Floodplain Forest

River-flat Eucalypt Forest

Coastal Saltmarsh

#### **Threatened fauna species**

Varied Sittella

Glossy Black-cockatoo

Squirrel Glider

Yellow-bellied Glider

Brush-tailed Phascogale

Eastern Freetail Bat

Eastern False Pipistrelle

Greater Broad-nosed Bat

Yellow-bellied Sheath-tail Bat

Large-footed Myotis

Eastern Bentwing Bat

Australian Grayling.

## Threatened ecological communities

### Lowland Grassy Woodland

South-east Lowland Grassy Woodland is currently known to occur within the Bega Valley, Eurobodalla and Queanbeyan-Palerang Local Government Areas. Major occurrences are found to the west of Batemans Bay, around Moruya, in the Araluen valley, in the Cobargo - Bega – Candelo area, the Towamba Valley and near Tanja. This community is associated with rainshadow areas of the south coast and hinterland of New South Wales. Typically, the community comprises an open tree canopy, a near-continuous groundcover dominated by grasses and herbs, sometimes with layers of shrubs and/or small trees. Undisturbed stands of the community may have a woodland or forest structure. Small trees or saplings may dominate the community in relatively high densities after partial or total clearing. The community also includes 'derived' native grasslands which result from removal of the woody strata from the woodlands and forests. South-east Lowland Grassy Woodland occurs as a narrow band on either side of the highway on the western side of the revised REF proposal site.

#### Assessment of Significance: Lowland Grassy Woodland

**a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,**

Not applicable to this EEC.

**b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

**(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

Construction of the proposal would require the permanent removal of 0.31 hectares of Lowland Grassy Woodland within the revised REF proposal site. This equates to 24% of the total area of the community present within the REF study area. Some additional patches of the community are likely to be present within nearby lowland areas occupied by residential development to the south of the REF study area, however, there are no previous records of the community in the REF study area and its immediate surrounds. Overall, the small area of Lowland Grassy Woodland present within the REF study area is anomalous with the broader distribution of this community type, which occurs inland and south of the locality and beyond. Despite this, given classifications made by previous studies and broadly consistent floristic data collected during the current study, a precautionary approach was taken to the classification of this community. Large contiguous occurrences of the community are present beyond the locality, however, in general this community type has been heavily displaced by agricultural development in these areas.

Habitat within the revised REF proposal site is partially degraded by clearing of canopy vegetation along the road verge, edge effects leading to community structural changes, halted fire regimes and minor weed infestation. A large proportion of the potentially impacted area (40-50%) comprises a 3m wide roadside strip that is cleared of mid-storey and canopy cover, and composed of a relatively diverse cover of herbaceous native understorey species. The vegetation that would be removed from this community is therefore already considerably modified.

Furthermore, a large proportion of the community mapped within the revised REF proposal site - along the northern boundary to the Kings Highway and throughout the areas mapped to the south of the Kings Highway – is composed of a transitional form of the community with Murrumbidgee-Bega Lowlands Forest. The most characteristic examples of the community occur north of the revised REF proposal site and will not be directly impacted by the proposal.

Subsequently, the total area of intact and non-transitional Lowland Grassy Woodland that will be impacted within the revised REF proposal site is likely to be considerably less than 0.31 hectares.

### Assessment of Significance: Lowland Grassy Woodland

Given the already modified condition and transitional nature of the community within the modified REF proposal site, the proposed reduction in extent is not likely to place the local occurrence of the community at any further risk of extinction. Furthermore, given that the broader distribution of Lowland Grassy Woodland occurs inland and to the south of the REF study area, and is separated from the REF study area by large tracts of tall wet/dry sclerophyll forest, the local occurrence of the community would make only a very minor contribution to its viability throughout its range.

**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

Particularly given the transitional nature of the community present within the revised REF proposal site, the proportion of the local population of the TEC that is contained within the revised REF proposal site is unlikely to contain an ecologically significant proportion of any of the individual species that comprise the local occurrence of Lowland Grassy Woodland.

During its operational phase, the proposal could result in edge effects, including weed infestation, and fauna mortalities from vehicle strike. These effects would be similar to those associated with the existing highway and are unlikely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Recommended environmental management measures are likely to mitigate against any substantial effects on the local population of the community outside of the immediate disturbance footprint.

In light of the above considerations, impacts within the revised REF proposal are not likely to remove, modify or fragment a significant proportion of the habitat for this TEC in the locality. The extensive areas of floristically similar vegetation in the REF study area and locality are likely to be sufficient to maintain viable local populations of the species that comprise the TEC as it occurs in the revised REF proposal site. Given the scale and context of the proposal, it is unlikely to modify the composition of any Lowland Grassy Woodland beyond the revised REF proposal site and immediately adjoining areas. As such, impacts of the proposal within the revised REF proposal site are not likely to modify the composition of the TEC in the locality such that any component species would become locally extinct.

**c) in relation to the habitat of a threatened species or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity,**

Construction of the proposal would require the permanent removal of 0.31 hectares of Lowland Grassy Woodland within the revised REF proposal site. This equates to 24% of the total area of the community present within the REF study area. However, considering that habitat within the revised REF proposal site is partially degraded and the transitional nature of the community present within the revised REF proposal site (see question b), the total area of intact and non-transitional Lowland Grassy Woodland that will be impacted by the proposal is likely to be considerably less.

Some additional patches of the community are likely to be present within nearby lowland areas occupied by residential development to the south of the REF study area, however, there are no previous records of the community in the REF study area and its immediate surrounds.

Overall, the small area of Lowland Grassy Woodland present within the REF study area is anomalous with the broader distribution of this community type, which occurs inland and south of the locality and beyond. Despite this, given classifications made by previous studies and broadly consistent floristic data collected during the current study, a precautionary approach was taken to the classification of this community. Large contiguous occurrences of the community are present beyond the locality, however, in general this community type has been heavily displaced by agricultural development in these areas.

Construction activities have the potential to result in indirect impacts upon areas of the TEC outside the revised REF proposal site, such as erosion and increased sedimentation.

During its operational phase, the proposal could result in edge effects, including weed infestation, and fauna mortalities from vehicle strike. These effects would be similar to those associated with the existing highway and are unlikely to substantially and adversely modify the



### Assessment of Significance: Lowland Grassy Woodland

composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Recommended environmental management measures are likely to mitigate against the modification of any additional habitat outside of the revised REF proposal site.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**

The proposal would not directly fragment or isolate any presently interconnected habitat for the community. All vegetation removal within the revised REF proposal site would occur along already disturbed patch edges. The proposal would widen the gap between stands of vegetation created by the existing road corridor by a minor degree, however, this is not likely to substantially alter movements of pollinators or seed dispersal compared to existing habitat condition.

**(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**

Construction of the proposal would require the permanent removal of 0.31 hectares of the TEC within the revised REF proposal site, which equates to 24% of the total area of the community present within the REF study area. However, considering that habitat within the revised REF proposal site is composed of considerably modified narrow roadside strips of transitional Lowland Grassy Woodland, the total area of intact and non-transitional TEC that will be impacted by the proposal is likely to be considerably less. Some additional patches of the community are likely to be present within nearby lowland areas occupied by residential development to the south of the REF study area, however, there are no previous records of the community in the REF study area and its immediate surrounds.

Overall, the small area of Lowland Grassy Woodland present within the REF study area is anomalous with the broader distribution of this community type, which occurs inland and south of the locality and beyond. Despite this, given classifications made by previous studies and broadly consistent floristic data collected during the current study, a precautionary approach was taken to the classification of this community. Large contiguous occurrences of the community are present beyond the locality, however, in general this community type has been heavily displaced by agricultural development in these areas.

Given its small size, considerably modified condition and transitional composition, TEC within the revised REF proposal site is not likely to be important to the long-term survival of the community in the locality.

**d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),**

There is no declared area of outstanding biodiversity value within the study area or locality.

**e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.**

The proposal would directly contribute to the operation of the following KTPs within the revised REF proposal site:

- Clearing of native vegetation – 0.31 hectares of this community would be removed within the revised REF proposal site as a result of this proposal;
- Loss of hollow-bearing trees – up to 3 hollow bearing trees would be removed within the revised REF proposal site from this community as a result of this proposal;
- Removal of dead wood and dead trees – standing and fallen dead timber is present within the revised REF proposal site and would be removed.

The proposal would comprise a relatively minor increase in the operation of these KTPs given the relatively minor magnitude of impacts and the presence of large amounts of native vegetation and habitat resources outside of the revised REF proposal site. The proposed retention and reinstatement of hollow timber and woody debris, as well as installation of nest boxes, would partially mitigate against the operation of these KTPs.

The proposal has the potential to cause or increase the operation of the following KTPs within the revised REF proposal site:

### Assessment of Significance: Lowland Grassy Woodland

- Invasion of plant communities by perennial exotic grasses – the proposal would create disturbed edges through native vegetation and potentially transfer exotic grass propagules;
- Invasion and establishment of exotic vines and scramblers, invasion and establishment of *Lantana camara*, – the proposal has the potential to increase the incidence of weeds;
- Infection of native plants by *Phytophthora cinnamomi* – the proposal would disturb soil within and adjoining native vegetation and potentially transfer fungi spores;
- Infection of frogs by amphibian chytrid causing the disease chytridiomycosis – the proposal would disturb soil within and adjoining native vegetation, wetlands and aquatic habitats and potentially transfer fungi spores.

The proposal would include environmental management measures including specific consideration of potential impacts on soil, water and native vegetation. These measures would mitigate against the operation of these KTPs.

### Conclusion of Assessment of Significance

Based on consideration of the above criteria, the proposal is unlikely to have a significant effect on the local occurrence of Lowland Grassy Woodland within the revised REF proposal site, pursuant to s.7.3 of the BC Act, given:

- The proposal would remove only a small area (0.31 ha) of the TEC within the revised REF proposal site along narrow roadside strips either side of the Kings Highway;
- The total area of intact and non-transitional community that will be impacted by the proposal is likely to be considerably less than 0.31 hectares;
- A large proportion (40-50%) of the TEC present within the revised REF proposal site is cleared of all woody vegetation, and comprised of moderately diverse native herbaceous understorey cover only;
- TEC present within the revised REF proposal site comprises a transitional form of the community with Murramurang-Bega Lowland Forest;
- Substantial contiguous occurrences of the community occur in close proximity to the locality.

## River-flat Eucalypt Forest

River-flat Eucalypt Forest occurs on flats, drainage lines and river terraces of coastal floodplains where flooding is periodic and soils are generally rich in silt, lack deep humic layers and have little or no saline (salt) influence. It occurs south from Port Stephens in the NSW North Coast, Sydney Basin and South East Corner bioregions and is characterised by a tall open canopy layer of eucalypts with variable species composition.

Within the REF study area, South Coast River-flat Eucalypt Forest (a form of River-flat Eucalypt Forest) occurs upon a coastal floodplain on the eastern side of the Clyde River. A large proportion of this community in the revised REF proposal site has been cleared for agricultural purposes, with a more intact regenerating area of the community present along the agricultural area's western edge, adjacent to Swamp Oak Floodplain Forest that occupies the banks of the Clyde River.

## Swamp Oak Floodplain Forest

Swamp Oak Floodplain Forest typically occurs below 20m above sea level on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes on coastal floodplains of NSW. It is associated with grey-black clay-loams and sandy loams, saline or sub-saline groundwater. Its structure is variable from open forests to scrubs or reedlands with scattered trees. The canopy is dominated by *Casuarina glauca* (north of Bermagui) or *Melaleuca ericifolia* (south of Bermagui). The understorey is characterised by frequent occurrences of vines, a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter.

Floodplain Swamp Forest (a form of Swamp Oak Floodplain Forest) occurs on either side of the Clyde River in the REF study area.

Assessment of Significance:	
River-flat Eucalypt Forest (RFEF)	Swamp Oak Floodplain Forest (SOFF)
<b>a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,</b>	
Not applicable to these communities.	
<b>b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:</b>	
<b>(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or</b>	
Construction of the proposal would require the clearing or modification of native vegetation within the revised REF proposal site, including the permanent removal of 2.95 hectares of River-flat Eucalypt Forest (RFEF) within the revised REF proposal site. This clearing is associated with the eastern approach to the new bridge and construction compound sites. Of this area, 2.00 ha (68%) of the TEC has been heavily modified and is in <i>poor</i> condition as a result of previous clearing of the canopy layer and subsequent cattle grazing. The remaining 0.95 ha (32%) of the area of RFEF impacted by the proposal is in <i>medium</i> condition, having also been predominately cleared and grazed, but	Construction of the proposal would require the clearing or modification of native vegetation within the revised REF proposal site, including the permanent removal of 0.52 hectares of Swamp Oak Floodplain Forest (SOFF) within the revised REF proposal site. This clearing comprises a very narrow strip from along the existing highway west of the Clyde River, as well as a section on the eastern bank of the Clyde River.  On the eastern bank of the Clyde River, a contiguous area of SOFF, about equal in size to that present within the REF study area, extends to north of the site.  According to Tozer <i>et al</i> (2010) scattered patches of SOFF occur along the Clyde River



Assessment of Significance:	
River-flat Eucalypt Forest (RFEF)	Swamp Oak Floodplain Forest (SOFF)
retaining higher levels of native species cover including regenerating canopy. According to Tozer <i>et al</i> (2010), substantial areas of RFEF occur on Clyde River flats and associated drainage lines throughout the locality and beyond. Upwards of 200 ha of RFEF are estimated to occur within the locality (Tozer <i>et al</i> 2010). As such, the area of RFEF to be removed in association with the proposal is a very small portion of the local extent of the community.	and its tributaries throughout the locality. Areas of SOFF become more prevalent downstream of the REF study area, whereas this community ceases to occur beyond 5km upstream. Upwards of 80 ha of SOFF are estimated to occur within the locality (Tozer <i>et al</i> 2010). As such, the area of SOFF to be removed in association with the proposal is a very small portion of the local extent of the community.
<p>These minor respective reductions in extent would not threaten the viability or persistence of either TEC in the locality or the region.</p> <p>In the case of RFEF, this is particularly the case when it is considered that the majority of the TEC that is to be removed within the revised REF proposal site is in <i>poor</i> condition, composed predominately of relatively species-poor mixed native-exotic pastureland. Furthermore, remaining areas of RFEF are in <i>medium</i> condition only, comprising a dominant but simplified native understorey with regenerating canopy. <i>Poor</i> condition RFEF throughout the REF study area, and to a lesser extent <i>medium</i> condition occurrences of the TEC, contain only a small proportion of the species that make up the community and would make a negligible contribution to the viability of its local and regional occurrences.</p>	
<b>(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,</b>	
<p>The 2.95 ha of RFEF (0.95 ha <i>medium</i> condition; 2.00 ha <i>poor</i> condition) and 0.52 ha of SOFF to be removed within the revised REF proposal site comprise &lt;1% of the estimated area of each respective TEC in the locality (Tozer <i>et al</i> 2010). The minor proportion of the local population of each TEC that is contained within the revised REF proposal site is unlikely to contain an ecologically significant proportion of any of the individual species that comprise RFEF and SOFF respectively.</p> <p>In the case of RFEF, this is particularly the case when it is considered that the majority of the TEC that is to be removed within the revised REF proposal site is in <i>poor</i> condition, composed predominately of relatively species-poor mixed native-exotic pastureland. Furthermore, remaining areas of RFEF are in <i>medium</i> condition only, comprising a dominant but simplified native understorey with regenerating canopy. <i>Poor</i> condition RFEF throughout the REF study area, and to a lesser extent <i>medium</i> condition occurrences of the TEC, contain only a small proportion of the species that make up the community and would make a negligible contribution to the viability of its local and regional occurrences.</p> <p>The proposal is not likely to remove, modify or fragment a significant proportion of the habitat for either TEC in the locality (refer part d). The extensive areas of floristically similar vegetation in the locality are likely to be sufficient to maintain viable local populations of the species that comprise each TEC. Given the scale and context of the proposal it is unlikely to modify the composition of either TEC beyond the revised REF proposal site and immediately adjoining areas.</p> <p>Standard environmental management measures are likely to mitigate against any potential effects on the local population of these communities that might arise outside of the immediate disturbance footprint.</p> <p>As such, the proposal is not likely to modify the composition of either RFEF nor SOFF in the locality such that any component species would become locally extinct.</p>	
<b>c) in relation to the habitat of a threatened species or ecological community:</b>	
<b>(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity,</b>	
Construction of the proposal would require the permanent removal of 2.95 hectares of River-flat Eucalypt Forest (RFEF) within the revised REF proposal site. This clearing is	Construction of the proposal would require the permanent removal of 0.52 hectares of Swamp Oak Floodplain Forest (SOFF) within the revised REF proposal site. This clearing

Assessment of Significance:	
River-flat Eucalypt Forest (RFEF)	Swamp Oak Floodplain Forest (SOFF)
<p>associated with the eastern approach to the new bridge and construction compound sites. Of this area, 2.00 ha (68%) of the TEC has been heavily modified and is in <i>poor</i> condition as a result of previous clearing of the canopy layer and subsequent cattle grazing. The remaining 0.95 ha (32%) of the area of RFEF impacted by the proposal within the revised REF proposal site is in <i>medium</i> condition, having also been predominately cleared and grazed, but retaining higher levels of native species cover including regenerating canopy.</p> <p>According to Tozer <i>et al</i> (2010), substantial areas of RFEF occur on Clyde River flats and associated drainage lines throughout the locality and beyond. Upwards of 200 ha of RFEF are estimated to occur within the locality (Tozer <i>et al</i> 2010). As such, the area of RFEF to be removed within the revised REF proposal site is a very small portion of the local extent of the community.</p>	<p>comprises a very narrow strip from along the existing highway west of the Clyde River, as well as a section on the eastern bank of the Clyde River.</p> <p>On the eastern bank of the Clyde River, a contiguous area of SOFF, about equal in size to that present within the REF study area, extends to north of the site.</p> <p>According to Tozer <i>et al</i> (2010) scattered patches of SOFF occur along the Clyde River and its tributaries throughout the locality. Areas of SOFF become more prevalent downstream of the REF study area, whereas this community ceases to occur beyond 5km upstream. Upwards of 80ha of SOFF are estimated to occur within the locality (Tozer <i>et al</i> 2010). As such, the area of SOFF to be removed within the revised REF proposal site is a very small portion of the local extent of the community.</p>
<b>(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and</b>	
<p>The proposal would not directly fragment or isolate any presently interconnected RFEF habitat.</p> <p>Removal of <i>medium</i> condition RFEF within the revised REF proposal site would make a very minor contribution to the degree of fragmentation of habitat in the locality by reducing forested connectivity along the northern edge of the existing eastern approach to Nelligen bridge. However, given that the REF study area and Nelligen township are isolated within a surrounding expanse of intact forest land, any impacts to overall habitat connectivity within the locality would be negligible.</p>	<p>The proposal would not directly fragment or isolate any presently interconnected SOFF habitat. Rather, the size of all existing patches of SOFF within the revised REF proposal site would be reduced.</p> <p>West of the Clyde River, very minor increases in the gap between SOFF patches already fragmented by the Kings Highway would occur (i.e in conjunction with minor road widening). This increase would make a negligible contribution to the degree of habitat fragmentation in the locality. This is particularly the case given the existing fragmentation and small size of these patches.</p>
<b>(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,</b>	
<p>The 2.95 ha of RFEF (0.95 ha <i>medium</i> condition; 2.00 ha <i>poor</i> condition) and 0.52 ha of SOFF to be removed within the revised REF proposal site comprise &lt;1% of the estimated area of each respective TEC in the locality (Tozer <i>et al</i> 2010).</p> <p>This minor proportion of the local population of each TEC that is contained within the revised REF proposal site is unlikely to contain an ecologically significant proportion of any of the individual species that comprise RFEF and SOFF respectively. In the case of RFEF, the majority of the TEC that is to be removed within the revised REF proposal site is in <i>poor</i> condition (2.00 ha), composed predominately of relatively species-poor mixed native-exotic pastureland. Furthermore, remaining areas of RFEF are in <i>medium</i> condition only (0.95 ha), comprising a dominant but simplified native understorey with regenerating canopy. <i>Poor</i> and <i>medium</i> condition RFEF throughout the REF study area contain only a small proportion of the species that comprise TEC and would make a very minor contribution to the viability of its local and regional occurrences. As such, the area of each TEC to be removed within the revised REF proposal site is a very small portion of the local extent of the community.</p>	

Assessment of Significance:	
River-flat Eucalypt Forest (RFEF)	Swamp Oak Floodplain Forest (SOFF)
<p>The REF study area and Nelligen township are isolated within a surrounding expanse of intact forest and riparian lands. The about 200 ha of RFEF and 80 ha of SOFF that are estimated to occur in the locality (Tozer <i>et al</i> 2010) occur upon a mix of privately owned and State Forest land, with areas of private ownership comprising a mix of developed and forested land. A relatively low proportion of these TECs occur within protected lands. All extant areas of each TEC are considered as forming an important contribution to each community in the locality. Despite this, the proposal is not likely to remove, modify, fragment or isolate a significant proportion of the habitat for either TEC within the revised REF proposal site such that their long-term survival in the locality is threatened (refer part c). The extensive areas of floristically similar vegetation in the locality are likely to be sufficient to maintain viable local populations of the species that comprise each TEC. Given the scale and context of the proposal it is unlikely to modify the composition of either TEC beyond the revised REF proposal site and immediately adjoining areas. Standard environmental management measures are likely to mitigate against any potential effects on the local population of these communities that might arise outside of the immediate disturbance footprint.</p>	
<p><b>d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),</b></p> <p>There is no declared area of outstanding biodiversity value within the study area or locality.</p>	
<p><b>e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.</b></p> <p>The proposal would directly contribute to the operation of the following KTPs within the revised REF proposal site:</p> <ul style="list-style-type: none"> <li>Clearing of native vegetation – 2.95 hectares of River-flat Eucalypt Forest (0.95 ha <i>medium</i> condition; 2.00 ha <i>poor</i> condition) and 0.52 of Swamp Oak Floodplain Forest would be removed within the revised REF proposal site as a result of the proposal;</li> <li>Removal of dead wood and dead trees – standing and fallen dead timber is present within the revised REF proposal site and would be removed.</li> </ul> <p>The proposal would comprise a relatively minor increase in the operation of these KTPs given the relatively minor magnitude of impacts and the presence of relatively large amounts of native vegetation and habitat resources outside of the revised REF proposal site. The proposed retention and reinstatement of hollow timber, woody debris and nest boxes would partially mitigate against the operation of these KTPs.</p> <p>The proposal has the potential to cause or increase the operation of the following KTPs within the revised REF proposal site:</p> <ul style="list-style-type: none"> <li>Invasion of plant communities by perennial exotic grasses – the proposal would create disturbed edges through native vegetation and potentially transfer exotic grass propagules;</li> <li>Invasion and establishment of exotic vines and scramblers, invasion and establishment of <i>Lantana camara</i> – the proposal has the potential to increase the incidence of weeds;</li> <li>Infection of native plants by <i>Phytophthora cinnamomi</i> - the proposal would disturb soil within and adjoining native vegetation and potentially transfer fungi spores;</li> <li>Infection of frogs by amphibian chytrid causing the disease chytridiomycosis - the proposal would disturb soil within and adjoining native vegetation, wetlands and aquatic habitats and potentially transfer fungi spores.</li> </ul> <p>The proposal would include environmental management measures including specific consideration of potential impacts on soil, water and native vegetation. These measures would mitigate against the operation of these KTPs.</p>	
<p><b>Conclusion of Assessment of Significance</b></p> <p>Based on consideration of the above criteria, the proposal is unlikely to have a significant impact upon the local occurrence of River-flat Eucalypt Forest or Swamp Oak Floodplain Forest within the revised REF proposal site, pursuant to s.7.3 of the BC Act, given:</p>	



## Assessment of Significance:

### River-flat Eucalypt Forest (RFEF)

### Swamp Oak Floodplain Forest (SOFF)

- The proposal would remove <1% of the estimated area of RFEF in the locality (Tozer *et al* 2010);
- A large proportion of RFEF to be removed within the revised REF proposal site (68%) is in *poor* condition, having been cleared of all woody vegetation and heavily modified as a result of previous clearing and subsequent cattle grazing;
- The proposal would remove <1% of the estimate area of SOFF in the locality (Tozer *et al* 2010);
- Substantial occurrences of RFEF (up to 200ha) and SOFF (up to 80ha) occur within the locality and beyond;
- The minor proportion of the local population of each TEC that is contained within the revised REF proposal site is unlikely to contain an ecologically significant proportion of any of the individual species that comprise each TEC.

## Coastal Saltmarsh

Coastal Saltmarsh occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. It is frequently found as a zone on the landward side of mangrove stands. Characteristic plants include *Baumea juncea*, Sea Rush (*Juncus kraussii* subsp. *australiensis*), Samphire (*Sarcocornia quinqueflora* subsp. *quinqueflora*), Marine Couch (*Sporobolus virginicus*), Streaked Arrowgrass (*Triglochin striata*), Knobby Club-rush (*Ficinia nodosa*), Creeping Brookweed (*Samolus repens*), Swamp Weed (*Selliera radicans*), Seablite (*Suaeda australis*) and Prickly Couch (*Zoysia macrantha*). Coastal Saltmarsh was recorded within the REF study area, on the western side of the Clyde River, associated with mangroves and swamp forest.

### Assessment of significance: Coastal Saltmarsh

**a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,**

Not applicable to this threatened community.

**b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

**(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

Construction of the proposal would require the clearing or modification of native vegetation within the revised REF proposal site, including the permanent removal of a maximum of 0.03 hectares of Coastal Saltmarsh (CS) within the revised REF proposal site. This clearing is associated with upgrade to the western road approach to the new bridge. The entire of the affected area occurs within an about 500m<sup>2</sup> patch of marginal and species poor Coastal Saltmarsh community which is fragmented from the estuarine intertidal zone by the Kings Highway, with minor tidal influence being maintained via a road culvert.

An additional 3.5 ha area of Coastal Saltmarsh occurs on the eastern bank of the Clyde River, immediately north of the REF study area. According to Tozer *et al* (2010), up to 50 ha of Coastal Saltmarsh occur within the Clyde River intertidal zone, predominately downstream of the REF study area. As such, the area of Coastal Saltmarsh to be removed within the revised REF proposal site forms a negligible portion of the local extent of the community (0.02%). Furthermore, the impact area comprises a marginal, species poor example of the TEC and contains only a small proportion of the species that make up the community.

This negligible reduction in extent of Coastal Saltmarsh would not threaten the viability or persistence of the TEC such that its local occurrence is likely to be placed at risk of extinction.

**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

Construction of the proposal would require the permanent removal of a maximum of 0.03 ha of marginal and species poor Coastal Saltmarsh within a small fragmented patch of the TEC within the revised REF proposal site. This represents 0.02% of the TEC present within the locality (Tozer *et al* 2010). Coastal Saltmarsh present within the revised REF proposal site would contain only a very small proportion of the species that make up the community and would make a negligible contribution to the viability of its local and regional occurrences. The extensive areas of floristically similar vegetation in the locality are likely to be sufficient to maintain viable local populations of the species that comprise the TEC.

Indirect impacts including sedimentation and erosion have the potential to impact adjacent areas of Coastal Saltmarsh if not suitably mitigated. Standard environmental management measures are likely to mitigate against any potential effects on the local population of the community that might arise outside of the immediate disturbance footprint.

Given the above considerations, the proposal is not likely to substantially and adversely modify the composition of the ecological community within the revised REF proposal site such that its local occurrence is likely to be placed at risk of extinction.

**c) in relation to the habitat of a threatened species or ecological community:**

## Assessment of significance: Coastal Saltmarsh

### (i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity,

Construction of the proposal would require the permanent removal of a maximum of 0.03 ha of marginal and species poor Coastal Saltmarsh within a small fragmented patch of the TEC within the revised REF proposal site. This represents 0.02% of the TEC present within the locality (Tozer *et al* 2010). The entire of the affected area occurs within an about 500m<sup>2</sup> patch which retains only minor tidal influence, maintained via a road culvert.

Indirect impacts of the proposal, including sedimentation and erosion, have the potential to impact adjacent areas of Coastal Saltmarsh if not suitably managed. Standard environmental management measures are likely to mitigate against any potential effects on the local population of the community that might arise outside of the immediate disturbance footprint.

### (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

The proposal would not directly fragment or isolate any presently interconnected areas of Coastal Saltmarsh TEC. The affected area occurs within an about 500m<sup>2</sup> patch of marginal and species poor Coastal Saltmarsh community which is fragmented from the estuarine intertidal zone by the Kings Highway, with minor tidal influence being maintained via a road culvert.

A very minor increase in the gap between the impacted area of Coastal Saltmarsh and the estuary intertidal zone north of the Kings Highway would occur in conjunction with minor road widening. This increase would make a negligible contribution to the degree of habitat fragmentation in the locality.

### (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

The small area of Coastal Saltmarsh to be removed within the revised REF proposal site comprises a marginal and species-poor example of the community. The impacted area would make only a very minor contribution to the viability of the local occurrence of the community and provide only a very minor area of marginal potential habitat.

### d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

There is no declared area of outstanding biodiversity value within the study area or locality.

### e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The proposal would directly contribute to the operation of the following KTPs within the revised REF proposal site:

- Clearing of native vegetation – up to 0.03 ha of marginal and species-poor Coastal Saltmarsh would be removed within the revised REF proposal site.

The proposal has the potential to cause or increase the operation of the following KTPs within the revised REF proposal site:

- Invasion of plant communities by perennial exotic grasses – the proposal would create disturbed edges through native vegetation and potentially transfer exotic grass propagules

A range of mitigation measures are recommended to minimise the risk of these KTPs affecting Coastal Saltmarsh.

## Conclusion of Assessment of Significance

The proposed development is unlikely to result in a significant impact on Coastal Saltmarsh EEC pursuant to section 7.3 of the BC Act given that:

- The proposal would require the removal of only a very small area of the TEC (0.03 ha) within the revised REF proposal site;
- The entire of the impacted area occurs within an about 500m<sup>2</sup> patch of marginal and species poor Coastal Saltmarsh community which is fragmented from the estuarine intertidal zone by the Kings Highway;
- The vegetation to be removed equates to 0.02% of the TEC that occurs within the locality.



### Assessment of significance: Coastal Saltmarsh

Mitigation measures are proposed to minimise indirect impacts on this community.

## Threatened fauna species

### Glossy Black-cockatoo

Glossy Black-cockatoos require suitable hollows in large, old eucalypt trees (living or dead) for nesting. There is a tendency for Glossy Black-cockatoos to nest in the same areas as other nesting pairs, sometimes even sharing the same nest tree (NPWS, 1999a). Roost sites are usually within 1 kilometre of a reliable water source and, during the breeding season, tend to be within 30 metres of a nesting tree (Garnett et al., 1999). The species is gregarious, usually recorded in family parties of up to 10. Locally nomadic, small flocks roam in search of feeding areas (NPWS, 1999b).

Glossy Black-cockatoos are highly specialised, feeding almost exclusively on the seeds extracted from the wooden cones of species of *Allocasuarina* and *Casuarina* (DECCW 2011). The cockatoos are highly selective with respect to both the trees and the cones on which they choose to forage, often showing fidelity to particular trees. Glossy Black-cockatoos prefer trees carrying a large number of cones (Pepper *et al.* 2000), in part because they appear to select feeding trees primarily on the basis of optimizing kernel intake (Crowley and Garnett, 2006).

#### Glossy Black Cockatoo

**a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,**

Chewed cones of *Allocasuarina littoralis* (feeding signs of Glossy Black-cockatoos) were observed in at a number of locations in the REF study area within Bateman's Bay Cycad Forest. The proposal would remove narrow strips of foraging habitat from alongside the existing highway within the revised REF proposal site. Much of this vegetation community is in mod-good poor condition as a result of the overstorey being removed for an electricity easement. In total, about 3.60 ha of vegetation includes foraging habitat for this species. Large areas of better quality foraging habitat are present in surrounding areas and would not be impacted by the proposal.

The proposal would remove up to 14 hollow-bearing trees within the revised REF proposal site of which a small subset could have suitable hollows for this species. The location of these hollow-bearing trees immediately adjacent to the existing highway may make them less desirable for this species, which is more likely to nest in tree hollows within larger patches of vegetation and away from disturbances including vehicles and domestic dogs and cats.

Given the large area of protected habitat present in the locality, the small area of foraging habitat to be removed, and the low quality of potential breeding habitat present, the proposal is unlikely to impact the lifecycle of the species such that a viable local population is placed at risk of extinction.

**b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

**(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

Not applicable to this threatened fauna species

**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

Not applicable to this threatened fauna species

**c) in relation to the habitat of a threatened species or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity,**

About 3.60 hectares of forest containing stands of *Allocasuarina* trees (foraging habitat) would be removed within the revised REF proposal site as a result of this proposal. Up to 14 hollow-bearing trees would be removed, although as discussed above this species is unlikely to nest in the revised REF proposal site.

## Glossy Black Cockatoo

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**

Fragmentation from existing roads, easements, residential areas and agricultural practices is already present. The proposal comprises removal of mainly narrow strips of vegetation from along the edges of the existing highway within the revised REF proposal site. No areas of vegetation would become isolated as a result of the proposal, however the proposal would increase fragmentation in the locality to a small degree. Given the mobility of Glossy Black-cockatoo, these additional gaps in the tree canopy are not likely to affect the viability of the local population of this species.

**(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**

Only small areas of woodland containing *Allocasuarina* trees would be cleared as a result of the proposal. Given the large areas of better quality habitat present in adjacent areas including within Benandarah State Forest and Clyde River National Park, the habitats in the REF study area are not considered important for this species.

**d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),**

There is no declared area of outstanding biodiversity value within the study area or locality.

**e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.**

The proposal would directly contribute to the operation of the following KTPs within the revised REF proposal site:

- Clearing of native vegetation – 3.60 hectares of forest would be removed within the revised REF proposal site as a result of this proposal.
- Loss of hollow-bearing trees – up to 14 hollow-bearing trees would be removed within the revised REF proposal site as a result of this proposal. It is unlikely that this species would nest in the revised REF proposal site.

The proposal has the potential to introduce or increase the operation of the following KTPs within potential habitat through soil disturbance and increased visitation within the revised REF proposal site:

- Infection of native plants by *Phytophthora cinnamomi*.
- Invasion and spread of weeds

Native vegetation is already subject to weed invasion from adjoining agricultural and residential areas. The proposal is unlikely to influence the introduction or further spread of exotic species within the revised REF proposal site, given their dominance throughout the REF study area in the understorey of most occurrences of native vegetation.

Mitigation measures to minimise indirect impacts would be included in the CEMP (see section 7.1 of the parent REF BIA report).

### Conclusion of Assessment of Significance

On consideration of the above criteria, the proposal is unlikely to have a significant effect on the Glossy Black-cockatoo pursuant to s7.3 of the BC Act as:

- Only 3.60 ha of foraging habitat would be removed;
- No areas of habitat would become isolated;
- While 14 hollow-bearing trees would be removed within the revised REF proposal site the species is unlikely to nest in these given their proximity to the highway;
- Large areas of habitat occur in the locality.



### Varied Sittella

The Varied Sittella occurs in eucalypt forests and woodlands, nesting in the tree canopy. The Varied Sittella's nest is a deep open cup of bark and spider web, decorated on the outside with long pieces of bark to look like the fork or branch where it is placed. This species usually breeds cooperatively, with the breeding pair having several helpers. They will sometimes also breed in single pairs. Only the breeding female incubates the eggs and broods the young, although all help to feed the young (Higgins and Peter, 2002).

The Varied Sittella inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticated bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy.

A group of three Varied Sittellas were observed foraging in the canopy of the REF study area, with Batemans Bay Cycad Forest.

#### Varied Sittella (Vulnerable)

**a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,**

A group of three Varied Sittellas were observed foraging in the canopy of the REF study area, with Batemans Bay Cycad Forest. This species may also forage elsewhere in the revised REF proposal site. The proposal would remove up to 4.55 ha of potential foraging and nesting habitat for this species (canopied eucalypt forest) within the revised REF proposal site, as well as 0.95 ha of vegetation containing scattered canopy trees. Large areas of better quality habitat are present in adjacent areas including within Benandarah State Forest and Clyde River National Park. Given the small area of potential habitat to be removed within the revised REF proposal site, the large tracts of habitat in the locality, and lack of limiting resources in the revised REF proposal site, the proposal is unlikely to affect the lifecycle of the species such that a viable local population would be placed at the risk of extinction.

**b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

**(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

Not applicable to this threatened fauna species

**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

Not applicable to this threatened fauna species.

**c) in relation to the habitat of a threatened species or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity,**

The proposal would remove up to 4.55 ha of potential foraging and nesting habitat for this species (canopied eucalypt forest) within the revised REF proposal site, as well as 0.95 ha of vegetation containing scattered canopy trees. No limiting resources would be removed within the revised REF proposal site. The removal of vegetation along the existing highway would create a new edge and may result in additional edge effects which may modify the vegetation along the new edge. Given the existing edge effects, these additional impacts are likely to be minor.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**

Fragmentation from existing roads, easements, residential areas and agricultural practices is already present. The proposal comprises removal of mainly narrow strips of vegetation from along the edges of the existing highway within the revised REF proposal site. No areas of vegetation would become isolated as a result of the proposal, however the proposal would

### **Varied Sittella (Vulnerable)**

increase fragmentation in the locality to a small degree. Given the mobility of Varied Sittella, these additional gaps in the tree canopy are not likely to affect the viability of the local population of this species.

#### **(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**

Foraging habitat for Varied Sittellas is present in forested areas of the revised REF proposal site and it is likely that Varied Sittellas feed regularly in the revised REF proposal site, but would not depend solely on these foraging habitats. It is also possible that individuals could breed in the revised REF proposal site and in the surrounding areas. Large areas of better quality habitat are present in adjacent areas including within Benandarah State Forest and Clyde River National Park. Given the presence of large areas of intact forest habitat in surrounding areas, and that habitat to be removed within the revised REF proposal site is located mostly along the edge of the highway, the habitat to be removed is not considered important for this species in the locality.

#### **d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),**

There is no declared area of outstanding biodiversity value within the study area or locality.

#### **e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.**

The proposal would directly contribute to the operation of the following KTPs within the revised REF proposal site:

- Clearing of native vegetation – the proposal would remove up to 4.55 ha of potential foraging and nesting habitat for this species (canopied eucalypt forest) within the revised REF proposal site, as well as 0.95 ha of vegetation containing scattered canopy trees.
- Loss of dead wood and dead trees - dead wood and dead trees would be removed as a result of the proposal.

The proposal has the potential to introduce or increase the operation of the following KTPs within potential habitat through soil disturbance and increased visitation within the revised REF proposal site:

- Infection of native plants by *Phytophthora cinnamomi*.
- Invasion and spread of weeds.

Native vegetation is already subject to weed invasion from adjoining agricultural and residential areas. The proposal is unlikely to influence the introduction or further spread of exotic species, given their dominance throughout the REF study area in the understorey of most occurrences of native vegetation.

Mitigation measures to minimise indirect impacts would be included in the CEMP (see section 7.1 of the parent REF BIA report).

### **Conclusion of Assessment of Significance**

On consideration of the above criteria, the proposal is unlikely to have a significant effect on the Varied Sittella pursuant to s7.3 of the BC Act as:

- Only 4.55 ha of foraging and nesting habitat for this species (canopied eucalypt forest) within the revised REF proposal site, as well as 0.95 ha of vegetation containing scattered canopy trees would be removed
- Large areas of habitat occur in the locality
- No areas of habitat would become isolated
- While 14 hollow-bearing trees would be removed within the revised REF proposal site the species is unlikely to nest in these given their proximity to the highway and presence of better quality habitat in nearby areas.

### ***Squirrel Glider***

The Squirrel Glider requires abundant tree hollows for refuge and nest sites, with family groups utilising a number of hollows within their home range (OEH, 2016b). Hollows used by Squirrel Gliders are small (about 5 centimetres diameter). They live in family groups of 2-10 individuals (Quin, 1995) and maintain home ranges of 0.65 and 10.5 hectares, varying according to habitat quality and food resource availability (Quin, 1995; Goldingay and Jackson 2004).

The Squirrel Glider requires a mix of eucalypts, banksias and acacias for foraging (OEH, 2016b). In the central coast, it has been found to prefer woodlands with an overstorey of winter-flowering eucalypts (such as Spotted Gum, Swamp Mahogany and Forest Red Gum) or an understorey of winter-flowering banksias or pinnate-leaved acacias (Smith and Murray, 2003). Its diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein (OEH, 2016b).

The Squirrel Glider was not recorded during surveys, but is known to occur in the locality.

### ***Yellow-bellied Glider***

Yellow-bellied Gliders live in small family groups, with actual numbers varying between locations (NPWS, 2003). In south coast of NSW, breeding systems alternate between monogamy and polygyny and groups may contain up to six individuals (Russell, 1984; Goldingay, 1992). A single young is usually produced each year, but breeding may sometimes occur in alternate years (Goldingay and Kavanagh 1990). Population densities of the Yellow-bellied Glider are generally low, occurring in densities of between 0.1-0.16 individuals per hectare on the south coast of NSW. Yellow-bellied Glider family groups occupy large home ranges of about 20-85 hectares (Goldingay, 1992) which are exclusive to a single family group (Goldingay, 1994). Yellow-bellied Gliders typically occupy tall, large diameter trees with large hollows, with family groups using up to 13 den trees within their home range (Goldingay and Kavanagh, 1990).

The Yellow-bellied Glider was not recorded during surveys, but is known to occur in the locality.

### ***Brush-tailed Phascogale***

Brush-tailed Phascogales prefer dry sclerophyll open forest with a sparse groundcover of herbs, grasses, shrubs or leaf litter, but have also been recorded in heath, swamps, rainforest and wet sclerophyll forest (OEH 2016b). Brush-tailed Phascogales nest in tree hollows with entrances about 2.5 – 4 cm wide, and use as many as 30 different nest sites each year (Traill and Coates 1993; Soderquist 2008). Distribution of individuals throughout an area is very sparse (Soderquist 2008). In forest areas, female Brush-tailed Phascogales have territories of about 20 - 40 ha which do not overlap with unrelated females, while male home ranges (often greater than 100 ha) overlap extensively with both females and other males (Traill and Coates 1993; Soderquist 2008).

The Brush-tailed Phascogale was not recorded during surveys, but is known to occur in the locality.



Squirrel Glider, Yellow-bellied Glider (Vulnerable)	Brush-tailed Phascogale (Vulnerable)
<b>a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,</b>	
<p>It is possible that a small number of Squirrel Glider and Yellow-bellied Glider family groups could utilise the REF study area. Of the 14 hollow-bearing trees that would be removed within the revised REF proposal site, a subset could be used by these family groups for denning, depending on the size of the trees and the hollows. A family group would be likely to use hollows both within and outside the revised REF proposal site, given the distribution of hollow-bearing trees and suitable hollows. These family groups would be part of a wider local population that would occur throughout the extensive tracts of vegetation in the locality.</p> <p>The proposal would reduce opportunities for gliders to cross the highway. Some gliders may be deterred from attempting to cross the highway, affecting behaviour, and potentially isolating some individuals, while others may be killed attempting to cross the highway. Connectivity may be maintained in locations where the revised REF proposal site narrows, and at the very eastern end of the revised REF proposal site. No population of any of these threatened glider species is likely to become entirely isolated, however some family groups may have their home ranges reduced, and there could be localised impacts on genetic exchange.</p>	<p>The Brush-tailed Phascogale may forage and breed in the REF study area. Of the 14 hollow-bearing trees that would be removed within the revised REF proposal site, a subset could be used by individuals of this species for nesting, depending on the size of the trees and the hollows. Individuals would be likely to use hollows both within and outside the revised REF proposal site, given the distribution of hollow-bearing trees and suitable hollows. These individuals would be part of a wider local population that would occur throughout the extensive tracts of vegetation in the locality.</p>
<p>The proposal would remove up to 4.55 ha of canopied forest and 1.35 ha of shrubland (modified Bateman's Bay Cycad Forest) within the revised REF proposal site that represents potential foraging habitat for these species. Most potential habitat to be removed within the revised REF proposal site occurs along the existing highway and is already subject to disturbance. Large areas of better quality habitat are present in adjacent areas including within Benandarah State Forest and Clyde River National Park.</p> <p>Given the large areas of habitat present in the locality, likely high density of hollow-bearing trees in surrounding habitat, location of the majority of clearing along the edge of the existing highway, the proposal is unlikely to impact the lifecycle of these species such that a viable local population is placed at risk of extinction.</p>	
<b>b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:</b>	
<b>(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or</b>	
Not applicable to this threatened fauna species	
<b>(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,</b>	
Not applicable to these threatened fauna species.	
<b>c) in relation to the habitat of a threatened species or ecological community:</b>	
<b>(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity,</b>	
The proposal would remove up to 4.55 ha of canopied forest and 1.35 ha of shrubland (modified Bateman's Bay Cycad Forest) within the revised REF proposal site that represents potential foraging habitat for these species. Up to 14 hollow-bearing trees would be removed within the revised REF	

Squirrel Glider, Yellow-bellied Glider (Vulnerable)	Brush-tailed Phascogale (Vulnerable)
<p>proposal site from along the edge of the existing highway. Large areas of better quality habitat are present in adjacent areas including within Benandarah State Forest and Clyde River National Park. The removal of vegetation along the existing highway would create a new edge and may result in additional edge effects which may modify the vegetation along the new edge. Given the existing edge effects, these additional impacts are likely to be minor.</p>	
<p><b>(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and</b></p>	
<p>Gliders are likely to cross the highway on occasion, as sections of it are within the glide distance of these species. The existing highway and other nearby roads create a partial barrier to the movement gliders in the REF study area and surrounds. The realignment of the highway would create a new gap and widen the gap in some locations, such as where the length of the cuttings near the eastern approach to the bridge have been extended. As such, the proposal would reduce opportunities for gliders to cross the highway. Some gliders may be deterred from attempting to cross the highway, affecting behaviour, and potentially isolating some individuals, while others may be killed attempting to cross the highway. Connectivity may be maintained in locations where the revised REF proposal site narrows, and at the very eastern end of the revised REF proposal site. No population of any of these threatened glider species is likely to become entirely isolated, however some family groups may have their home ranges reduced, and there could be localised impacts on genetic exchange.</p>	<p>Fragmentation from existing roads, easements, residential areas and agricultural practices is already present. The proposal comprises removal of mainly narrow strips of vegetation from along the edges of the existing highway within the revised REF proposal site. No areas of vegetation would become isolated as a result of the REF proposal, however the proposal would increase fragmentation in the locality to a small degree. These additional gaps in the tree canopy are not likely to affect the viability of the local population of these species.</p>
<p><b>(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,</b></p>	
<p>A range of eucalypts and acacias were recorded throughout the REF study area, providing potential foraging habitat for the Squirrel Glider. Most forest in the REF study area is structurally diverse, with fallen timber and dead trees, providing foraging opportunities for the Brush-tailed Phascogale. A small number of Squirrel Glider family groups and Brush-tailed Phascogale individuals could use hollows both within and outside the revised REF proposal site. These family groups would be part of a wider local population that would occur throughout extensive tracts of forest that are present in the locality. Given the extensive areas of adjacent habitat, and location of the proposal mainly along the alignment of the existing highway, the REF study area is not considered important for the long-term survival of the species in the locality.</p>	
<p><b>d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),</b></p>	
<p>There is no declared area of outstanding biodiversity value within the study area or locality.</p>	
<p><b>e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.</b></p>	
<p>The proposal would directly contribute to the operation of the following KTPs within the revised REF proposal site:</p> <ul style="list-style-type: none"> <li>• Clearing of native vegetation – the proposal would remove up to 5.77 ha of potential foraging habitat within the revised REF proposal site;</li> <li>• Loss of hollow-bearing trees – up to 14 hollow-bearing trees would be removed within the revised REF proposal site;</li> <li>• Loss of dead wood and dead trees - dead wood and dead trees would be removed within the revised REF proposal site as a result of the proposal.</li> </ul>	
<p>The proposal has the potential to introduce or increase the operation of the following KTPs within potential habitat through soil disturbance and increased visitation within the revised REF proposal site:</p>	

Squirrel Glider, Yellow-bellied Glider (Vulnerable)	Brush-tailed Phascogale (Vulnerable)
<ul style="list-style-type: none"> <li>• Infection of native plants by <i>Phytophthora cinnamomi</i>.</li> </ul> <p>Native vegetation is already subject to weed invasion from adjoining agricultural and residential areas. The proposal is unlikely to influence the introduction or further spread of exotic species, given their dominance throughout the REF study area in the understorey of most occurrences of native vegetation.</p> <p>Mitigation measures to minimise indirect impacts would be included in the CEMP (see section 7.1 of the parent REF BIA report).</p>	
<b>Conclusion of Assessment of Significance</b>	
<p>On consideration of the above criteria, the proposal is unlikely to have a significant effect on the Squirrel Glider and Brush-tailed Phascogale pursuant to s7.3 of the BC Act as:</p> <ul style="list-style-type: none"> <li>• Up to 4.55 ha of canopied forest and 1.35 ha of shrubland (modified Bateman's Bay Cycad Forest) that represents potential foraging habitat for these species would be removed within the revised REF proposal site;</li> <li>• Up to 14 hollow-bearing trees would be removed within the revised REF proposal site;</li> <li>• Large areas of habitat occur in the locality</li> <li>• No areas of habitat would become isolated.</li> </ul>	



### ***Hollow-dependent bats***

The Greater Broad-nosed Bat inhabits tall, wet forests and roosts in hollow trunks of eucalypts, and occasionally in caves and buildings. It inhabits tall wet forests with a dense understorey. The species prefers continuous forest, and is generally absent from small patches of remnant forest (Churchill, 2008).

The Eastern Freetail Bat roosts in tree hollows (generally spouts of large mature trees). They have also been recorded roosting in buildings and under exfoliating bark. This species occurs in dry forests and woodlands where it shows a preference for foraging in open spaces in these habitats, as well as over waterways (Churchill, 2008).

The Eastern False Pipistrelle generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. It prefers moist habitats, with trees taller than 20 m, and forages above or just below the canopy (OEH 2016b).

The Yellow-bellied Sheath-tail-bat roosts singly or in small group, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. This species forages in most habitats across its very wide range, with and without trees. It forages above the canopy, or lower in more open country (OEH 2016b).

Hollow-dependent bats are likely to require multiple roost trees, generally in close proximity. Roost sites used on consecutive nights are typically within a few hundred metres of one another (Parnaby and Hamilton-Smith, 2004).

There are records in the locality for all of these threatened bat species (OEH 2016a) but none was recorded in the REF BIA within the REF study area.

### ***Non-hollow dependent bats***

The Eastern Bentwing Bat is essentially a cave bat, but also utilises man-made habitats such as road culverts, storm-water tunnels and other man-made structures as roost sites outside the breeding season. Breeding takes place from October to April in a number of maternity caves that host up to 100,000 females (Churchill, 2008). Maternity colonies are known from Wee Jasper, Bungonia, Willi-Willi, and Riverton (OEH 2016b). The Eastern Bentwing Bat is known from a variety of habitats along the east coast, including rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grasslands. It also occurs in urban areas. In forested areas, it flies above the canopy to hunt, while in open grassland areas, flight may be within six metres of the ground. Moths form the major component of their diet (Churchill 2008). There are records for the Eastern Bentwing Bat in the locality. This species could use the bridge as a temporary roost, and forage over native vegetation and exotic grassland.

The Large-footed Myotis breeds November or December, roosting in a variety of habitats including caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage. The Large-footed Myotis is primarily a coastal species that forages over streams and watercourses feeding on fish and insects. It is known to occur in urban areas (Churchill, 2008). There are records for the Large-footed Myotis in the locality. This species could use the bridge as a temporary roost, however, a 2018 targeted study by EcoLogical Australia found no visual or acoustic evidence of microbat habitation of Nelligen Bridge and concluded that potential roosting habitat available within the bridge is sub-optimal (ELA 2018). It may also roost in hollow-bearing trees, and forage over the river and wetlands.

## Section 5A Assessment: microchiropteran bats

Hollow-dependent bats	Eastern Bentwing Bat	Large Footed Myotis
<b>a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,</b>		
<p>The Eastern Freetail Bat, Eastern False Pipistrelle, Greater Broad-nosed Bat and Yellow-bellied Sheathtail Bat may forage in forest patches in the REF study area, as well as in more open areas. Native vegetation to be removed within the revised REF proposal site occurs as narrow strips along already highly modified and disturbed edges. Many of the threatened microbats rely on large areas intact vegetation for foraging. Large areas of better quality habitat are present in adjacent areas including within Benandarah State Forest and Clyde River National Park. The proposal would remove a negligible area of foraging habitat for these species within the revised REF proposal site.</p> <p>The proposal would remove up to 14 hollow bearing trees within the revised REF proposal site. These occur alongside the existing roads and are subject to high levels of disturbance, potentially making them less suitable for these species.</p> <p>The proposal would widen the gap between stands of vegetation along the highway. This would not prevent these highly mobile species from travelling between foraging and roosting habitat.</p> <p>Given the mobility of the species, the negligible impact on potential foraging habitat, and the location of hollow-bearing trees that would be removed adjacent to the highway, the proposal is unlikely to have an adverse effect on the life cycle of these species such that a viable local</p>	<p>The Eastern Bentwing may roost under the bridge outside the breeding season. Demolition of the bridge could temporarily disrupt the roosting habitat of this species if they are present during demolition. There is also the potential for mortality of individuals during demolition. Following construction, this species may be able to roost under the new bridge once built.</p> <p>There is no breeding habitat for the Eastern Bentwing Bat in the REF study area.</p> <p>This species may forage on occasion in the REF study area. The Eastern Bentwing Bat forages over forested and cleared land. Extensive areas of foraging habitat are present in the surrounding locality. The proposal would have negligible impact on the foraging habitat for this species within the revised REF proposal site.</p> <p>The proposal would widen the gap between stands of vegetation along the highway. This would not prevent this highly mobile species from travelling between foraging and roosting habitat.</p> <p>Given the mobility of the species, the lack of impact on specific breeding habitat, and the negligible impact on foraging habitat, the proposal is unlikely to have an adverse effect on the life cycle of this species such that a viable local population of these species is likely to be placed at risk of extinction.</p>	<p>The Large-footed Myotis may roost under the bridge and could potentially also breed at this location. Demolition of the bridge could temporarily disrupt the roosting habitat of this species, and may result in the loss of breeding habitat if individuals are present during construction. There is also the potential for mortality of individuals during demolition. Following construction, individuals of this species may be able to roost under the new bridge once built.</p> <p>The Large-footed Myotis may also breed in hollow-bearing trees. Up to 14 hollow-bearing trees may be removed within the revised REF proposal site. These occur alongside the existing road and are subject to high levels of disturbance, potentially making them less suitable for this species. Many hollow-bearing trees are also present in the extensive areas of native vegetation in the locality.</p> <p>This species may forage along the Clyde River and adjacent creeks. The proposal would have negligible impact on the foraging habitat for this species within the revised REF proposal site.</p> <p>The proposal would widen the gap between stands of vegetation along the highway. This would not prevent this highly mobile species from travelling between foraging and roosting habitat.</p> <p>Given the mobility of the species, the negligible impact on foraging habitat, and presence of large areas of alternate breeding habitat, the proposal is unlikely to have an adverse effect on the life cycle of these species such that a viable local population of these species is likely to be placed at risk of extinction.</p>

### Section 5A Assessment: microchiropteran bats

population of these species is likely to be placed at risk of extinction.

**b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

**(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

Not applicable to this threatened fauna species

**(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

Not relevant to these threatened species.

**c) in relation to the habitat of a threatened species or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity,**

The proposal would remove up to 8.72 ha of terrestrial native vegetation forming potential foraging habitat for these species and 14 hollow-bearing trees within the revised REF proposal site from alongside the existing highway. Extensive areas of native vegetation containing hollow-bearing trees are present in the locality. In addition, demolition of the existing bridge could temporarily disrupt the roosting habitat of two of the species, and could result in mortality of individuals if present during demolition. The removal of vegetation along the existing highway would create a new edge and may result in additional edge effects which may modify the vegetation along the new edge. Given the existing edge effects, these additional impacts are likely to be minor.

**(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**

Fragmentation from existing roads, easements, residential areas and agricultural practices is already present. The proposal comprises removal of mainly narrow strips of vegetation from along the edges of the existing highway within the revised REF proposal site. No areas of vegetation would become isolated as a result of the proposal, however the proposal would increase fragmentation in the locality to a small degree. The proposal would widen the gap between stands of vegetation along the highway. This would not prevent this highly mobile species from travelling between foraging and roosting habitat. These additional gaps in the tree canopy are not likely to affect the viability of the local population of any of these bat species.

**(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**



## Section 5A Assessment: microchiropteran bats

Foraging habitat for many microbat species is present in forested areas (and cleared areas) of the revised REF proposal site and it is likely that they would feed regularly in the revised REF proposal site, but would not depend solely on these foraging habitats. It is also possible that microbats could roost and breed in hollows in the revised REF proposal site and in the surrounding areas. Large areas of better quality habitat are present in adjacent areas including within Benandarah State Forest and Clyde River National Park. Given the presence of large areas of intact forest habitat in surrounding areas, and that habitat to be removed within the revised REF proposal site is located mostly along the edge of the highway, the habitat to be removed is not considered important for this species in the locality.

The Eastern Bent-wing Bat breeds in caves, but may roost under the bridge on occasions. However, a targeted survey in 2018 (ELA 2018) found no evidence of microbat habitation of Nelligen Bridge and concluded that potential roosting habitat available within the bridge is sub-optimal. This bridge could represent important diurnal roosting habitat for this species. The demolition of the bridge may result in a temporary removal of roosting habitat; however this is likely to be replaced by the new bridge.

Foraging habitat for this species is present in forested areas and cleared areas of the revised REF proposal site and it is likely that it would feed regularly in the revised REF proposal site, but would not depend solely on these foraging habitats. Given the presence of large areas of intact forest habitat in surrounding areas, and that habitat to be removed is located mostly along the edge of the highway, the habitat to be removed is not considered important for this species in the locality.

The Large-footed Myotis may roost under the bridge on occasion, and could also potentially breed under the bridge. The demolition of the bridge may result in a temporary removal of roosting habitat; however this is likely to be replaced by the new bridge. A targeted survey in 2018 (ELA 2018) found no evidence of microbat habitation of Nelligen Bridge and concluded that potential roosting habitat available within the bridge is sub-optimal.

The species is also likely to roost and may breed in tree hollows in the revised REF proposal site. Extensive tracts of vegetation containing hollow-bearing trees are present in the locality. Potential breeding habitat in the revised REF proposal site is therefore not likely to be important for this species in the locality.

The Large-footed Myotis is likely to forage along the Clyde River and other creeks in the area. The Clyde River is likely to be important foraging habitat for this species. The proposal would have a negligible impact on the foraging habitat for this species within the revised REF proposal site.

### **d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),**

There is no declared area of outstanding biodiversity value within the study area or locality.

### **e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.**

The proposal would result in the operation of the following KTPs within the revised REF proposal site:

- Clearing of native vegetation – up to 8.72 ha of terrestrial native vegetation would be removed within the revised REF proposal site.
- Loss of hollow-bearing trees – up to 14 hollow-bearing trees would be removed within the revised REF proposal site.
- Loss of dead wood and dead trees – the proposal is likely to remove dead wood and dead trees.

Mitigation measures to minimise direct impacts on fauna habitat would be included in the CEMP (see section 7.1 of the parent REF BIA report).

The proposal has the potential to introduce or increase the operation of the following KTPs within this community through soil disturbance and increased visitation within the revised REF proposal site:

- Infection of native plants by *Phytophthora cinnamomi*.

## Section 5A Assessment: microchiropteran bats

- Invasion and establishment of weeds.

Native vegetation is already subject to weed invasion from adjoining agricultural and residential areas. The proposal is unlikely to influence the introduction or further spread of exotic species, given their dominance throughout the REF study area in the understorey of most occurrences of native vegetation.

Mitigation measures to minimise indirect impacts would be included in the CEMP (see section 7.1 of the parent REF BIA report)

### Conclusion of Assessment of Significance

The proposal is highly unlikely to result in a significant impact on any hollow-dependent microbat species pursuant to s.7.3 of the BC Act given:

- Up to 8.72 ha of native vegetation that represents potential foraging habitat for these species would be removed within the revised REF proposal site
- Up to 14 hollow-bearing trees would be removed within the revised REF proposal site.
- Large areas of habitat including many hollow-bearing trees occur in the locality
- No areas of habitat would become isolated
- Indirect impacts would occur along an already modified and disturbed edge.

The proposal is highly unlikely to result in a significant impact on the Eastern Bentwing Bat pursuant to s.7.3 of the BC Act given:

- No breeding habitat would be impacted.
- There would be a temporary loss of potential diurnal roosting habitat during demolition of the bridge. It is likely that similar habitat would be present under the new bridge
- Up to 8.72 ha of native vegetation that represents potential foraging habitat for these species would be removed within the revised REF proposal site.
- Large areas of habitat occur in the locality
- No areas of habitat would become isolated
- Indirect impacts would occur along an already modified and disturbed edge.

The proposal is highly unlikely to result in a significant impact on the Large-footed Myotis pursuant to s.7.3 of the BC Act given:

- There would be a temporary loss of diurnal roosting habitat during demolition of the bridge. It is likely that similar habitat would be present under the new bridge
- Up to 14 hollow-bearing trees would be removed within the revised REF proposal site.
- Large areas of habitat including many hollow-bearing trees occur in the locality
- The proposal would have a negligible impact on foraging habitat within the revised REF proposal site.
- No areas of habitat would become isolated.

## Australian Grayling

The Australian Grayling migrates between freshwater streams and the ocean. Spawning occurs in freshwater from late summer to winter, with exact timing being dependant on location and annual conditions. Newly-hatched larvae drift downstream and out to sea, where they remain for about six months. Juveniles then return to the freshwater environment (around November of their first year), where they remain for the remainder of their lives (Backhouse et al 2008). The Australian Grayling has not been recorded on site during surveys for the revised proposal.

### Australian Grayling (Endangered, FM Act)

#### **a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,**

The Australian Grayling would be present in the Clyde River following spawning in upland streams, and again when returning to those upland streams. No breeding habitat is present in the revised REF proposal site.

The proposal would not create a permanent barrier to fish passage. The process of removing and constructing bridges may hamper the movement of fish/larvae up and downstream. Impacts may arise from silt curtains but these impacts would be localised and temporary. Any impacts on fish passage as a result of water quality and turbidity are likely to be highly localised and would be dispersed rapidly given water quality of the river. Impacts would only occur during construction and demolition.

The proposal would temporarily disturb water quality in the vicinity of the existing bridge during demolition and at the site of the new bridge during construction activities, and may also disturb the river substrate. Larvae could continue to drift downstream, and juveniles to migrate back upstream. Given that there would be no impact on breeding habitat, and no permanent blockage of fish passage the proposal is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

#### **b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

##### **(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

Not applicable to this threatened fauna species.

##### **(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

Not applicable to this threatened fauna species.

#### **c) in relation to the habitat of a threatened species or ecological community:**

##### **(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity,**

The proposal would not create a permanent barrier to fish passage. The process of removing and constructing bridges may hamper the movement of fish/larvae up and downstream. Impacts may arise from silt curtains but these impacts would be localised and temporary. Any impacts on fish passage as a result of water quality and turbidity are likely to be highly localised and would be dispersed rapidly given water quality of the river. Impacts would only occur during construction and demolition.

The proposal would temporarily disturb water quality in the vicinity of the bridge during demolition and construction activities, and may also disturb the river substrate. These impacts would be temporary, as they would occur during construction and demolition only. There is the potential for scouring around the new piers. This is unlikely to be substantially different to the existing conditions.

##### **(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**

The proposal would not create a permanent barrier to fish passage. The process of removing and constructing bridges may hamper the movement of fish/larvae up and downstream. Impacts may arise from silt curtains but these impacts would be localised and temporary. Any impacts on fish passage as a result of water quality and turbidity are likely to be highly localised and would be dispersed rapidly given the water quality of the river. Impacts would only occur during construction and demolition. Demolition of the bridge and temporary disturbance of the Clyde River would not



### **Australian Grayling (Endangered, FM Act)**

result in a barrier to movement the Clyde River. The proposal would not fragment habitat for this species.

#### **(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**

The Clyde River is important migratory habitat for the Australian Grayling. This species is likely to be present twice a year, in autumn as larvae drift down to sea, and again in spring when the juveniles return to upland streams.

#### **d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),**

There is no declared area of outstanding biodiversity value within the study area or locality.

#### **e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.**

The proposal would result in the operation of one KTP of relevance to the Australian Grayling:

- The degradation of native riparian vegetation along NSW water courses – an area of riparian vegetation would be removed for the construction of the new bridge and demolition of the old bridge.

The proposal has the potential to introduce or increase the operation of the following KTPs

- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands – the new bridge will have piles in the river. These are not likely to substantially alter flow, but would have localised impacts.
- Instream structures and other mechanisms that alter natural flow – the new bridge will have piles in the river. These are not likely to substantially alter flow, but would have localised impacts.
- The removal of large woody debris from NSW rivers and streams - construction of the new bridge and demolition of the old bridge has the potential to disturb woody debris.

Mitigation measures to minimise impacts on aquatic habitat would be included in the CEMP (see section 7.1 of the parent REF BIA report)

### **Conclusion of Assessment of Significance**

On consideration of the above criteria, the proposal is unlikely to have a significant effect on the Australian Grayling, pursuant to s 7.3 of the BC Act as:

- No breeding or spawning habitat would be impacted
- Impacts on water quality would be temporary
- There would be no permanent blockage of fish habitat
- There would be no changes to flows further to that created by piers of existing bridge.

## Appendix C – Assessments of significance (EPBC Act)

### **Legislative context**

The significant impact guidelines for threatened biota listed under the EPBC Act (DotE 2013) lists various factors that must be taken into account in the determination of the significance of potential impacts of an activity on those biota. The assessment of significance is used to determine whether an activity is likely to impose a significant impact on threatened biota and whether additional assessment and approval under the EPBC Act is required.

An assessment of the likely significance of impacts has been prepared for the following biota listed under the EPBC Act:

- Greater Glider (vulnerable species)
- Australian Grayling (vulnerable species)
- Coastal Swamp Oak (*Casuarina glauca*) Forest (endangered ecological community)
- Lowland Grassy Woodland (critically endangered ecological community)



## **EPBC Act Assessment: Greater Glider, a vulnerable species**

### **Greater Glider, a vulnerable species**

Modelling of Greater Glider distribution suggests that they require native forest patches of at least 160 km<sup>2</sup> to maintain viable populations (Eyre 2002). The species has a low dispersal ability and has shown substantial declines in areas that are logged (TSSC 2016). Given the threats habitat clearing and logging in the area, and large potential area of habitat that could support a viable population, the local population is considered an important population for this assessment.

**According to the DoE (2013) 'significant impact criteria' for vulnerable species, an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**

#### **Lead to a long-term decrease in the size of an important population of a species**

It is possible that a small number of Greater Glider family groups could utilise the REF study area. The features that are most important to maintaining this population would include extent and connectivity of habitat and presence of important habitat resources such as denning sites. Of the 14 hollow-bearing trees that would be removed within the revised REF proposal site, a subset could be used by these family groups for denning, depending on the size of the trees and the hollows. A family group would be likely to use hollows both within and outside the revised REF proposal site, given the distribution of hollow-bearing trees and suitable hollows. These family groups would be part of a wider local population that would occur throughout the extensive tracts of vegetation in the locality.

The proposal would increase the risks and energy costs associated with gliders crossing the highway by creating or increasing the width of gaps between patches of habitat. Some gliders may be deterred from attempting to cross the highway, affecting behaviour, and potentially isolating some individuals, while others may be killed attempting to cross the highway. Connectivity may be maintained in locations where the revised REF proposal site narrows, and at the very eastern end of the revised REF proposal site. No population of any of these threatened glider species is likely to become entirely isolated, however some family groups may have their home ranges reduced, and there could be localised impacts on genetic exchange.

The proposal would remove up to 4.55 ha of canopied forest and 1.35 ha of shrubland (modified Bateman's Bay Cycad Forest) within the revised REF proposal site that represents potential foraging habitat for this species. Most potential habitat to be removed occurs along the existing highway and is already subject to disturbance. Large areas of better quality habitat are present in adjacent areas including within Benandarah State Forest and Clyde River National Park and are likely to be sufficient to maintain the local and regional populations of the species.

Given the large areas of habitat present in the locality, likely high density of hollow-bearing trees in surrounding habitat, location of the clearing along the edge of the majority existing highway, the proposal is unlikely to lead to a long-term decrease in the size of an important population.

#### **Reduce the area of occupancy of an important population**

The Greater Glider population that occur in the REF study area is likely to be part of a much larger population that occurs in extensive tracts of vegetation in the locality and surrounds. The loss of up to 4.55 ha of canopied forest and 1.35 ha of shrubland (modified Bateman's Bay Cycad Forest) would not reduce the area of occupancy of an important population.

#### **Fragment an existing important population into two or more populations**

Gliders are likely to cross the highway on occasion, as sections of it are within the glide distance of this species and there are areas of suitable habitat on each side. The existing highway and other nearby roads create a partial barrier to the movement of gliders in the REF study area and surrounds. The realignment of the highway would create a new gap and widen the gap in some locations, such as where the length of the cuttings near the eastern approach to the bridge have been extended. As such, the

## **EPBC Act Assessment: Greater Glider, a vulnerable species**

### **Greater Glider, a vulnerable species**

proposal would reduce opportunities for gliders to cross the highway. Some gliders may be deterred from attempting to cross the highway, affecting behaviour, and potentially isolating some individuals, while others may be killed attempting to cross the highway. Connectivity may be maintained in locations where the revised REF proposal site narrows, and at the very eastern end of the revised REF proposal site. No population of any of these threatened glider species is likely to become entirely isolated, however, some family groups may have their home ranges reduced, and there could be localised impacts on genetic exchange. Based on these points, the proposal is unlikely to fragment an existing important Greater Glider population into two or more populations.

### **Adversely affect habitat critical to the survival of a species**

A range of eucalypts and acacias were recorded throughout the REF study area, providing potential foraging habitat for the Greater Glider. A small number of Greater Glider family groups could use hollows both within and outside the revised REF proposal site. These family groups would be part of a wider local population that would occur throughout extensive tracts of forest that are present in the locality. Given the extensive areas of adjacent habitat, and location of the proposal mainly along the alignment of the existing highway, the proposal is unlikely to affect habitat critical to the survival of the species.

### **Disrupt the breeding cycle of an important population**

As discussed above, within the revised REF proposal site, the proposal would remove up to 14 hollows-bearing trees, up to 4.55 ha of canopied forest and 1.35 ha of shrubland (modified Bateman's Bay Cycad Forest) that represents potential foraging habitat for this species, and increase the gap over the highway, reducing connectivity between patches. Given the large areas of habitat present in the locality, likely high density of hollow-bearing trees in surrounding habitat and location of the majority of clearing along the edge of the existing highway, the proposal is unlikely to disrupt the breeding cycle of an important population.

### **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The proposal would remove up to 4.55 ha of canopied forest and 1.35 ha of shrubland (modified Bateman's Bay Cycad Forest) within the revised REF proposal site that represents potential foraging habitat for this species. Up to 14 hollow-bearing trees would be removed from along the edge of the existing highway. The removal of vegetation along the existing highway would create a new edge and may result in additional edge effects which may modify the vegetation along the new edge. Given the existing edge effects, these additional impacts are likely to be minor. Given the small area of vegetation to be removed within the revised REF proposal site, and the large areas of better quality habitat that are present in adjacent areas including within Benandarah State Forest and Clyde River National Park, the proposal is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat within the revised REF proposal site to the extent that the species is likely to decline.

### **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat**

The proposal is unlikely to result in the establishment of an invasive species in the habitat for this species. Mitigation measures are proposed to minimise the spread of weeds.

### **Introduce disease that may cause the species to decline**

The proposal is unlikely to result in the establishment of a disease in the habitat for this species. Mitigation measures are proposed to minimise the spread of disease.

### **Interfere substantially with the recovery of the species**

There is no recovery plan for this species. Conservation actions identified in the conservation advice for this species include:

- Reduce the frequency and intensity of prescribed burns.

## EPBC Act Assessment: Greater Glider, a vulnerable species

### Greater Glider, a vulnerable species

- Identify appropriate levels of patch retention, habitat tree retention, and logging rotation in hardwood production.
- Protect and retain hollow-bearing trees, suitable habitat and habitat connectivity.

While the proposal would remove up to 4.55 ha of potential foraging and denning habitat for these species within the revised REF proposal site, the loss of this vegetation is not likely to interfere with the recovery of the species. The proposal will increase the width of the gap in vegetation at some locations, however some movement of gliders across the highway is still likely to occur, at least on occasion. Mitigation measures included in section 7.1 of the parent REF BIA report include retaining hollow-bearing trees where possible.

### Conclusion

On consideration of the above criteria, the proposal is unlikely to have a significant effect on the Greater Glider as:

- Up to 4.55 ha of canopied forest and 1.35 ha of shrubland (modified Bateman's Bay Cycad Forest) that represent potential foraging habitat for this species would be removed within the revised REF proposal site.
- Up to 14 hollow-bearing trees would be removed within the revised REF proposal site.
- Large areas of habitat containing hollow-bearing trees occur in the locality.
- No areas of habitat would become isolated.



## EPBC Act Assessment: Greater Glider, a vulnerable species

### Greater Glider, a vulnerable species

Modelling of Greater Glider distribution suggests that they require native forest patches of at least 160 km<sup>2</sup> to maintain viable populations (Eyre 2002). The species has a low dispersal ability and has shown substantial declines in areas that are logged (TSSC 2016). Given the threats habitat clearing and logging in the area, and large potential area of habitat that could support a viable population, the local population is considered an important population for this assessment.

**According to the DoE (2013) 'significant impact criteria' for vulnerable species, an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**

#### **Lead to a long-term decrease in the size of an important population of a species**

It is possible that a small number of Greater Glider family groups could utilise the REF study area. The features that are most important to maintaining this population would include extent and connectivity of habitat and presence of important habitat resources such as denning sites. Of the 14 hollow-bearing trees that would be removed within the revised REF proposal site, a subset could be used by these family groups for denning, depending on the size of the trees and the hollows. A family group would be likely to use hollows both within and outside the revised REF proposal site, given the distribution of hollow-bearing trees and suitable hollows. These family groups would be part of a wider local population that would occur throughout the extensive tracts of vegetation in the locality.

The proposal would increase the risks and energy costs associated with gliders crossing the highway by creating or increasing the width of gaps between patches of habitat. Some gliders may be deterred from attempting to cross the highway, affecting behaviour, and potentially isolating some individuals, while others may be killed attempting to cross the highway. Connectivity may be maintained in locations where the revised REF proposal site narrows, and at the very eastern end of the revised REF proposal site. No population of any of these threatened glider species is likely to become entirely isolated, however some family groups may have their home ranges reduced, and there could be localised impacts on genetic exchange.

The proposal would remove up to 4.55 ha of canopied forest and 1.35 ha of shrubland (modified Bateman's Bay Cycad Forest) within the revised REF proposal site that represents potential foraging habitat for this species. Most potential habitat to be removed occurs along the existing highway and is already subject to disturbance. Large areas of better quality habitat are present in adjacent areas including within Benandarah State Forest and Clyde River National Park and are likely to be sufficient to maintain the local and regional populations of the species.

Given the large areas of habitat present in the locality, likely high density of hollow-bearing trees in surrounding habitat, location of the clearing along the edge of the majority existing highway, the proposal is unlikely to lead to a long-term decrease in the size of an important population.

#### **Reduce the area of occupancy of an important population**

The Greater Glider population that occur in the REF study area is likely to be part of a much larger population that occurs in extensive tracts of vegetation in the locality and surrounds. The loss of up to 4.55 ha of canopied forest and 1.35 ha of shrubland (modified Bateman's Bay Cycad Forest) would not reduce the area of occupancy of an important population.

#### **Fragment an existing important population into two or more populations**

Gliders are likely to cross the highway on occasion, as sections of it are within the glide distance of this species and there are areas of suitable habitat on each side. The existing highway and other nearby roads create a partial barrier to the movement of gliders in the REF study area and surrounds. The realignment of the highway would create a new gap and widen the gap in some locations, such as where the length of the cuttings near the eastern approach to the bridge have been extended. As such, the proposal would reduce opportunities for gliders to cross the highway. Some gliders may be deterred from attempting to cross the highway, affecting behaviour, and potentially isolating some individuals, while others may be killed attempting to cross the highway.

## **EPBC Act Assessment: Greater Glider, a vulnerable species**

### **Greater Glider, a vulnerable species**

Connectivity may be maintained in locations where the revised REF proposal site narrows, and at the very eastern end of the revised REF proposal site. No population of any of these threatened glider species is likely to become entirely isolated, however, some family groups may have their home ranges reduced, and there could be localised impacts on genetic exchange. Based on these points, the proposal is unlikely to fragment an existing important Greater Glider population into two or more populations.

### **Adversely affect habitat critical to the survival of a species**

A range of eucalypts and acacias were recorded throughout the REF study area, providing potential foraging habitat for the Greater Glider. A small number of Greater Glider family groups could use hollows both within and outside the revised REF proposal site. These family groups would be part of a wider local population that would occur throughout extensive tracts of forest that are present in the locality. Given the extensive areas of adjacent habitat, and location of the proposal mainly along the alignment of the existing highway, the proposal is unlikely to affect habitat critical to the survival of the species.

### **Disrupt the breeding cycle of an important population**

As discussed above, within the revised REF proposal site, the proposal would remove up to 14 hollows-bearing trees, up to 4.55 ha of canopied forest and 1.35 ha of shrubland (modified Bateman's Bay Cycad Forest) that represents potential foraging habitat for this species, and increase the gap over the highway, reducing connectivity between patches. Given the large areas of habitat present in the locality, likely high density of hollow-bearing trees in surrounding habitat and location of the majority of clearing along the edge of the existing highway, the proposal is unlikely to disrupt the breeding cycle of an important population.

### **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The proposal would remove up to 4.55 ha of canopied forest and 1.35 ha of shrubland (modified Bateman's Bay Cycad Forest) within the revised REF proposal site that represents potential foraging habitat for this species. Up to 14 hollow-bearing trees would be removed from along the edge of the existing highway. The removal of vegetation along the existing highway would create a new edge and may result in additional edge effects which may modify the vegetation along the new edge. Given the existing edge effects, these additional impacts are likely to be minor. Given the small area of vegetation to be removed within the revised REF proposal site, and the large areas of better quality habitat that are present in adjacent areas including within Benandarah State Forest and Clyde River National Park, the proposal is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat within the revised REF proposal site to the extent that the species is likely to decline.

### **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat**

The proposal is unlikely to result in the establishment of an invasive species in the habitat for this species. Mitigation measures are proposed to minimise the spread of weeds.

### **Introduce disease that may cause the species to decline**

The proposal is unlikely to result in the establishment of a disease in the habitat for this species. Mitigation measures are proposed to minimise the spread of disease.

### **Interfere substantially with the recovery of the species**

There is no recovery plan for this species. Conservation actions identified in the conservation advice for this species include:

- Reduce the frequency and intensity of prescribed burns.
- Identify appropriate levels of patch retention, habitat tree retention, and logging rotation in hardwood production.
- Protect and retain hollow-bearing trees, suitable habitat and habitat connectivity.

## **EPBC Act Assessment: Greater Glider, a vulnerable species**

### **Greater Glider, a vulnerable species**

While the proposal would remove up to 4.55 ha of potential foraging and denning habitat for these species within the revised REF proposal site, the loss of this vegetation is not likely to interfere with the recovery of the species. The proposal will increase the width of the gap in vegetation at some locations, however some movement of gliders across the highway is still likely to occur, at least on occasion. Mitigation measures included in section 7.1 of the parent REF BIA report include retaining hollow-bearing trees where possible.

### **Conclusion**

On consideration of the above criteria, the proposal is unlikely to have a significant effect on the Greater Glider as:

- Up to 4.55 ha of canopied forest and 1.35 ha of shrubland (modified Bateman's Bay Cycad Forest) that represent potential foraging habitat for this species would be removed within the revised REF proposal site.
- Up to 14 hollow-bearing trees would be removed within the revised REF proposal site.
- Large areas of habitat containing hollow-bearing trees occur in the locality.
- No areas of habitat would become isolated.



## EPBC Act Assessment: Australian Grayling, a vulnerable species

Important populations necessary to the long term survival and recovery of the Australian Grayling are identified in the recovery plan (Backhouse et al 2008) and include the population in the Clyde River.

**According to the DotE (2013) 'significant impact criteria' for vulnerable species, an action is likely to had a significant impact on a vulnerable species if there is a real chance or possibility that it will:**

### **Lead to a long-term decrease in the size of an important population of a species**

No breeding habitat of the Australian Grayling is present in the revised REF proposal site. The species would be present in the reach of the Clyde River adjoining the REF proposal site following spawning in upland streams, and again when returning to those upland streams. The proposal would not create a permanent barrier to fish passage. The process of removing and constructing bridges (and especially the installation of silt curtains and similar sediment control measures) may hamper the movement of fish/larvae up and downstream on a short-term basis. Impacts may arise from silt curtains but these impacts would be localised and temporary. Silt curtains would not block the entire width of the river, but would be located around the piles, and would only be present during construction.

Any impacts on fish passage as a result of water quality and turbidity are likely to be highly localised and would be dispersed rapidly given the flow rates and water quality of the river. Impacts would only occur during construction and demolition. Demolition of the bridge and temporary disturbance of the Clyde River would not result in a barrier to movement of the species up and down the Clyde River.

Given the above considerations, the proposal would be unlikely to lead to a long-term decrease in the size of an important population of the species.

### **Reduce the area of occupancy of an important population**

No breeding habitat of the Australian Grayling is present in the revised REF proposal site. The species would be present in the Clyde River following spawning in upland streams, and again when returning to those upland streams. The proposal would not create a permanent barrier to fish passage. The process of removing and constructing bridges may hamper the movement of fish/larvae up and downstream on a short-term basis. Impacts may arise from silt curtains but these impacts would be localised and temporary. Any impacts on fish passage as a result of water quality and turbidity are likely to be highly localised and would be dispersed rapidly given the flow rates and water quality of the river. Impacts would only occur during construction and demolition. Demolition of the bridge and temporary disturbance of the Clyde River would not result in a barrier to movement the Clyde River.

Given the above considerations, the proposal would be unlikely to reduce the area of occupancy of an important population of the species.

### **Fragment an existing important population into two or more populations**

The proposal would not create a permanent barrier to fish passage. The process of removing and constructing bridges may hamper the movement of fish/larvae up and downstream on a short-term basis. Impacts may arise from silt curtains but these impacts would be localised and temporary. Any impacts on fish passage as a result of water quality and turbidity are likely to be highly localised and would be dispersed rapidly given the water quality of the river. Impacts would only occur during construction and demolition. Demolition of the bridge and temporary disturbance of the Clyde River would not result in a barrier to movement the Clyde River. The proposal would not fragment habitat for this species.

### **Adversely affect habitat critical to the survival of a species**

Given the wide distribution and range of habitats used by the species throughout its life, it is not practical to specify habitat that is critical to survival as all habitat where Australian Grayling potentially occur. However, some habitats such as spawning, refuge and juvenile habitats are likely to be limited in distribution, yet crucial to the grayling's life cycle (Backhouse et al 2008)

The Australian Grayling would be present in the Clyde River following spawning in upland streams, and again when returning to those upland streams. No spawning, refuge or juvenile habitat is present in the revised REF proposal site.

## EPBC Act Assessment: Australian Grayling, a vulnerable species

The proposal would not create a permanent barrier to fish passage that would prevent the movement of individuals between their spawning area and the ocean. There would be temporary disturbance and changes to water quality during construction, however this is unlikely to impact spawning habitat.

Given that there would be no direct impact on spawning habitat, no permanent blockage of fish passage, and impacts on water quality are likely to be temporary and restricted in area, the proposal is unlikely to have an adverse effect on habitat critical to the survival of the species.

### **Disrupt the breeding cycle of an important population**

The Australian Grayling travel along the Clyde River following spawning in upland streams, and again when returning to those upland streams. No breeding habitat is present in the revised REF proposal site.

The proposal would not create a permanent barrier to fish passage. The process of removing and constructing bridges may hamper the movement of fish/larvae up and downstream. Impacts may arise from silt curtains but these impacts would be localised and temporary. Any impacts on fish passage as a result of water quality and turbidity are likely to be highly localised and would be dispersed rapidly given water quality of the river. Impacts would only occur during construction and demolition.

The proposal would temporarily disturb water quality in the vicinity of the existing bridge during demolition and at the site of the new bridge during construction activities, and may also disturb the river substrate. Larvae could continue to drift downstream, and juveniles to migrate back upstream.

Given that there would be no impact on breeding habitat, and no permanent blockage of fish passage the proposal is unlikely to disrupt the breeding cycle of an important population of the species.

### **Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The proposal would not create a permanent barrier to fish passage nor directly impact upon breeding habitat. The process of removing and constructing bridges may hamper the movement of fish/larvae up and downstream on a short-term basis. Impacts may arise from silt curtains but these impacts would be localised and temporary. Any impacts on fish passage as a result of water quality and turbidity are likely to be highly localised and would be dispersed rapidly given the water quality of the river. Impacts would only occur during construction and demolition. Demolition of the bridge and temporary disturbance of the Clyde River would not result in a barrier to movement the Clyde River. The proposal would be unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

### **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat**

The proposal is unlikely to result in the establishment of an invasive species in the habitat for this species. Mitigation measures are proposed to minimise the spread of weeds.

### **Introduce disease that may cause the species to decline**

The proposal is unlikely to result in the establishment of a disease in the habitat for this species. Mitigation measures are proposed to minimise the spread of disease.

### **Interfere substantially with the recovery of the species**

The *National Recovery Plan for Australian Grayling* Prototroctes maraena (Backhouse et al 2008) details the species' distribution, biology, conservation status, threats, recovery objectives and actions necessary to ensure the long-term survival of the Australian Grayling.

The proposal would not substantially increase the action of any activities identified as having the potential to have a detrimental impact upon the Australian Grayling, namely:

- Construction of permanent barriers to fish movement/migration.
- Permanent reduction in/alteration of river flows.
- Removal/degradation of riparian habitat.

## EPBC Act Assessment: Australian Grayling, a vulnerable species

- Removal of snags, woody debris or rocks from potential habitat.
- Ongoing events leading to increased siltation or sedimentation.
- Release of potential predators/competitors.
- Pesticide or fertiliser runoff.

Any impacts on fish passage as a result of water quality and turbidity as a result of bridge demolition and construction are likely to be highly localised and would be dispersed rapidly given the flow rates and water quality of the river.

Given consideration of the above, the proposal is unlikely to interfere substantially with the recovery of the species.

### Conclusion

On consideration of the above criteria, the proposal is unlikely to have a significant effect on the Australian Grayling as:

- No breeding or spawning habitat would be impacted.
- Impacts on water quality would be temporary.
- There would be no permanent blockage of fish habitat.
- There would be no changes to flows further to that created by piers of the existing bridge.



## **EPBC Act Assessment: Coastal Swamp Oak (*Casuarina glauca*) Forest, an endangered ecological community**

**According to the DotE (2013) 'significant impact criteria' for endangered and critically endangered ecological communities, an action is likely to have a significant impact on an endangered ecological community if there is a real chance or possibility that it will:**

### **Reduce the extent of an ecological community**

Construction of the proposal would require the clearing or modification of native vegetation within the revised REF proposal site, including the permanent removal of 0.52 hectares of Coastal Swamp Oak Forest. The substantial majority of this area of Coastal Swamp Oak Forest to be cleared occurs on the eastern bank of the Clyde River, with only a very minor area of the community being cleared within the revised REF proposal site on the River's western bank. On the eastern bank of the Clyde River, a contiguous area of Coastal Swamp Oak Forest which forms a >5 ha patch of the community extends north of the site. According to Tozer *et al* (2010) scattered patches of Coastal Swamp Oak Forest occur along the Clyde River and its tributaries throughout the locality. Areas of Coastal Swamp Oak Forest become more prevalent downstream of the REF study area, whereas this community ceases to occur beyond 5 km upstream. Upwards of 80 ha of Coastal Swamp Oak Forest is estimated to occur within the locality (Tozer *et al* 2010). As such, the area of Coastal Swamp Oak Forest to be removed in association with the proposal is a very small portion of the local extent of the community and would comprise a minor reduction in the current extent of the community.

### **Fragment or increase fragmentation of an ecological community**

Clearing for the proposal would only occur at the edges of patches of the community where they adjoin previously cleared land or the Clyde River. As such the proposal would not directly fragment or isolate any presently interconnected Coastal Swamp Oak Forest habitat. Rather, the size of all existing patches of Coastal Swamp Oak Forest within the revised REF proposal site would be reduced. West of the Clyde River, very minor increases in the gap between Coastal Swamp Oak Forest patches already fragmented by the Kings Highway would occur (i.e. in conjunction with minor road widening). This increase would make a negligible contribution to the degree of habitat fragmentation in the locality. This is particularly the case given the existing fragmentation and small size of these patches.

### **Adversely affect habitat critical to the survival of an ecological community**

The substantial majority of the 0.52 ha of Coastal Swamp Oak Forest to be removed within the revised REF proposal site forms part of >5 ha patch of the community that extends north of the REF study area on the eastern bank of the Clyde River. This area comprises <1% of the estimated area of the TEC in the locality based on GIS analysis of Tozer *et al* (2010) mapping. This minor proportion of the local population of the TEC that is contained within the revised REF proposal site is unlikely to contain an ecologically significant proportion of any of the individual species that comprise Coastal Swamp Oak Forest.

The REF study area and Nelligen township are isolated within a surrounding expanse of intact forest and riparian lands. The about 80 ha of Coastal Swamp Oak Forest that are estimated to occur in the locality based on GIS analysis of Tozer *et al* (2010) mapping occur upon a mix of privately owned and State Forest land, with areas of private ownership comprising a mix of partially developed and forested land. A relatively low proportion of the TEC occurs within protected lands. All extant areas of the TEC are considered as forming an important contribution to the community in the locality.

Despite this, the proposal is not likely to affect a significant proportion of the habitat for the TEC within the revised REF proposal site such that its long-term survival in the locality is threatened. The extensive areas of floristically similar vegetation in the locality are likely to be sufficient to maintain viable local populations of the species that comprise the TEC. Given the scale and context of the proposal it is unlikely to modify the composition of the TEC beyond the revised REF proposal site and immediately adjoining areas. Standard environmental management measures are likely to mitigate against any potential effects on the local population of the community that might arise outside of the immediate disturbance footprint.

**EPBC Act Assessment: Coastal Swamp Oak (*Casuarina glauca*) Forest, an endangered ecological community**

**Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns**

Coastal Swamp Oak Forest typically occurs on unconsolidated sediments, associated with low-lying coastal alluvial floodplains and alluvial flats, where soils are at least occasionally saturated, water-logged or inundated. The ecological community is typically found where groundwater is saline or brackish.

The proposal would not result in any substantial changes to the flow of the Clyde River during normal flow conditions, in its construction nor operational phases (GHD 2016b).

During construction, impacts to hydrology would be associated with changes in the local topography and changes to the existing drainage patterns in the vicinity of the revised REF proposal site. Such impacts would potentially be a result of earthworks, positioning of ancillary facilities (e.g. compound buildings or stockpiles) or the positioning of plant and equipment. Impacts to drainage patterns would be temporary in nature and would be localised to the proposal site. Such impacts would be minimised by redirecting flows from offsite around the revised REF proposal site to ensure that existing flow paths largely remain intact. The proposal would also involve works within tidal areas which would result in soils being stirred up and potentially resulting in boggy ground. This could result in changes to surface water flows and also result in areas of standing water. Impacts on surface water flows would be minimised through the implementation of safeguards and management measures including the Erosion and Sedimentation Plan for the proposal site (GHD 2016b).

During operation, the proposal would not result in any significant impacts on surface water flows as the design will incorporate drainage infrastructure which would maintain flows through the revised REF proposal site. This would include directing any flows from the new roadway and bridge to water quality devices, which would then discharge following treatment. The detailed design of the drainage system for the proposal would ensure that surface water flows to the surrounding landscape are not substantially altered (GHD 2016b).

Given the above considerations, the proposal would not modify or destroy abiotic factors necessary for the survival of Coastal Swamp Oak Forest within the study area nor locality.

**Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting**

The substantial majority of the 0.52 ha of Coastal Swamp Oak Forest to be removed within the revised REF proposal site forms part of >5 ha patch of the community that extends north of the REF study area on the eastern bank of the Clyde River. This area comprises <1% of the estimated area of the TEC in the locality (Tozer *et al* 2010). This minor proportion of the local population of the TEC that is contained within the revised REF proposal site is unlikely to contain an ecologically significant proportion of any of the individual species that comprise Coastal Swamp Oak Forest.

The REF study area and Nelligen township are isolated within a surrounding expanse of intact forest and riparian lands. The about 80 ha of Coastal Swamp Oak Forest that are estimated to occur in the locality based on GIS analysis of Tozer *et al* (2010) mapping occur upon a mix of privately owned and State Forest land, with areas of private ownership comprising a mix of developed and forested land. A relatively low proportion of the TEC occurs within protected lands. All extant areas of the TEC are considered as forming an important contribution to the community in the locality.

Despite this, the proposal is not likely to affect a significant proportion of the habitat for the TEC within the revised REF proposal site such that its long-term survival in the locality is threatened. The extensive areas of floristically similar vegetation in the locality are likely to be sufficient to maintain viable local populations of the species that comprise the TEC. Given the scale and context of the proposal it is unlikely to modify the composition of the TEC beyond the revised REF proposal site and immediately adjoining areas. Standard environmental management measures are likely to mitigate against any potential effects on the local population of the community that might arise outside of the immediate disturbance footprint.

## **EPBC Act Assessment: Coastal Swamp Oak (*Casuarina glauca*) Forest, an endangered ecological community**

**Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:**

- **Assisting invasive species, that are harmful to the listed ecological community, to become established, or**
- **Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.**

The substantial majority of the 0.52 ha of Coastal Swamp Oak Forest to be removed within the revised REF proposal site forms part of >5 ha patch of the community that extends north of the REF study area on the eastern bank of the Clyde River. The area to be cleared east of the Clyde River forms a narrow strip (~10 m wide) of the community at the southern extent of the patch. As a result, clearing would not substantially increase the edge:area ratio of the patch and, as such, establish only limited increased opportunity for invasion of invasive weed species. Weed cover within the eastern patch of the community is presently low, and it is unlikely that major new weed invasions will occur as a result of the proposal. To the west of the Clyde River only a very minor amount of Coastal Swamp Oak Forest is to be cleared along the roadside edge within the revised REF proposal site. Moderate weed levels already occur within this western patch of the community and it is unlikely that the proposal will substantially increase the impact upon the community due to increased weed invasion.

Similarly, the proposal would not directly fragment or isolate any presently interconnected Coastal Swamp Oak Forest habitat. Rather, the size of all existing patches of Coastal Swamp Oak Forest within the revised REF proposal site would be slightly reduced through clearing of vegetation along the edge of patches. West of the Clyde River, very minor increases in the gap between Coastal Swamp Oak Forest patches already fragmented by the Kings Highway would occur (i.e. in conjunction with minor road widening). This increase would make a negligible contribution to the degree of habitat fragmentation in the locality. This is particularly the case given the existing fragmentation and small size of these patches.

The proposal is not likely to affect a significant proportion of the habitat for the TEC such that its long-term survival in the locality is threatened. The extensive areas of floristically similar vegetation in the locality are likely to be sufficient to maintain viable local populations of the species that comprise the TEC. Given the scale and context of the proposal it is unlikely to modify the composition of the TEC beyond the revised REF proposal site and immediately adjoining areas. Standard environmental management measures are likely to mitigate against any potential effects on the local population of the community that might arise outside of the immediate disturbance footprint.

Given the above considerations, the proposal is unlikely to cause a substantial reduction in the quality or integrity of occurrences of the community within the REF study area.

### **Interfere with the recovery of an ecological community**

No adopted or made recovery plan exists for Coastal Swamp Oak Forest.

The proposal would not interfere with the recovery of the ecological community because:

- The substantial majority of the area of the community to be cleared comprises a small area that is already bound to its south by road infrastructure and to its east by agricultural development.
- The substantial majority of the area to be cleared occurs at the southern extent of a >5 ha patch of the community.
- The substantial majority of the area to be cleared would not impact the community such that its long-term survival in the study area nor locality is threatened.
- The substantial majority of the area to be cleared is surrounded by extensive areas of floristically similar vegetation that are likely to be sufficient to maintain viable local populations of the species that comprise the TEC.
- Environmental management measures including specific consideration of potential impacts on soil, water and native vegetation would be established to minimise



## EPBC Act Assessment: Coastal Swamp Oak (*Casuarina glauca*) Forest, an endangered ecological community

impacts upon the community and other adjoining native vegetation outside the revised REF proposal site.

### Conclusion

Based on consideration of the above criteria, the proposal is unlikely to have a significant impact upon the local occurrence of Coastal Swamp Oak Forest within the revised REF proposal site, given:

- The proposal would remove <1% of the estimated area of Coastal Swamp Oak Forest in the locality based on GIS analysis of Tozer *et al* (2010) mapping.
- Substantial occurrences of Coastal Swamp Oak Forest (up to 80ha) occur within the locality and beyond.
- The minor proportion of the local population of the TEC that is contained within the revised REF proposal site is unlikely to contain an ecologically significant proportion of any of the individual species that comprise the TEC.
- The proposal would not directly fragment or isolate any presently interconnected Coastal Swamp Oak Forest habitat.

## **EPBC Act Assessment: Lowland Grassy Woodland, a critically endangered ecological community**

**According to the DotE (2013) 'significant impact criteria' for endangered and critically endangered ecological communities, an action is likely to have a significant impact on a critically endangered ecological community if there is a real chance or possibility that it will:**

### **Reduce the extent of an ecological community**

Construction of the proposal would require the permanent removal of 0.31 hectares of Lowland Grassy Woodland within the revised REF proposal site. This equates to 24% of the total area of the community present within the REF study area. Some additional patches of the community are likely to be present within nearby lowland areas occupied by residential development to the south of the REF study area, however, there are no previous records of the community in the REF study area and its immediate surrounds. The presence of Lowland Grassy Woodland present within the REF study area is unusual in the context of the broader distribution of this community type, which typically occurs inland and south of the locality and beyond. Despite this, given classifications made by previous studies and broadly consistent floristic data collected during the current study, a precautionary approach was taken to the classification of this community. Large contiguous occurrences of the community are present beyond the locality, however, in general the extent of this community has been heavily reduced by agricultural development in these areas.

Habitat within the revised REF proposal site is partially degraded by past clearing of canopy vegetation along the road verge, edge effects leading to community structural changes, unnatural fire regimes and minor weed infestation. A large proportion of the potentially impacted area of Lowland Grassy Woodland (40-50%) comprises a 3 m wide roadside strip that is cleared of mid-storey and canopy cover, and composed of a relatively diverse cover of herbaceous native understorey species. The vegetation that would be removed from this community is therefore already considerably modified.

Furthermore, a large proportion of the community mapped within the revised REF proposal site - along the northern boundary to the Kings Highway and throughout the areas mapped to the south of the Kings Highway - is composed of a transitional form of the community with Murrumarang-Bega Lowlands Forest. The most characteristic examples of the community occur north of the revised REF proposal site and will not be directly impacted by the proposal.

The quantum of impact on better condition and non-transitional forms of the community is likely to be considerably less than the total impact area of 0.31 hectares. The modified and transitional forms of Lowland Grassy Woodland that will be impacted within the revised REF proposal site would have less importance to maintaining the ecological community than better condition or representative patches in other parts of its distribution. Given the already modified condition and transitional nature of the community within the modified REF proposal site, the proposed reduction in patch size is not likely to place the local occurrence of the community at any further risk of extinction. The extent of Lowland Grassy Woodlands would thus not be reduced, despite the occurrence at Nelligen being at the northern extent of the community. Furthermore, given that the broader distribution of Lowland Grassy Woodland occurs inland and to the south of the REF study area, and is separated from the REF study area by large tracts of tall wet/dry sclerophyll forest, the local occurrence of the community would make only a very minor contribution to its viability throughout its range.

### **Fragment or increase fragmentation of an ecological community**

The proposal would not directly fragment or isolate any presently interconnected habitat for the community. All vegetation removal within the revised REF proposal site would occur along already disturbed patch edges. The proposal would widen the gap between stands of vegetation created by the existing road corridor by a minor degree, however, this is not likely to substantially alter movements of pollinators or seed dispersal compared to existing habitat condition.

### **Adversely affect habitat critical to the survival of an ecological community**

Construction of the proposal would require the permanent removal of 0.31 hectares of the TEC within the revised REF proposal site. Considering that habitat within the revised REF

## **EPBC Act Assessment: Lowland Grassy Woodland, a critically endangered ecological community**

proposal site is composed of considerably modified narrow roadside strips of transitional Lowland Grassy Woodland, the total area of intact and non-transitional TEC that will be impacted by the proposal is likely to be considerably less.

As described above the Lowland Grassy Woodland at the REF study area is outside the typical distribution of this community and a precautionary approach was taken to the classification of this TEC.

Given its small size, considerably modified condition and transitional composition, Lowland Grassy Woodland within the revised REF proposal site is not likely to be critical to the long-term survival of the ecological community. Furthermore, given that the broader distribution of Lowland Grassy Woodland occurs inland and to the south of the REF study area, and is separated from the REF study area by large tracts of tall wet/dry sclerophyll forest, the local occurrence of the community would make only a very minor contribution to its viability throughout its range.

### **Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns**

Lowland Grassy Woodland within the revised REF proposal site occurs at elevated positions above the Kings Highway and proposed works. Standard environmental management measures are likely to mitigate against any potential effects on the local population of the community that might arise outside of the immediate disturbance footprint. As such the proposal would not modify or destroy abiotic factors necessary for the community's survival.

### **Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting**

Given the small extent of impact (0.31 hectares) and transitional nature of the community present within the revised REF proposal site, the proportion of the local population of the TEC that would be removed is unlikely to contain an ecologically significant proportion of any of the individual species that comprise the local occurrence of Lowland Grassy Woodland.

During its operational phase, the proposal could result in edge effects, including weed infestation, and fauna mortalities from vehicle strike. These effects would be similar to those associated with the existing highway and are unlikely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Recommended environmental management measures are likely to mitigate against any substantial effects on the local population of the community outside of the immediate disturbance footprint.

Given the scale and context of the proposal, it is unlikely to modify the composition of any Lowland Grassy Woodland beyond the revised REF proposal site and immediately adjoining areas. As such, impacts of the proposal within the revised REF proposal site are not likely to modify the composition of the TEC in the locality such that any component species would become locally extinct.

### **Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:**

- **Assisting invasive species, that are harmful to the listed ecological community, to become established, or**
- **Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.**

During its operational phase, the proposal could result in edge effects, including weed infestation, and fauna mortalities from vehicle strike. These effects would be similar to those associated with the existing highway and are unlikely to substantially and adversely modify



## **EPBC Act Assessment: Lowland Grassy Woodland, a critically endangered ecological community**

the quality or integrity of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

### **Interfere with the recovery of an ecological community**

No adopted or made recovery plan exists for Lowland Grassy Woodland.

The proposal would not interfere with the recovery of the ecological community because:

- The area of the community to be cleared is modified and degraded by past clearing of canopy vegetation along the road verge, edge effects leading to community structural changes, halted fire regimes and minor weed infestation.
- A large proportion of the community to be cleared is composed of a transitional form of the community with Murramarang-Bega Lowlands Forest. The most characteristic examples of the community occur north of the revised REF proposal site and will not be directly impacted by the proposal.
- The area of the community to be cleared is small and not likely to be critical to the long-term survival of the community given its condition and transitional nature.
- Operational impacts of the proposal would not exceed those associated with the existing highway.
- Given that the broader distribution of Lowland Grassy Woodland occurs inland and to the south of the REF study area, and is separated from the REF study area by large tracts of tall wet/dry sclerophyll forest, the local occurrence of the community would make only a very minor contribution to its viability throughout its range.

Environmental management measures including specific consideration of potential impacts on soil, water and native vegetation would be established to minimise impacts upon the community and other adjoining native vegetation outside the revised REF proposal site.

### **Conclusion**

Based on consideration of the above criteria, the proposal is unlikely to have a significant effect Lowland Grassy Woodland, given:

- The proposal would remove only a small area (0.31 ha) of the TEC within the revised REF proposal site along narrow roadside strips either side of the Kings Highway.
- TEC present within the revised REF proposal site comprises a transitional form of the community with Murramurang-Bega Lowland Forest.
- The total area of intact and non-transitional community that will be impacted by the proposal is likely to be considerably less than 0.31 hectares.
- A large proportion (40-50%) of the TEC present within the revised REF proposal site is cleared of all woody vegetation, and comprised of moderately diverse native herbaceous understorey cover only.;

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133 Castlereagh St Sydney NSW 2000


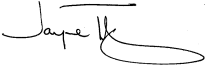
T: +61 2 9239 7100 F: +61 2 9239 7199 E: sydmail@ghd.com.au

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Final 2	D Whaite	B Harrington		Jayne Tipping		05.06.19

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## Appendix D

### Nelligen Bridge Replacement – REF addendum stage 2 PACHCI assessment

# **NELLIGEN BRIDGE REPLACEMENT – REF ADDENDUM**

Stage 2 PACHCI Assessment

**FINAL**

November 2018



## NELLIGEN BRIDGE REPLACEMENT – REF ADDENDUM

Stage 2 PACHCI Assessment

### FINAL

Prepared by  
**Umwelt (Australia) Pty Limited**  
on behalf of  
**Roads and Maritime Services**

Project Director: Nicola Roche  
Project Manager: Karyn Virgin  
Report No. 4704/R01/V2/Final  
Date: November 2018



**Newcastle**

75 York Street  
Teralba NSW 2284

Ph. 02 4950 5322

[www.umwelt.com.au](http://www.umwelt.com.au)



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## Document Status

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# 1.0 Introduction

In 2016, Umwelt Australia Pty Limited (Umwelt) was engaged by Roads and Maritime Services (Roads and Maritime) in accordance with the *Roads and Maritime Services Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) to prepare an Aboriginal cultural heritage assessment (ACHA) in accordance with the Stage 3 requirements of the Roads and Maritime PACHCI for the Nelligen Bridge Replacement Project (the 'Project'). The 2016 ACHA formed part of a Review of Environmental Factors (REF) prepared for the Project.

Roads and Maritime are now completing an addendum to the REF to include additional areas outside the 2016 study area and currently approved project boundary. These additional areas are herein referred to as the 'addendum study areas'. Umwelt has been engaged to prepare an assessment of the addendum study areas in accordance with the Stage 2 requirements of the Roads and Maritime PACHCI.

## 1.1 The 2016 ACHA and Stage 3 PACHCI Requirements

As noted above, Umwelt completed an ACHA to inform the existing, 2016 Nelligen Bridge Project REF. This ACHA was prepared in accordance with the Stage 3 requirements of the Roads and Maritime PACHCI. This assessment included the completion of archaeological test excavation at one location within the currently approved project boundary, and recommended that an Aboriginal Heritage Impact Permit (AHIP) be obtained for the project. AHIP C0003256 was issued on 23 January 2018 and remains valid for 6 years from date of issue.

Further information regarding these test excavations and the associated registered site (AHIMS #58-4-1352) is provided at Section 5.2.2.

## 1.2 Additional Project Areas and Proposed Works

The addendum study areas have been proposed as the 2016 study area and REF were developed based on the concept design and with the best information available at that time. A detailed design has now been completed, and the expansion of 2016 REF boundary is required to allow for additional ancillary site locations and additional design changes.

### Additional Ancillary Facilities

In developing the detailed design, the ancillary site facilities identified in the determined REF (2016) were found to be inadequate for the storage of bridge girders, construction equipment and plant, vehicle turnaround area, and safe and efficient operation of the construction site.

The proposed additional ancillary locations are:

- Proposed laydown area
- Proposed additional laydown and truck marshalling area during construction
- Proposed stockpile site (noting this area is currently used as a stockpiling site)
- Proposed site compound, with additional area to allow for safe vehicle and plant access from Old Nelligen Road
- Minor expansion of the 2016 study area along the project length to allow the minimum width for the safe and efficient operation of the construction site.

## Design Changes Required During the Detailed Design

Each of the proposed design changes have been developed with the intention to minimise social and environmental impacts, including the consideration of worker and motorist safety during works, as well as potential impacts to property, and potential visibility and noise impacts.

Design changes that have arisen as part of the detailed design phase, and which require expansion of the 2016 study area boundaries, include:

- Wharf Street Area – required to allow a smooth tie-in with the existing road
- Utility Relocation – consultation with utility providers has determined that additional under boring will be required within the addendum study areas to facilitate the installation of telecommunications and other services
- Water Quality/Spill Containment Basin – this will be required at the western end of the project, with the final design now including a combination of roadside swales, trash screens, and bio-retention/spill containment basins
- Culvert Extensions – extensions to existing drainage are required where culverts are proposed to be replaced or widened to allow for discharge flowing through the natural path of the existing landscape beyond the project boundary. This will also require vegetation clearance
- Driveway access at Thule Road – an additional area was required to allow a smooth tie-in with an existing property driveway at east end of the Thule Road

The proposed additional works have been summarised below in relation to the discrete addendum study areas. The addendum study areas have been separated based on their variable accessibility, associated landforms, geographical location relative to the 2016 study area, and the various works proposed within each.

**Table 1.1 Addendum study areas in relation to proposed works**

Addendum Study Area	Proposed Works
1	Laydown Area
2	Additional Stockpile Site
3	Driveway access at Thule Road
4	Wharf Street Extension
5	Spill Containment Basin
6	Site Compound Access
7	Extension of Culvert and Utility Relocation Along Thule Road

The addendum study areas referred to in this assessment, as well as the works proposed therein, are shown in **Figure 1.1**.



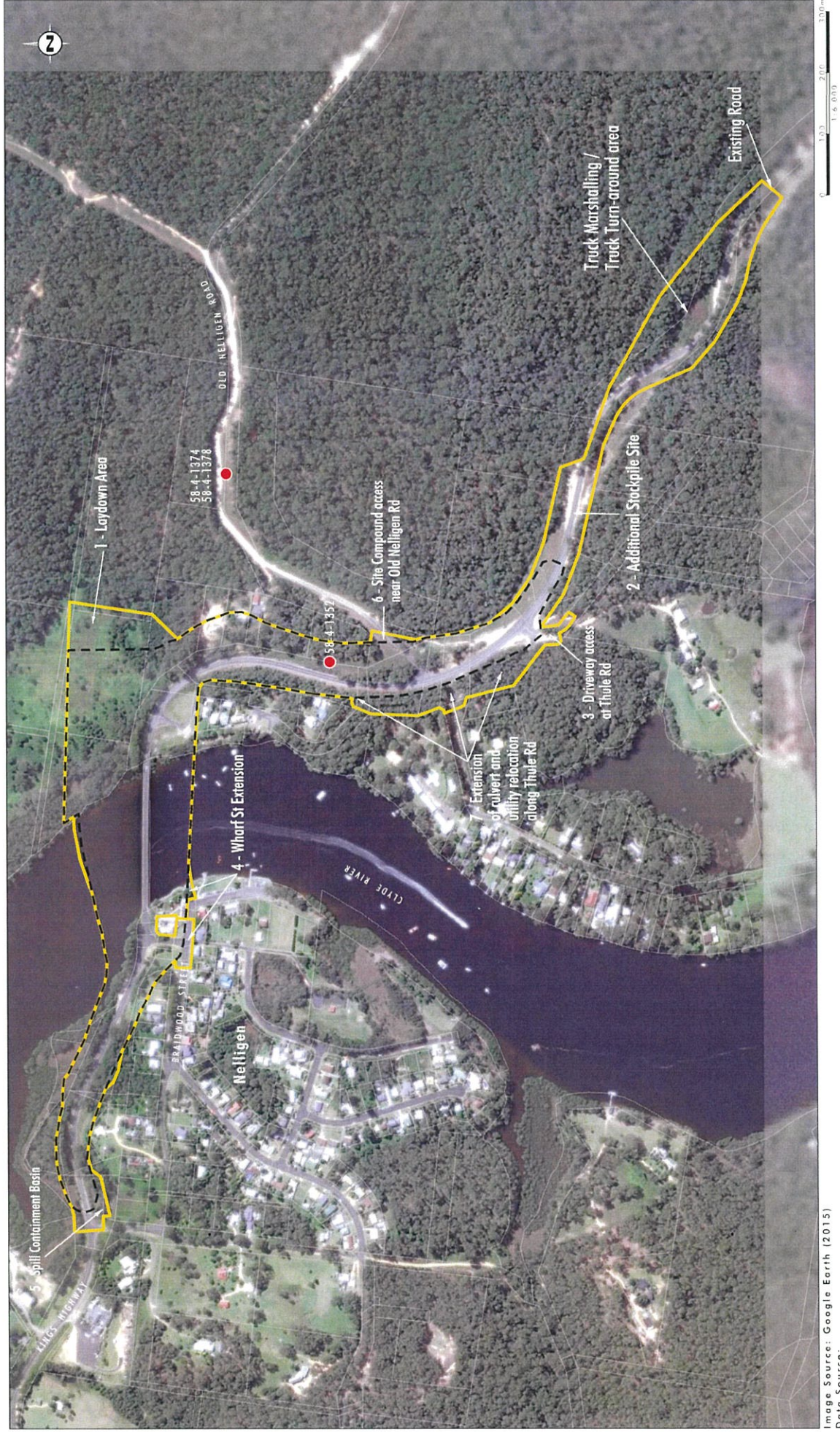


Image Source: Google Earth (2015)  
Data Source:

#### Legend

- Nelligen Bridge - Previous Aboriginal Heritage Impact Permit Area
- Nelligen Bridge - Addendum Study Areas
- AHIMS sites (Artefact)

FIGURE 1.1

Proposed Aboriginal Heritage Impact Permit Area  
showing Cadastral Information

## 2.0 Legislative and Regulatory Context

The Office of Environment and Heritage (OEH) is primarily responsible for regulating the management of Aboriginal cultural heritage in New South Wales under the *National Parks and Wildlife Act 1974* (NPW Act). Supporting the NPW Act is the National Parks and Wildlife Regulation 2009 (the Regulation) and other codes of practice and guidelines including the due diligence code.

The NPW Act defines an Aboriginal object as:

any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales

In accordance with Section 86(1) of the NPW Act, it is an offence to harm or desecrate a known Aboriginal object, whilst it is also an offence to harm an Aboriginal object under Section 86(2). Harm is defined as any act or omission that:

- a) destroys, defaces or damages an object or place, or
- b) in relation to an object – moves the object from the land on which it had been situated, or
- c) is specified by the regulations, or
- d) causes or permits the object or place to be harmed in a manner referred to in paragraph (a), (b) or (c), but does not include any act or omission that:
- e) desecrates the object or place (noting that desecration constitutes an offence separate to harm), or
- f) is trivial or negligible, or
- g) is excluded from this definition by the regulations.

Section 87(2,4) establishes that it is a defence to prosecution under Section 86(2) (the strict liability offence) if due diligence was exercised to reasonably determine that the activity or omission would not result in harm to an Aboriginal object or if the activity or omission constituting the offence is a low impact act or omission (in accordance with Section 80B of the Regulation). The Regulation identifies that compliance with the due diligence code is taken to constitute due diligence in determining whether a proposed activity will harm an Aboriginal object.



## 3.0 Aboriginal Party Consultation

### 3.1 Previous Consultation (2016 ACHA)

As part of the 2016 ACHA, consultation was undertaken in compliance with the Department of Environment, Climate Change and Water (DECCW, now Office of Environment and Heritage (OEH)) *Aboriginal Cultural Heritage Consultation Requirements (ACHCRs) for proponents* (2010a) and the Roads and Maritime PACHCI (2011).

Registered Aboriginal parties were encouraged to provide comments on the Aboriginal cultural values and significance of the 2016 study area, as well as to provide input and comments on the draft copy of the 2016 ACHA report. Consultation regarding cultural heritage matters within the 2016 study area is detailed in **Table 3.1**, for reference.

**Table 3.1 Record of Consultation with Aboriginal Parties as part of the 2016 ACHA Report**

Date	Type of Consultation	Authorities/Aboriginal Parties Contacted	Outcome
15/01/16	Letter providing notification of assessment and request to identify Aboriginal parties	Office of Environment and Heritage	OEH provided a list of 43 names that have registered an interest in this location.
		Batemans Bay Local Aboriginal Land Council	BBLALC were engaged to do Stage 2 PACHCI works.
		Office of the Registrar of Aboriginal Owners	Advised there were NO registered Aboriginal owners in the project area. Referred Roads and Maritime to Batemans Bay LALC for further stakeholders.
		National Native Title Tribunal	Did not receive a response.
		New South Wales Aboriginal Land Council	Recommended we contact the Local Aboriginal Land Council the project lies within. (Batemans Bay LALC)
		Local Land Services South East	Recommended contacting OEH.
		NSW Native Title Services Corporation	Did not receive a response.
		Eurobodalla Shire Council	Referred Roads, and Maritime to Batemans Bay LALC

Date	Type of Consultation	Authorities/Aboriginal Parties Contacted	Outcome
27/01/16	Advertisement providing notification of assessment and opportunity to registration interest in on-going consultation	Advertisement placed in: The Koori Mail Bay Post  The National Indigenous wasn't operable at time of print	
10/02/16	Letter providing an invitation to attend an Aboriginal focus group meeting and to review draft methodology for subsurface testing provided to registered Aboriginal parties	All 43 Aboriginal parties whose name was put forward by the OEH on 05/02/2016.	Two stakeholders attended the AFG on Tuesday 23 February 2016. The Roads and Maritime Project Manager and Aboriginal Cultural Heritage Advisor visited the Batemans Bay LALC after the meeting to discuss the proposal for Nelligen as they did not attend the AFG. No comments received on methodology.
11/02/16	Letter providing notification of assessment and invitation to register interest in consultation (for known Aboriginal parties previously identified as potentially having an interest in this area)	All registered Aboriginal parties were sent a letter on 11/02/2016	Some undeliverable emails. No alternative contacts were provided apart from an email.  Letters posted to parties without an email address on 11/02/2016
24/02/16	The subsurface testing methodology provided to OEH for review	OEH Queanbeyan	After discussions no changes required to methodology
25/02/16	Provide meeting minutes to Aboriginal parties	All 43 registered parties	No further comments
30/03/16	Engagement of Aboriginal Sites Officers	Engagement letter sent	Site Officers engaged to do works on Monday 11 April 2016
11/04/16	Subsurface testing conducted with Aboriginal party representatives	Two sites officers from the MBMAC participated in the subsurface testing.	A total of 14 artefacts were recovered and the Roads and Maritime PAD 1 was rerecorded as Roads and Maritime AS1.



Date	Type of Consultation	Authorities/Aboriginal Parties Contacted	Outcome
9/06/2016	Letter providing an invitation to attend an Aboriginal Focus Group meeting and to review draft report ACHA and Subsurface Testing Report provided to registered Aboriginal parties.	All 43 registered Aboriginal parties	<p>No stakeholders were available to attend the AFG on Tuesday 23 June 2016. However, the Roads and Maritime Project Manager, Aboriginal Cultural Heritage Advisor and Umwelt Senior Archaeologist visited the Batemans Bay LALC to conduct the meeting to discuss the project, to outline the subsurface testing results, review the ACHA and to discuss management recommendations for the project. It was discussed that a study area wide AHIP would be applied for not just a site AHIP.</p> <p>Only one response was received. This was a letter from MBMAC dated 7 July 2016 which stated that the community agreed with the recommendation for Option 3 – Impact Site without Further Investigation under AHIP and Conservation of Possible Burial Marker Trees</p>

## 3.2 Consultation as Part of the Current Assessment

Consultation with Aboriginal parties is a key aspect of documenting and understanding Aboriginal cultural values within the addendum study areas. In accordance with the Stage 2 PACHCI requirements, consultation has been undertaken with the relevant local Aboriginal land council, being the Batemans Bay LALC.

Uncle Les Simon of the Batemans Bay LALC attended the visual inspection of the addendum study areas on 3 October 2018. Following the visual inspection, Uncle Les provided an Aboriginal Stakeholder Cultural Heritage Survey Report, as required under the Stage 2 PACHCI. This report stated that, based on their visual inspection of the addendum study areas, the Batemans Bay LALC did not identify any significant known or potential Aboriginal cultural heritage features, and did not make any recommendations for further Aboriginal cultural heritage assessment or investigation.

A copy of the Aboriginal Stakeholder Cultural Heritage Survey Report provided by the Bateman's Bay LALC is attached at **Appendix 1**, for reference.

## 4.0 Environmental Context

The decisions people make regarding where they live, the range of resources they use and other aspects of daily life may all be influenced by the environment in which they live. The likelihood of sites being preserved and visible is also affected by environmental factors such as vegetation, past land use and disturbance. A review of the environmental context of an area is therefore integral to developing a model with which to predict the likelihood of Aboriginal archaeological sites being present and preserved.

The following section provides a summary of the environmental context of the 2016 study area and the addendum study areas, including the underlying geology, relevant soil landscapes, original vegetation communities, and topography and hydrology.

### 4.1.1 Geology and Soils

The 2016 study area and addendum study areas are situated on Ordovician deep water turbidite sedimentary rocks of the Adaminaby Group (DoM 1974). Quaternary alluviums characterise the main valley floors and estuaries, overlaying this underlying bedrock (DoM 1974). Small areas of estuarine mudflat are present within depositional fringes of the Clyde River.

Soil landscape mapping is not available for the area. However, studies completed for the original REF identified that soils on slopes within the area are typically shallow, stony, contain predominantly silt and fine sand and are derived from weathering of parent material. The areas of river flats contain alluvial sands and loams or estuarine muds, depending on landscape context (SEEC 2016:6).

### 4.1.2 Hydrology and Topography

The 2016 study area and addendum study areas span the Clyde River at Nelligen and include part of the river channel, floodplain and the terraces of the Clyde River, as well as part of the adjoining hills, ridges and moderate slopes of the Clyde Valley and Budawang Range (NSW Government 2002). The portions of the addendum study areas located on the Clyde River floodplain could have been subject to one in 100 year flood events; however, it is possible the landform could retain evidence of Aboriginal occupation that has been buried by flood events and not been destroyed by flood events or river channel migration.

The Clyde River is estuarine at Nelligen and would have provided abundant resources for Aboriginal people who used and occupied the area in the past. There is a minor unnamed creek mapped to the east of the Clyde River and north of the Kings Highway (along the northern boundary of Addendum Study Area 1) which would have supplied fresh water for Aboriginal people.

### 4.1.3 Flora and Fauna

Across the 2016 study area and addendum study areas, the vegetation consists of estuarine and wetland communities such as estuarine saltmarsh, floodplain swamp forest, estuarine fringe forest, estuarine mangrove forest, and seagrass meadows; forest communities such as southeast lowland grassy woodland, south coast river flat forest, and Batemans Bay cycad forest; and shrub land (Data provided by Roads and Maritime in Data Package 20140130).

The below table provides a list of plants that are likely to have occurred within the broader Eurobodalla region that would have been used for food, medicinal or technological purposes by Aboriginal people before European settlement. In addition, the native vegetation communities would have also supported a range of mammal, reptile and bird species that provided food and other resources for Aboriginal people.

**Table 4.1 Aboriginal resource plants most likely to have occurred in the surrounding landscape**

Common Name and Scientific Name	Purpose	Reference
<b>Apple berries</b> <i>Billardiera</i> spp.	Food: The ripe fruits were eaten raw; the unripe fruits were roasted then eaten.	Low 1991: 124 Isaacs 1987: 218
<b>Australian blackthorn</b> <i>Bursaria spinosa</i>	Food: Nectar is sucked out of flowers.	Isaacs 1987: 219
<b>Australian bugle</b> <i>Ajuga australis</i>	Medicinal: Bruised and soaked leaves used in some areas to bathe sores and boils.	Hiddins 2003: 14 Isaacs 1987: 231
<b>Banksias</b> <i>Banksia</i> spp.	Food: Nectar from the blossoms provided sugary food, and was sucked from the flower.	Low 1991: 141 Isaacs 1987: 218
<b>Blackwood</b> <i>Acacia melanoxylon</i>	Technology: Bark.	Boot 2002:118
<b>Blady grass</b> <i>Imperata cylindrica</i>	Medicinal: Sharp, unfolded leaves used to cause sneezing by tickling the nose. Technology: The leaves were used to thatch huts and weave dillies.	Low 1991: 114 Isaacs 1987: 237
<b>Blushing bindweed</b> <i>Convolvulus angustissimus</i>	Food: Roots eaten cooked and kneaded to make dough. Medicinal: Decoction used to treat diarrhoea, indigestion, and stomach pain.	Isaacs 1987: 220, 234
<b>Bottlebrush</b> <i>Callistemon</i> spp.	Food: Flowers sucked for nectar.	Isaacs 1987: 219
<b>Bracken</b> <i>Pteridium esculentum</i>	Food: The rhizomes were roasted and eaten, sometimes as a paste. Black skin peeled off and eaten with meat. Medicinal: The sap from the stems of young ferns was used to treat insect bites.	Low 1991: 115 Isaacs 1987: 228
<b>Bulbine lily</b> <i>Bulbine bulbosa</i>	Food: The bland starchy tubers were harvested.	Low 1991: 103 Isaacs 1987: 219
<b>Bulrush</b> <i>Typha</i> spp.	Food: Rhizomes roasted and steamed. After skin removed, the fibres were chewed until the starch was gone. Young shoots were pulled and eaten raw. Technology: Leftover fibres from the rhizomes were spun into a tough string.	Low 1991: 54 Isaacs 1987: 229



Common Name and Scientific Name	Purpose	Reference
<b>Cabbage tree palm</b> <i>Livistona australis</i>	Food: Vegetable food, young shoots and leaves eaten raw.	Isaacs 1987: 225
<b>Caustic Weed</b> <i>Chamaesyce drummondii</i>	Medicinal: Whole plant boiled and liquid applied for scabies or pains in the chest. Sometimes the latex used to treat sore eyes, and the juice for venereal infection and genital sores.	Isaacs 1987: 236
<b>Chocolate lilies</b> <i>Dichopogon strictus</i> ; <i>D. fimbriatus</i>	Food: The juicy, slightly bitter tubers were eaten.	Low 1991: 105 Isaacs 1987: 218
<b>Common fringed lily</b> <i>Thysanotus tuberosus</i>	Food: The crisp, juicy, almost flavourless tubers and the base of stems were eaten.	Low 1991: 106 Isaacs 1987: 229
<b>Cranberry heath</b> <i>Astroloma humifusum</i>	Food: Apple tasting fruits were eaten.	Low 1991: 132 Isaacs 1987: 218
<b>Cycads</b> Cycadaceae and Zamiaceae (families)	Food: Seeds were leached of their toxins by being soaked in water for days or weeks. The starchy kernels were cracked or crushed, sometimes cooked first, the fragments ground to paste, and then cooked. Surplus seeds could be preserved by being ground and fermented in water.	Low 1991: 138-139 Isaacs 1987: 220
<b>Devil's twines</b> <i>Cassytha</i> spp.	Food: The small fruits are edible, and used as snack foods. Technology: The stems were sometimes used as twine.	Low 1991: 125 Isaacs 1987: 219
<b>Early Nancy</b> <i>Wurmbea</i> spp.	Food: The tiny rounded tubers of some species were eaten; however most seem unpalatable, including the common <i>W. dioica</i> .	Low 1991: 101 Isaacs 1987: 218
<b>Eucalyptus</b> <i>Eucalyptus</i> spp.	Food: Some species roots tapped for water. Medicinal: Leaves burnt and smoke used to treat fevers.	Isaacs 1987: 223, 235
<b>Fig</b> <i>Ficus coronata</i> ; <i>F. obliqua</i> ; <i>F. rubiginosa</i>	Food: The fruit was eaten raw. Technology: The rough leaves were used as sandpaper.	Hiddins 2003: 105 Isaacs 1987: 224
<b>Flax lilies</b> <i>Dianella</i> spp.	Food: Berries eaten (except <i>D. tasmanica</i> ). Edible species include <i>D. caerulea</i> , <i>D. longifolia</i> , <i>D. revoluta</i> , <i>D. pavopennacea</i> and <i>D. bambusifolia</i> . Roots are also edible. Technology: Tough leaves of flax lilies used to weave dillies and baskets.	Low 1991: 113 Isaacs 1987: 220



Common Name and Scientific Name	Purpose	Reference
<b>Geebungs</b> <i>Persoonia</i> spp.	<p>Food: Fruits were eaten raw. Fruits ripen on the ground and are best when soft. The skin is discarded and the soft pulp around the seed is consumed.</p> <p>Medicinal: An infusion of the bark and leaves was used to relieve sore throats and colds. A concoction of inner bark and water used to relieve sore eyes.</p>	Low 1991: 134 Hiddins 2003: 77 Isaacs 1987: 226
<b>Golden stars</b> <i>Hypoxis pratensis</i> ; <i>H. hygrometrica</i> ; <i>H. nervosa</i>	<p>Food: The roasted tubers of these species were eaten. The other species are irritants and inedible.</p>	Low 1991: 103 Isaacs 1987: 224
<b>Grasstrees</b> <i>Xanthorrhoea</i> spp.	<p>Food: The starch, nectar, shoots, and leaf bases are all edible and all eaten raw. The flower heads were also sometimes soaked in coolamons to make sweet drinks.</p> <p>Technology: The gum served as glue; flower stalks were made into firesticks and spear handles; the resin was used as a fire starter; and the dead trunks served as fire wood, burning hot even when wet.</p>	Low 1991: 140 Hiddins 2003: 80 Isaacs 1987: 229
<b>Grevillea</b> <i>Grevillea</i> spp.	<p>Food: Nectar sucked from flowers.</p>	Isaacs 1987: 224
<b>Ground orchids</b> Orchidaceae (family)	<p>Food: Starchy tubers eaten either roasted or raw. Epiphytic tree orchids such as <i>Dendrobium speciosum</i> have thickened stems, which were chewed or sucked for their starch.</p>	Low 1991: 108 Isaacs 1987: 224, 226
<b>Grey Box</b> <i>Eucalyptus bosistoana</i>	<p>Technology: Bark.</p>	Boot 2002:118
<b>Headache vine</b> <i>Clematis glycinoides</i>	<p>Medicinal: The odour used to treat headaches.</p>	Isaacs 1987: 234
<b>Hovea</b> <i>Hovea</i> spp.	<p>Food: Young pods eaten.</p>	Isaacs 1987: 224
<b>Indigo</b> <i>Indigofera</i> spp.	<p>Medicinal: Roots hammered and placed in fresh or salt water as a fish poison.</p>	Isaacs 1987: 237
<b>Kangaroo apples</b> <i>Solanum</i> spp.	<p>Food: The soft sickly sweet berries were eaten either roasted or raw.</p>	Low 1991: 133 Isaacs 1987: 228
<b>Kangaroo grass</b> <i>Themeda triandra</i>	<p>Food: Seeds ground and baked.</p>	Isaacs 1987: 229

Common Name and <i>Scientific Name</i>	Purpose	Reference
<b>Kurrajong</b> <i>Brachychiton populneus</i>	Technology: Bark.	Boot 2002:118
<b>Lance beard heath</b> <i>Leucopogon lanceolatus</i>	Food: Fruits were eaten.	Low 1991: 130
<b>Lawyer vine</b> <i>Smilax australis</i>	Medicinal: Extract used to treat sore eyes.	Isaacs 1987: 239
<b>Lilly pillly</b> <i>Syzygium smithii</i>	Food: The fruits were widely eaten.	Isaacs 1987: 217
<b>Long-leaf mat-rush</b> <i>Lomandra longifolia</i>	Food: The white inner leaf bases and seeds were eaten raw. Technology: The tough leaves were split into strips and woven into dillies and mats.	Low 1991: 118 Isaacs 1987: 225
<b>Messmate</b> <i>Eucalyptus obliqua</i>	Technology: Bark.	Boot 2002:118
<b>Milkmaids</b> <i>Burchardia umbellata</i>	Food: The crisp juicy tubers eaten	Low 1991: 101
<b>Mistletoes</b> Loranthaceae and Visaceae (families)	Food: The fruits of many species were eaten as a snack. Mainly Amyema and Lysiana species.	Low 1991: 126 Isaacs 1987: 218
<b>Mountain she-oak</b> <i>Allocasuarina verticillata</i>	Food: Leaves and young cones chewed raw when thirsty	Isaacs 1987: 217
<b>Nardoo</b> <i>Marsilea drummondii</i>	Food: In some areas, the seeds would be collected and ground into flour.	Hiddins 2003: 2
<b>Native cherry</b> <i>Exocarpos cupressiformis</i>	Food: The fruits were eaten.	Low 1991: 137 Isaacs 1987: 223

Common Name and Scientific Name	Purpose	Reference
<b>Native grape</b> <i>Cissus hypoglauca</i>	Food: The grapes eaten raw. Vines used as a water source.	Hiddins 2003: 138 Isaacs 1987: 220
<b>Native plantain</b> <i>Plantago</i> spp.	Medicinal: After heavy rains the seeds swell into balls of jelly (mucilage) which was used as a cure for constipation	Low 1991: 97
<b>Native sarsaparilla</b> <i>Smilax glycyphylla</i>	Medicinal: Leaf infusion used as general tonic and remedy and to treat coughs and chest troubles. Also a good source of vitamin C.	Isaacs 1987: 239
<b>Pale-fruit ballart</b> <i>Exocarpos strictus</i>	Food: The fruits were eaten.	Low 1991: 137
<b>Pale grass lily</b> <i>Caesia calliantha</i> ; <i>C. parviflora</i>	Food: The roots of both species were eaten.	Low 1991: 102
<b>Paperbark</b> <i>Melaleuca</i> spp.	Medicinal: Leaf oils used in treatment of colds. The flexible bark used as bandages.	Isaacs 1987: 237
<b>Pigface</b> <i>Carpobrotus</i> spp.	Food: The fruits were eaten and the salty leaves were sometimes used in place of salt with meat.  Medicinal: Juice used to treat sandfly bites, and a poultice of crushed leaves used on burns and scalds.	Low 1991: 30 Hiddins 2003: 16
<b>Pink-flowered native raspberry</b> <i>Rubus parvifolius</i>	Food: The fruits were eaten.  Medicinal: Decoction of young leaves used to treat 'bad' belly.	Low 1991: 127 Isaacs 1987: 228, 238
<b>Prickly broom heath</b> <i>Monotoca scoparia</i>	Food: Fruits were eaten.	Low 1991: 129
<b>Red ash</b> <i>Alphitonia excelsa</i>	Medicinal: Young leaf tips chewed for upset stomach and decoction of bark and wood used for muscle pains and toothaches.	Isaacs 1987: 231
<b>Rounded noon-flower</b> <i>Disphyma crassifolium</i> subsp. <i>Clavellatum</i>	Food: Fleshy leaves eaten raw or baked.	Isaacs 1987: 220



Common Name and <i>Scientific Name</i>	Purpose	Reference
<b>Sallee</b> <i>Eucalyptus stellulata</i> .	Technology: wood used for variety of purposes.	Boot 2002:118
<b>Saw-sedge</b> <i>Gahnia aspera</i>	Food: The seeds were pounded and ground to form flour that was used to make damper.	Hiddins 2003: 11
<b>Sedge</b> <i>Carex</i> sp.	Food: The flower stems were eaten.	Boot 2002:118
<b>Sour currant-bush</b> <i>Leptomeria acida</i>	Food: The fruits were eaten.	Low 1991: 135
<b>Stinging nettle</b> <i>Urtica incisa</i>	Medicinal: Leaves used to cause a nettle rash in areas suffering from rheumatism. For sprains, an infusion was used to bathe affected part. Boiled leaves also used as a poultice.	Isaacs 1987: 240
<b>Stringybark</b> <i>Eucalyptus muellerana</i> .	Technology: Bark and wood used for various purposes.	Boot 2002:118
<b>Tall spike rush</b> <i>Eleocharis sphacelata</i>	Food: The starch in the young underground stems eaten.	Low 1991: 53 Isaacs 1987: 220
<b>Tree fern</b> <i>Cyathea</i> spp. and <i>Dicksonia</i> spp.	Food: The upper trunk contains a core of white starch which was eaten raw or roasted. The croziers (curled top of the young fern) were also eaten.	Low 1991: 86 Isaacs 1987: 220
<b>Twining fringed lily</b> <i>Thysanotus patersonii</i>	Food: The watery tubers eaten.	Low 1991: 107
<b>Vanilla lilies</b> <i>Arthropodium minus</i> ; <i>A. milleflorum</i>	Food: The juicy, sweetish or bitter tubers eaten.	Low 1991: 102 Isaacs 1987: 218
<b>Water ribbons</b> <i>Triglochin</i> spp.	Food: Bland starchy tubers were roasted, pounded and fed to teething babies and the elderly. The raw or roasted tubers were also eaten by adults, and were probably an important staple food throughout much of Australia.	Low 1991: 49



Common Name and Scientific Name	Purpose	Reference
<b>Wattles</b> <i>Acacia</i> spp.	Food: The gum of pale species was eaten and often blended with water or nectar to make drinks. Acacia seeds are exceptionally nutritious and were also eaten.  Medicinal: Inner bark soaked or boiled and liquid drunk as a cough medicine.	Low 1991: 152  Isaacs 1987: 217, 231
<b>Wild sorghum</b> <i>Sorghum leiocladum</i>	Food: Seeds ground and baked.	Isaacs 1987: 228
<b>Wombat berry</b> <i>Eustrephus latifolius</i>	Food: The burst berries contain a small amount of crisp white pulp which was eaten. The tubers were also eaten, though less often and not after dry weather.	Low 1991: 122
<b>Yellow wood sorrel</b> <i>Oxalis</i> spp.	Food: Sour, lemony leaves of wood sorrel were sometimes eaten. Some tap roots dug as food, resembling a carrot and tasting like coconut.	Low 1991: 99  Isaacs 1987: 226

#### 4.1.4 Previous Land Use and Disturbance

Like the 2016 study area, the addendum study areas have been subject to a range of disturbances over time. This disturbance is predominately the result of the construction of the Kings Highway and Nelligen Bridge, which would have involved modification of the landscape in the form of levelling, cutting, and filling. In addition to this, additional disturbance has occurred through the following uses/development of the surrounding landscape:

- Residential and commercial development of Nelligen (the western side of Nelligen Bridge)
- Infrastructure generally, including footpaths, roads, drainage, and similar
- Vegetation clearance
- Previous use of the land for grazing and agriculture
- Installation of services.

These disturbances have resulted in changes to the landscape within which the addendum study areas are located.

## 5.0 Archaeological Context

### 5.1 Aboriginal Heritage Information Management System (AHIMS) Database Search

As part of the 2016 ACHA report, a search of the OEH Aboriginal Heritage Information Management System (AHIMS) database was undertaken on 21 August 2015. This search encompassed the 2016 study area as well as a five kilometre buffer. The results of this search showed that 48 Aboriginal archaeological sites had been registered within five kilometres of the 2016 study area, none of which were registered within the 2016 study area itself.

This search was updated on 28 September 2018. The updated search showed that an additional four Aboriginal archaeological sites had been recorded since August 2015. Two of these sites, AHIMS #58-4-1378 and 58-4-1375 are a duplicate recording of the same site (identical co-ordinates registered), leaving a total of three newly recorded sites. Only one of these is located in proximity to the addendum study areas, being AHIMS #58-4-1352 ('RMS Nelligen Artefact Scatter 1'), which is situated within the 2016 study area approximately 40 metres north of Addendum Study Areas 6 and 7. The other two sites are located more than 200 metres from the 2016 study area and the addendum study areas.

Of the 51 registered sites, the most commonly recorded site type is artefact scatters, which account for almost 70% of all recorded site types (n=35). Isolated finds, and PADs have also been recorded, but with lesser frequency. Artefact sites with or without shell midden have also been recorded, as well as a single shell midden site. **Table 5.1** provides a summary of the frequency of these site types. The full database search has been included as **Appendix 2**. The distribution of previously recorded sites is shown in **Figure 1.1**.

**Table 5.1 Aboriginal Sites/Places Listed on the AHIMS Site Database within 5km of the Study Area**

Site Type	No.
Artefact scatter	35
Isolated find	5
Potential archaeological deposit (PAD)	5
Midden/artefact scatter	5
Midden	1
<b>Total</b>	<b>51</b>

A review of the archaeological context of the 2016 study area and addendum study areas has demonstrated that artefact scatters registered within the search area are predominately low density artefact scatters (with less than 56 recorded artefacts), and are most commonly found on ridge crests and ridge slopes.

The five PADs recorded on in the AHIMS search area were all recorded on spur slopes, and have been subject to subsurface testing since the initial recording:

- One PAD was determined not to be a site (#58-4-1073)
- One PAD (#58-4-1069) was determined to be a part of a pre-recorded site (#58-4-0955)
- PAD (#58-4-1070) was determined to be an artefact scatter and was re-registered as (#58-4-1109)
- PAD (#58-4-1071) was determined to be an isolated find and was re-registered as (#58-4-1110)
- PAD (#58-4-1072) was determined to be an isolated find and was re-registered as (#58-4-1111).

The five isolated finds were all recorded on slopes and include the two sites that were previously recorded as PAD.

The three midden/artefact scatter sites include only three artefacts each and shell species such as *Anadara* (saltwater bivalves) and *Saccostrea cucullata* (natural rock oyster). These sites were recorded on slopes and a creek flat. The single shell midden site was recorded about two kilometres south-east of the 2016 study area and addendum study areas.

Distribution of the sites across the landscape has been biased by the lack of archaeological survey and assessment across large portions of the AHIMS search area. It could also be a reflection of the fact works were conducted before it was legally required that Aboriginal cultural and archaeological assessment be undertaken. Therefore, while the presence of sites indicates Aboriginal use of an area, it does not follow that the lack of sites means Aboriginal people did not use an area.

## 5.2 Previous Archaeological Assessment in the Region

The majority of the archaeological survey and assessments conducted within the Nelligen region have been for housing subdivisions, proposed quarries, new transmission lines, academic research and as a component of a Eurobodalla based heritage study. Of these assessments, the most relevant is that completed as a component of the 2016 REF (Umwelt 2016), which will be discussed in detail in **Section 5.2.1.**

Previous archaeological research conducted for the Nelligen region is summarised in **Table 5.2.** Please note not all reports are available through OEH so relevant information has been summarised from other reports and available site cards when necessary. It should also be noted relevant information is not always recorded.

**Table 5.2 Previous archaeological research conducted for the Nelligen region**

Year	Author	Study Area	Site/PAD	Landform	Artefact Type	Distance and Direction From Current Study Areas
Unknown	Nicholson	Unknown	One artefact scatter	Ridge Crest	26 artefacts	4.2 km south-east
Unknown	Arncliffe	Unknown	One artefact scatter	Silt bank on edge of Clyde River	8 artefacts- Flakes, broken flakes, flaked pieces	3.5 km north.
Unknown	McKeown	Unknown	Two Artefact scatters	Ridge top	21 artefacts- Flakes and cores	2.6 to 4.3 km east.
Unknown	D. Wood	Unknown	One artefact scatter and midden	Creek flat	3 artefacts- 1 core and two silcrete flaked pieces	6.6 km south-east
Unknown	V. Wood	Unknown	One artefact scatter	Hill slope	56 artefacts, 45 chips, 6 flaked pieces, 4 cores and 1 flake	6.6 km south-east
Unknown	Hall	Unknown	One artefact scatter	Ridge Top	5 artefacts- 3 flaked pieces and 2 cores	6.7 km south-east
Unknown	State Forests of NSW	Unknown	Three artefact scatters	Ridge crest	Flakes	4.9 km north-west
1988	Hackwell	Archaeological survey of a housing subdivision at Nelligen, South Coast, NSW	Two artefact scatters	Ridge	Unknown	About 4.6 km west
1989	Kuskie	Archaeological investigations of the Nelligen Run, Potato Point & Dwyer's Creek Quarries on the South Coast of NSW	10 artefact scatters	Upper ridge slope, ridge crest, creek terrace, saddle, basal slope, simple slope,	33 artefacts-Flakes, broken flakes, flaked pieces, cores and blades	About 600 metres north to 2.5 km south-east



Year	Author	Study Area	Site/PAD	Landform	Artefact Type	Distance and Direction From Current Study Areas
1992	Paton	An Archaeological investigation of the proposed Ulladulla to Moruya 132Kv Transmission Line	One artefact scatter	Northern slope of ridge	4 artefacts- 3 flakes and 1 core	4.5 km south-east
1992	Williams	Report on the archaeological survey of a proposed subdivision of Lots 22, 23, 24, DP1068, Clyde Road, Batemans Bay.	Four artefact scatters	Ridge Top	22 artefacts and some shell	5.9 km south-east
1995	Kuskie	An Archaeological Assessment of Lot 8 DP 837396 at North Batemans Bay, South Coast NSW	Three artefact scatters, one isolated find	Ridge crest, ridge, basal slope simple slope	19 artefacts-Flakes, broken flakes, flaked pieces, cores and a hammerstone	6.7 km south-east
2002	Saunders	Lot 1 DP 1015889 and Lot 2 DP 865527, Kings Highway, North Batemans Bay, NSW. Archaeological Survey.	One artefact scatter, one artefact scatter and midden, three isolated finds	Basal slope, basal spur slope, mid spur slope	36 artefacts- Flakes, flaked pieces, cores and blades	About 6.5 km south-east
2002	Boot	Didthul, Bhundoo, Gulaga and Wadbilliga: An Archaeological Study of the Aboriginals of the New South Wales South Coast Hinterland.	Two artefact scatters and one isolated find	Slope, low terrace and saddle on north-west/south-east ridge	10 artefacts- Flaked pieces, core, flakes, broken flakes, clay hearths	About 3.4 to 5 km north

Year	Author	Study Area	Site/PAD	Landform	Artefact Type	Distance and Direction From Current Study Areas
2004	Saunders/McGregor	Lot 10 DP1015889 & Lot 2 DP865527, Kings Highway, North Batemans Bay: Archaeological Investigation of Six PAD's	Five PAD	lower spur slope, basal spur slope, mid spur slope	8 artefacts including flakes and a hammerstone	About 6.6 to 5.2 km south-east
2009	Carriage	Clyde River National PARK: Aboriginal Sites Inspection	One Midden and one midden and artefact scatter	Unknown	Unknown	4.9 to 2.4 km to the south
2014	Dibden	Lot 6 DP 263081 Windywoppa Road, Benandarah, via Batemans Bay NSW. Aboriginal Cultural Heritage Assessment Report	Two artefact scatters	Spur crest	38 artefacts- Cores, flakes and broken flakes	1.5 km to the north

### 5.2.1 The 2016 ACHA and AHIMS #58-4-1352

A visual survey of the 2016 study area was undertaken in October 2015 to inform an 'Aboriginal Archaeological Survey Report' in accordance with the Stage 2 requirements of the PACHCI (Umwelt 2016). The following summary of results was provided in this report:

- Ground surface visibility and exposure was relatively low except for within the riverbank landform
- Roads and Maritime Nelligen PAD1 was identified within the ridge slope landform on the eastern side of the Clyde River to the east of the Kings Highway. The PAD was identified to be approximately 10 by 20 metres in area
- Two trees identified by the Aboriginal stakeholders as having the potential to be burial markers were identified north of the Kings Highway and west of Clyde River, and outside of the 2016 study area
- No sites were identified through the survey

- No other areas of PAD were identified due to the absence of suitable low inclination landforms and/or the high level of identifiable disturbance.

### 5.2.2 AHIMS #58-4-1352

As noted above, AHIMS #58-4-1352 was originally recorded as a potential archaeological deposit (PAD) as part of the Aboriginal archaeological survey of the 2016 study area undertaken in 2015. The site was identified within a small section of near level ridge slope landform on the eastern side of the Clyde River, to the east of the Kings Highway. As originally recorded, the PAD was estimated to be approximately 10 by 20 metres in area.

At the time of recording, the Aboriginal cultural heritage significance of the site was assessed by key stakeholders as moderate, and the archaeological significance of the site was assessed by Umwelt (2016) as moderate on a local level and low on a regional level. Overall, the PAD was assessed as having low to moderate archaeological significance.

In April 2016, the PAD was subject to sub-surface test excavation in accordance with the Code of Practice (DECCW 2010a). As a result of the test excavations undertaken, a total of 14 artefacts were recovered from four test pits (each measuring 50cm by 50cm and located five metres apart) within AHIMS #58-4-1352 ('Roads and Maritime Nelligen PAD1', later renamed 'Roads and Maritime Nelligen Artefact Scatter 1'). This included eight broken flakes, three complete flakes, two cores and one flaked piece, of which all were manufactured from quartz. Artefacts were excavated from each of the four test pits, and the assemblage was interpreted to confirm that a low density and low complexity selection of artefacts were present within the registered site location. An analysis of the soil profile in all test pits demonstrated that 'the study area had been previously disturbed and did not retain an intact soil profile.' (Umwelt 2016:16).

Following the test excavations, the significance of the site was re-assessed. The archaeological significance of 'Roads and Maritime Nelligen AS1' was assessed by Umwelt (2016) as low on both a local and a regional level. The level of significance was reduced after subsurface testing because the site was found to be disturbed, there was no assemblage complexity, and quartz is locally available. It was therefore determined that there would be little learned by further investigation of the site. Overall, and following test excavation, 'Roads and Maritime Nelligen AS1' was assessed as having low archaeological significance.

## 5.3 Summary of the Archaeological Context

Based on the information outlined above, the following summary of the archaeological context of the addendum study areas is provided below:

- The majority of the sites recorded locally are low density artefact scatters
- Isolated finds and PADs are the next most common site type recorded in the surrounding landscape
- Middens with low density artefact scatters and a midden have also been recorded within five kilometres of the addendum study areas
- Sites are more commonly recorded in association with ridges, ridge crests and ridge slopes
- Sites are also recorded on creek flats, creek terraces, spurs, saddles and slopes
- The most common artefact type is flake. However, broken flakes, flaked pieces, hammerstones, cores (including blade, bipolar and fragments), flaked pieces, manuports and a broken blade have been recorded

- Raw materials recorded include quartz, silcrete, chert, volcanic, quartzite, fine grained volcanic, acid volcanic, porphyry, rhyolite and sandstone
- There is no single dominant raw material. However, quartz, volcanic and silcrete are most commonly used
- The 2016 study area contained a sub-surface artefact scatter comprising 14 artefacts excavated from 4 test pits. This artefact assemblage was composed entirely of quartz and was assessed as a low density artefact scatter. The assessment of the remainder of the 2016 study area did not identify any other sites or areas of PAD based on the nature of the identified landforms and/or the extent of prior disturbance.



## 6.0 Visual Inspection

A visual inspection of the addendum study areas was undertaken by Nicola Roche, Manager Cultural Heritage, on 3 October 2018. Also in attendance was Uncle Les Simon of the Batemans Bay LALC. The visual inspection was undertaken on foot where practical, and from within a vehicle where pedestrian survey was deemed unnecessary, impractical and/or unsafe. Within Addendum Study Area 2, vehicle movements for heavy vehicle inspection and truck marshalling will be limited to the areas of existing road infrastructure. No additional vegetation clearance or ground surface impacts are required in this area outside the current road alignments. This portion of Addendum Study Area 2 was therefore not subject to inspection.

As discussed at **Section 1.2** and shown in **Figure 1.1**, a total of seven discrete addendum study areas have been identified for the purposes of this assessment. These areas have been determined based on their variable accessibility, associated landforms, and geographical location relative to the 2016 study area.

The following table summarises the results of the visual inspection of the addendum study areas.

**Table 6.1 Results of the visual inspection of the addendum study areas**

Addendum Study Area	Description	Archaeological sites	Archaeological Potential	Plates
1	<p>Predominantly undifferentiated floodplain with heavy coverage of pasture grass and weeds. Area has been subject to modification as a result of agricultural use, including the establishment of drainage features (potentially impacting a former watercourse on the northern boundary of this area). Area subject to substantial inundation in major flood events and consequently is likely that upper portion of soil profile is post-European accumulation. There is potential that sub-surface deposits may be present below modern flood deposits but the proposed works will not involve impacts at depth.</p> <p>South-eastern portion of this area includes section of steep to moderately inclined slopes. Existing access track within this area has been cut into slope, revealing that soils are very shallow, with exposed bedrock in sections. Based on the inclination of slopes, lack of topsoil and evidence of prior disturbance, there is limited potential for sub-surface deposits.</p>	None	Low within extent of proposed works	6.1 and 6.2
2	<p>The portion of this area subject to inspection comprised an existing stock pile area and a section of moderately inclined slopes bordering the Kings Highway. The existing stock pile has been constructed via the deposition of fill to establish a level surface and therefore has been entirely modified and has no archaeological potential.</p> <p>The adjoining slopes to the west are largely cleared, with a section of dense regrowth native vegetation along the north-eastern extent. Based on areas of exposure and visibility within this area, soils are skeletal. Based on the slope inclination and lack of topsoil, there is limited potential for sub-surface deposits in this area</p>	None	<p>None within existing stockpile</p> <p>Low within adjoining area</p>	6.3 and 6.4
3	<p>This area comprises heavily disturbed minor crest. Disturbance relates to the presence of two established property access roads within which topsoil deposits have been largely removed. One small section of native vegetation remains between the two driveways and comprises regrowth vegetation.</p> <p>Based on the extent of prior disturbance and the absence of topsoil, there is limited potential for sub-surface deposits in this area</p>	None	Low	6.5

Addendum Study Area	Description	Archaeological sites	Archaeological Potential	Plates
4	<p>This area comprises the modified banks of the Clyde River and the existing streetscape of Braidwood Road and Wharf St. The portion of this area immediately bordering the Clyde River has been substantially modified by the installation of bank stabilisation works, public open space (including a playground) and construction of the road and bike paths. The remaining portion of this area includes current road alignments, footpaths, services and heavily landscape footpaths.</p> <p>The extent of modification in this area is such that this is little to no potential that archaeological deposits will remain extant in this area.</p>	None	Low	6.6 and 6.7
5	<p>This area immediately borders the Kings Highway. It has been highly modified by the construction of the highway and associated drainage features. Prior to modification, it is likely that the majority of this area comprised low-lying readily inundated landforms.</p> <p>Based on the extent of modification and the nature of original landforms in this area, there is little to no potential that archaeological deposits will remain extant.</p>	None	Low	6.8
6	<p>This area borders Old Nelligen Road and has been subject to substantial disturbance across much of the area due to the construction of this road and the Kings Highway. The remaining portions of this area comprise moderately inclined slopes leading to an existing powerline easement within the 2016 study area. The area has been largely cleared of vegetation, with limited grass coverage. Soils within this area comprise a very thin layer of topsoil that appears to have been subject to ongoing sheetwash erosion.</p> <p>Based on the extent of modification and the nature of original landforms in this area, there is little to no potential that archaeological deposits will remain extant.</p>	None	Low	6.9 and 6.10
7	<p>This area comprises moderate to steeply inclined slopes bordering Thule Road. In this area, appears to have been partially cut into the natural slope and is heavily disturbed. The portion of this area outside the formed road contains dense regrowth vegetation and is very steeply inclined. Based on the nature of the soils in the surrounding area and sections of visible soil profile along Thule Road, there is little to no remaining topsoil in this area. There is signage for the presence of existing Telstra infrastructure in this area</p> <p>Based on the inclination of slopes, lack of topsoil and evidence of prior disturbance, there is limited potential for sub-surface deposits.</p>	None	Low	6.11 and 6.12





**Plate 6.1** View across undifferentiated alluvial flat in Addendum Study Area 1

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**Plate 6.2** View along cut for access track on slope landforms within Addendum Study Area 1

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**Plate 6.3** View showing extent of fill associated with current stockpile area

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**Plate 6.4** View across slopes within Addendum Study Area 2

© Umwelt, 2018





**Plate 6.5** View of regrowth vegetation between driveways in Addendum Study Area 3

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**Plate 6.6** View of Addendum Study Area 4 from Clyde River

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**Plate 6.7** View of Addendum Study Area 3 facing east along Braidwood Road

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**Plate 6.8** View within Addendum Study Area 5 showing existing drainage works (facing east near intersection of Kings Highway and Braidwood Road)

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**Plate 6.9** Addendum Study Area 6 view south-west to 2016 study area

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**Plate 6.10** Addendum Study Area 6 view along Old Nelligen Road and adjacent access track showing extent of disturbance

© Umwelt, 2018





**Plate 6.11** View along Thule Road showing cut into slope



**Plate 6.12** View along Thule Road showing the location of existing Telstra infrastructure

## 6.1 Summary

During the survey of the addendum study areas, no new Aboriginal archaeological sites (including scarred trees) were identified. Levels of visibility and exposure across all of the surveyed areas were relatively low, thereby necessitating consideration of whether Aboriginal objects could be present but not visible.

With reference to this, where trees were present within the addendum study areas, they primarily comprised regrowth vegetation and therefore are not sufficiently old to have been subject to scarring by Aboriginal people. As discussed throughout the preceding section, consideration was also given to the potential for Aboriginal archaeological deposits to be present in a sub-surface context. This potential was assessed as low to nil for all of the addendum study areas based on the nature of the landforms, the limited extent of topsoil deposits and/or the impacts of existing disturbance factors. This outcome is consistent with the results of the 2016 assessment for areas immediately adjoining the addendum study areas.

As discussed in **Section 3.2**, this assessment is also consistent with that provided by Batemans Bay Local Aboriginal Land Council.

## 7.0 Consideration of Proposed Work Against the Due Diligence Code

The due diligence code (as discussed in **Section 2**) provides guidance on when it is necessary to seek an AHIP for proposed works. Section 8 of the due diligence code outlines the process to guide due diligence assessments, summarised below in relation to the proposed works. Consideration of the requirements of the due diligence code is consistent with the level of assessment undertaken under the Stage 2 requirements of the Roads and Maritime PACHCI.

1: *Will the activity disturb the ground surface or any culturally modified trees?*

Yes. As discussed in **Section 1.2**, the proposed works will involve ground disturbance within the addendum study areas. The majority of the works will result in limited sub-surface disturbance; this includes proposed laydown, marshalling, stockpiling, and compound areas, and new road tie-ins. Greater sub-surface disturbance is proposed in association with utility relocation works, culvert extensions, vegetation clearance and the development of a spill contamination basin and roadside swales.

Some of the existing trees within the addendum study areas are to be removed where required to facilitate the proposed works. However, none of the trees present were identified during the visual inspection to be of an age suitable for cultural modification, and no evidence of cultural modification was identified.

2: *Are there any:*

a) *Relevant confirmed site records or other associated landscape feature information on AHIMS?*

As discussed in **Section 5.0**, one Aboriginal archaeological site has been registered within the 2016 study area and in proximity to the addendum study areas. This site, AHIMS #58-4-1352, was subject to test excavation in 2016 and was subsequently approved for harm under AHIP C0003256. AHIMS #58-4-1352 was originally recorded as a PAD, and later recognised as a low density sub-surface artefact site following the recovery of 14 artefacts from four test pits as part of the test excavations.

No other sites have been previously recorded in or within 200 metres of the addendum study areas. The next closest site is an artefact scatter located approximately 260 metres east of Addendum Study Area 1, at its closest point.

b) *Any other sources of information of which a person is already aware?*

Based on a review of the environmental context, as well as an understanding of other archaeological sites recorded in the wider area, it is considered the most likely site type to occur in the area (if present) would be sites containing stone artefacts. PADs and shell midden sites may also be present.

Based on the location of previously recorded sites in the vicinity, such sites, if present, are most likely to be located on ridge slopes and crests (artefact sites and PADs) or on creek flats (shell middens sites), and within land that has been subject to relatively limited disturbance.



c) *Landscape features that are likely to indicate the presence of Aboriginal objects?*

The due diligence code identifies landscape features that indicate the likely existence of Aboriginal objects as including areas within 200 metres of waters. The proposed works are to occur across and in close proximity to a reliable water course, being the Clyde River. The Clyde River is estuarine at Nelligen and would have provided abundant resources for Aboriginal people who used and occupied the area in the past. There is also a minor creek mapped to the east of the Clyde River and north of the Kings Highway which may have supplied fresh water for Aboriginal people but now appears to have been substantially modified for drainage purposes.

The location of the addendum study areas in association with areas of alluvial floodplain that border the Clyde River can also be indicative of Aboriginal archaeological potential, as this landform is associated with water sources that are likely to have been targeted by Aboriginal people in the past both for occupation and use. In addition, alluvial deposition can act to cap archaeological deposits, thereby protecting them at considerable depth. Conversely, alluvial processes can also act to destroy archaeological sites by washing away deposits and/or eroding landforms containing deposits. The nature of flood events dictates which of these is most likely, with gradual flooding most likely to result in the protection of archaeological sites and substantial, dynamic flooding most likely to result in impacts to archaeological sites.

The broader landscape of which the addendum study areas form part is likely to have been utilised by Aboriginal people accessing the resources of the Clyde River. In order to clarify the potential sensitivities of the addendum study areas specifically, a visual inspection of the addendum study areas was undertaken as part of a Stage 2 assessment under the PACHCI.

3: *Desktop Assessment and Visual Inspection:*

**Sections 4.0 to 6.0** of this report provide the details of the desktop assessment and visual inspection of the addendum study areas. No Aboriginal objects were identified within the addendum study areas, and no vegetation within the addendum study areas was identified to be suitable for or show any evidence of cultural modification, including scarring.

The broader landscape has proven potential to contain Aboriginal archaeological material, particularly in the form of stone artefact sites. Where present, artefact sites have predominately comprised a low density of artefacts, and have been identified in association with specific landforms, such as ridge slopes and spurs, and within areas that have been subject to relatively limited disturbance.

No Aboriginal archaeological sites were identified during the visual inspection of the addendum study areas. In addition, for the reasons outlined in **Table 6.1**, the addendum study areas were assessed as having low or no archaeological potential within the areas subject to proposed impacts.

On this basis, there is no requirement to seek an AHIP or a variation to the current AHIP in relation to the proposed works.

## 8.0 Recommendations

The following recommendations are made with reference to the requirements of the NPW Act, the NPW Regulation, the Roads and Maritime PACHCI and the due diligence code, as well as the findings of this assessment as presented throughout this report.

It is noted that these recommendations are provided from an archaeological perspective. Input received from the Bateman's Bay LALC has been attached to this report at **Appendix 1**, for reference and does not make specific recommendations.

- The addendum study areas have been assessed to have a nil-low or low degree of archaeological potential. As such, there are no identified constraints to works proceeding within the addendum study areas, provided the below recommendations are followed and provided that the works undertaken are consistent with those described in this report.
- In the unlikely event that an Aboriginal object is identified whilst carrying out works, all activities in the immediate vicinity of the identified Aboriginal object should cease and a suitably qualified archaeologist should be contacted to confirm the validity of the object. Should the object be confirmed to be of Aboriginal cultural origin, the landholder/contractor must notify OEH and may need to apply for an AHIP prior to the recommencement of further ground disturbance works in proximity to that object.
- All persons working on site that are involved in ground disturbing works should be made aware that it is an offence under Section 86 of the NPW Act to harm or desecrate an Aboriginal object unless that harm or desecration is the subject of an approved Aboriginal Heritage Impact Permit (AHIP).

## 9.0 References

DoM, 1974, *Metallogenic Map Sheet, 1:250,000 Ulladulla (S1 56-13)*, published by Geological Survey of NSW, NSW Department of Mines, Compiled by G. McIlveen - First Edition 1974.

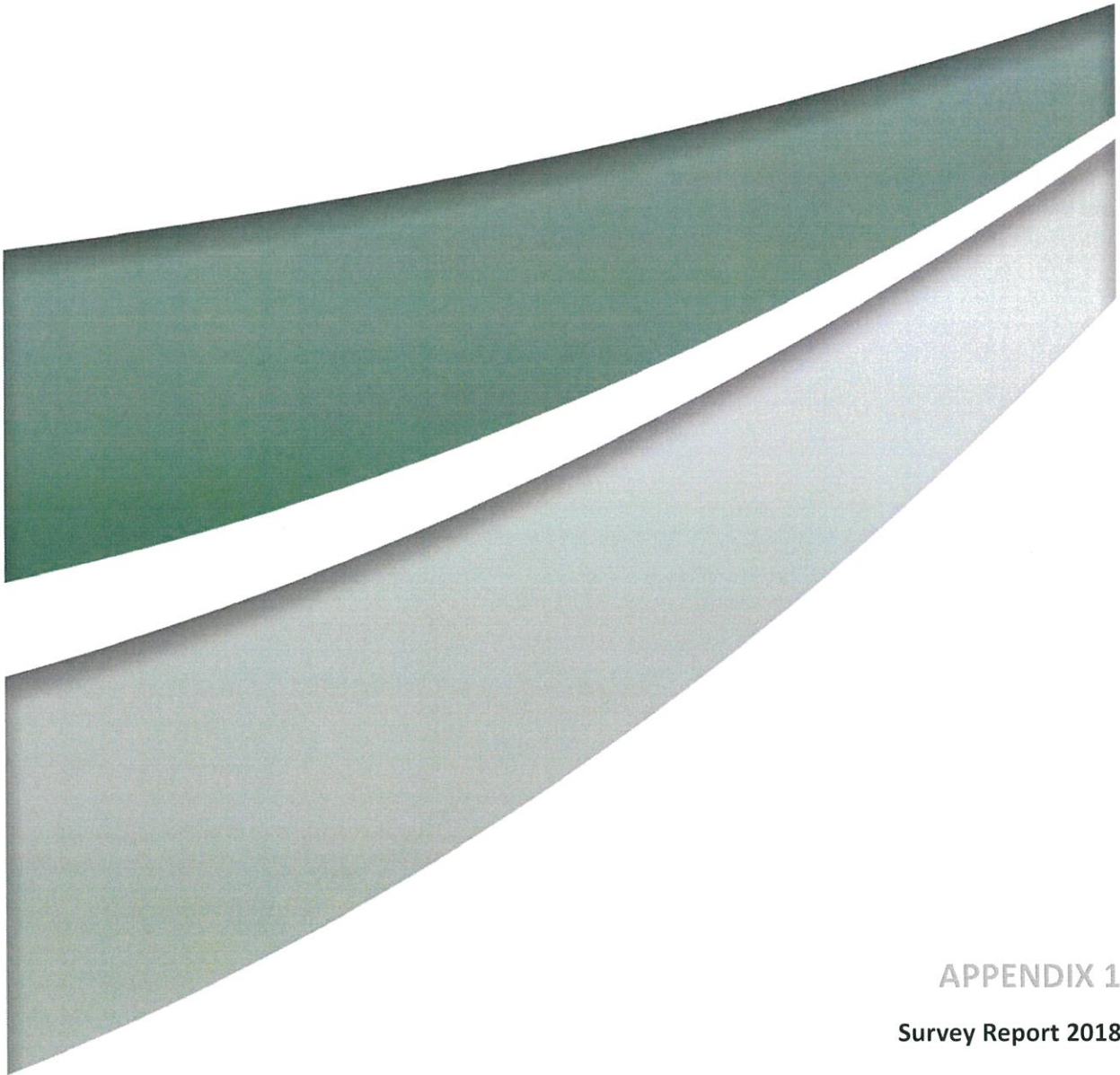
Morgan, G., 2001, *Delineation and Description of the Eastern Environmental Subregions provinces in New South Wales Study*, NSW National Parks and Wildlife Service, Hurstville, accessed online October, 2015 : <http://www.environment.nsw.gov.au/bioregions/Bioregions.htm>.

New South Wales National Parks and Wildlife Service NPWS 2003 *The Bioregions of New South Wales: their Biodiversity, Conservation and History*, New South Wales National Parks and Wildlife Service, Hurstville.

Strategic Environmental and Engineering Consulting (SEEC), 2016, *Erosion and Sediment Management Report: Replacement of the Kings Highway Bridge over the Clyde River at Nelligen*.

Umwelt, 2016, *Nelligen Bridge Replacement – Aboriginal Cultural Heritage Assessment*, prepared for Roads and Maritime.





## APPENDIX 1

Survey Report 2018

# **NELLIGEN BRIDGE REPLACEMENT PROJECT**

## **Aboriginal stakeholder cultural heritage survey report**

STAGE 2 – ROADS AND MARITIME SERVICES PROCEDURE FOR  
ABORIGINAL CULTURAL HERITAGE CONSULTATION AND  
INVESTIGATION (RESOURCE 7)

**OCTOBER 2018**

## **Aboriginal stakeholder cultural heritage survey report**

### **1. Purpose of this assessment**

This assessment forms part of the Stage 2 assessment of the Roads and Maritime Services (RMS) *Procedure for Aboriginal Cultural Heritage Consultation and Investigation*. Its purpose is to determine whether any features of Aboriginal cultural significance occur within the study area for this project, and whether they would be affected by the project. This assessment will be used to assist the RMS in determining whether further assessment and consultation is required for this project.

### **2. Project details: (provide the following information)**

- a) Project title: Nelligen Bridge Replacement Project
- b) Location of study area: Nelligen
- c) Name of Aboriginal site officer(s) completing this assessment:  
Uncle Les Simon
- d) Name of Aboriginal organisation(s) represented by this survey:  
Batemans Bay Local Aboriginal Land Council
- e) Name of site officer(s) who undertook site survey:  
Uncle Les Simon
- f) Date of survey: Wednesday 3<sup>rd</sup> October 2018



(If additional space is required, please attach sheets)



### 3. Methodology:

- a) Approximately how much of the total project area was surveyed (eg 10%-100%) and why? (Eg Certain areas were heavily disturbed, properties were inaccessible, ground visibility was poor, difficult weather conditions, etc.)

100%

- b) How was the survey undertaken? (Eg On foot, by car, individually, in groups, other? If other people were involved in the survey, please provide their names and name of their organisation, if relevant)

On foot.



#### 4. Results:

- a) Please provide a description of the area surveyed. Include a description of the total area covered, landforms, built areas, etc. Where appropriate, survey areas should be identified on a map/plan.

Floodplain area on Nth West
Side of the Nellygen Bridge.



b) Were any of the following features identified during the survey? (Please tick as required)

- ☐ stone tools or flakes      ☐ hearths      ☐ shell middens
- ☐ scarred trees      ☐ shelters      ☐ art sites
- ☐ bora circles      ☐ significant spiritual or social areas
- ☐ totems      ☐ significant cultural landscape features
- ☐ other – please state:

If any of the above items were ticked, please provide a description including the location, quantity, size, condition and significance of the feature, if known. Where considered appropriate, this information should be identified on a map/plan).

NO - Possible camping & gathering area.



(If additional space is required, please attach sheets)

- c) Is it likely that any of the above features may be present in the study area, despite not being positively identified during the survey?  
No. Yes. (If yes, where are they considered likely to occur?)

Edge of the tree line.

- d) If known, please provide a description of the natural resources used by Aboriginal people that are, or would have been, available within the study area. Please describe the significance of these resources to past and present Aboriginal communities.

Canning & gathering area.





- e) Please provide a description of past disturbances to the study area, if known, and how this may have affected Aboriginal cultural heritage features.

Farm use - cattle run.



## 5. Conclusion:

Is the project likely to affect any significant known or potential Aboriginal cultural heritage features as identified by the survey?

☒ No.

☐ Yes. (If yes, please describe the features and how they would be affected).

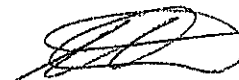



This assessment has been completed by:

Name:

LES SIMON

Provide name



Provide signature

Position title:

ELDER SITE OFFICER.

Provide title

Organisation name:

BATEMANS BAY LALC.

Provide name of Aboriginal organisation

On the following date:

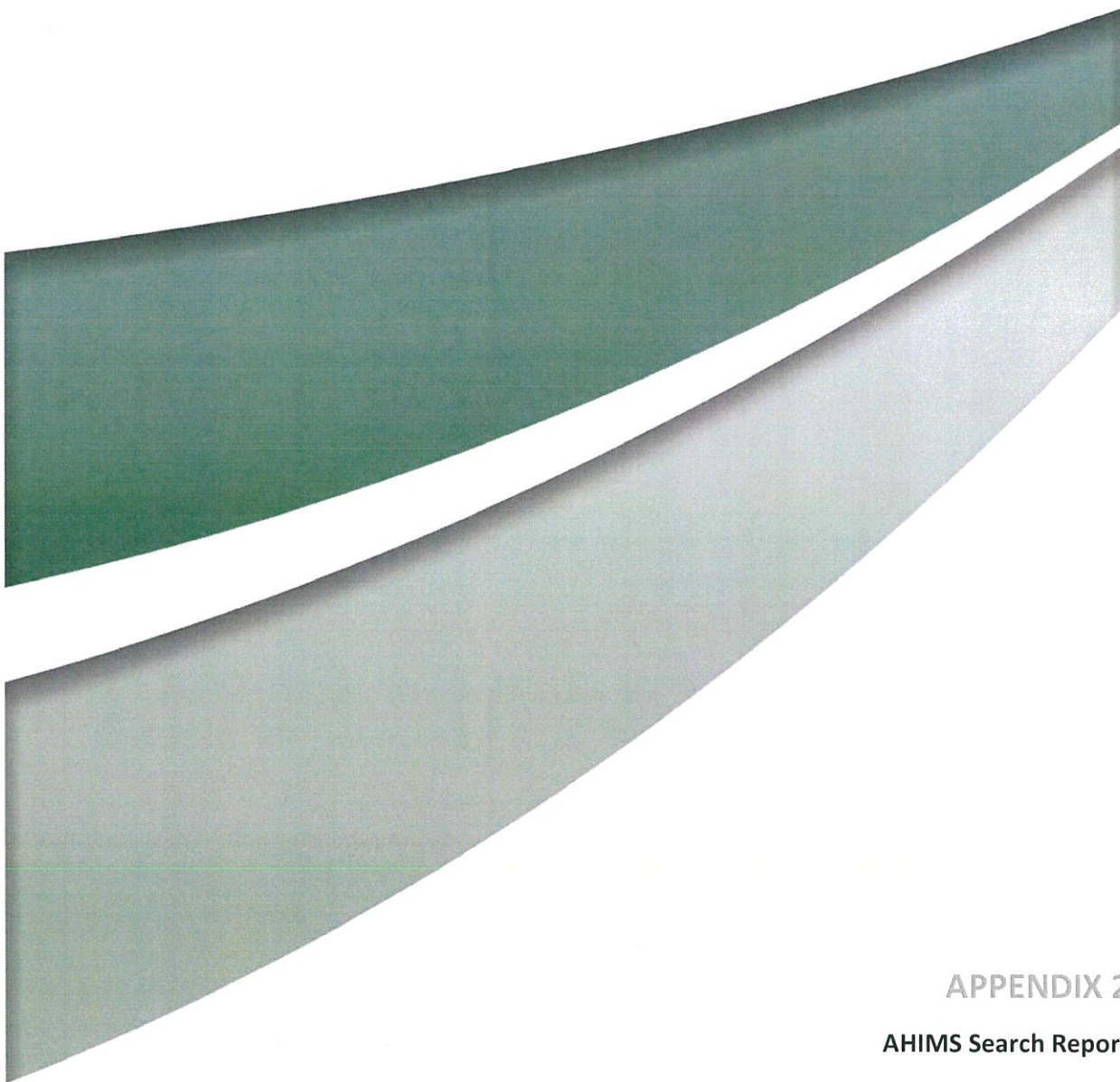
03/10/2018

Insert date









## APPENDIX 2

### AHIMS Search Report

# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref/PO Number : Nelligen

Client Service ID : 373453

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
58-4-0719	PB 130; <a href="#">Contact</a>	AGD	56	240720	6054620	Open site	Valid	Artefact : -	Open Camp Site	99058
58-4-0720	PB 131; <a href="#">Contact</a>	AGD	56	241340	6056160	Open site	Valid	Artefact : -	Open Camp Site	99058
58-4-0526	Holmes Lookout A1; <a href="#">Contact</a>	AGD	56	243180	6047420	Open site	Valid	Artefact : -	Open Camp Site	
58-4-0238	89/PK/33; <a href="#">Contact</a>	AGD	56	242300	6051300	Open site	Valid	Artefact : -	Open Camp Site	
58-4-0239	89/PK/32; <a href="#">Contact</a>	AGD	56	242350	6051350	Open site	Valid	Artefact : -	Open Camp Site	
58-4-0240	89/PK/29; <a href="#">Contact</a>	AGD	56	242400	6052200	Open site	Valid	Artefact : -	Open Camp Site	
58-4-0241	89/PK/28; <a href="#">Contact</a>	AGD	56	242200	6051400	Open site	Valid	Artefact : -	Open Camp Site	
58-4-0243	89/PK/27; <a href="#">Contact</a>	AGD	56	241700	6051700	Open site	Valid	Artefact : -	Open Camp Site	
58-4-0244	89/PK/26; <a href="#">Contact</a>	AGD	56	241600	6051800	Open site	Valid	Artefact : -	Open Camp Site	
58-4-0245	89/PK/24; <a href="#">Contact</a>	AGD	56	241100	6051800	Open site	Valid	Artefact : -	Open Camp Site	
58-4-0482	River Rod; <a href="#">Contact</a>	AGD	56	240700	6054600	Open site	Valid	Artefact : -	Open Camp Site	
58-4-0280	89/DM/38;Benandarah State Forest; <a href="#">Contact</a>	AGD	56	243300	6049700	Open site	Valid	Artefact : -	Open Camp Site	
58-4-0288	89/DM/20;Boyne State Forest; <a href="#">Contact</a>	AGD	56	245200	6052700	Open site	Valid	Artefact : -	Open Camp Site	
58-4-0423	No.3; <a href="#">Contact</a>	AGD	56	236400	6051400	Open site	Valid	Artefact : -	Open Camp Site	1997
58-4-0424	No1+2; <a href="#">Contact</a>	AGD	56	236600	6051700	Open site	Valid	Artefact : -	Open Camp Site	1997
58-4-0237	89/PK/35; <a href="#">Contact</a>	AGD	56	242350	6050950	Open site	Valid	Artefact : -	Open Camp Site	
58-4-0692	Liamena 4; <a href="#">Contact</a>	AGD	56	245900	6047300	Open site	Valid	Artefact : -	Open Camp Site	

Report generated by AHIMS Web Service on 28/09/2018 for Karyn Virgin for the following area at Datum :GDA, Zone : 56, Eastings : 236500 - 246500, Northings : 6046500 - 6056500 with a Buffer of 50 meters. Additional Info : research. Number of Aboriginal sites and Aboriginal objects found is 52

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# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref/PO Number : Nelligen

Client Service ID : 373453

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
58-4-0693	Liamena 3; <a href="#">Contact</a>	AGD	56	245950	6047130	Open site	Valid	Artefact : - <a href="#">Permits</a>	Open Camp Site	767
58-4-0694	Liamena 2; <a href="#">Contact</a>	AGD	56	245950	6046730	Open site	Valid	Artefact : - <a href="#">Permits</a>	Isolated Find	767
58-4-0695	Liamena 1; <a href="#">Contact</a>	AGD	56	246150	6046730	Open site	Valid	Artefact : - <a href="#">Permits</a>	Open Camp Site	767
58-4-0651	UM 4 <a href="#">Contact</a>	AGD	56	243500	6047300	Open site	Valid	Artefact : - <a href="#">Permits</a>	Open Camp Site	2253
58-4-0659	CR-4 <a href="#">Contact</a>	AGD	56	245650	6046700	Open site	Valid	Artefact : 3, Shell : 1 <a href="#">Permits</a>	Open Camp Site	2319
58-4-0660	CR-2 <a href="#">Contact</a>	AGD	56	245230	6047360	Open site	Valid	Artefact : 15, Shell : 10 <a href="#">Permits</a>	Open Camp Site	2319
58-4-0661	CR-3 <a href="#">Contact</a>	AGD	56	245500	6047000	Open site	Valid	Artefact : 4 <a href="#">Permits</a>	Open Camp Site	2319
58-4-0987	TR 23 <a href="#">Contact</a>	AGD	56	241350	6055110	Open site	Valid	Artefact : 1 <a href="#">Permits</a>		98358,98359,98360,99058
58-4-0955	KPH2 <a href="#">Contact</a>	AGD	56	245260	6046380	Open site	Valid	Artefact : 30 <a href="#">Permits</a>		98990
58-4-0242	89/PK/39; <a href="#">Contact</a>	AGD	56	243300	6049700	Open site	Valid	Artefact : - <a href="#">Permits</a>	Open Camp Site	2099,2100
58-4-0899	surfside 1 <a href="#">Contact</a>	AGD	56	245930	6046460	Open site	Valid	Artefact : - <a href="#">Permits</a>	Open Camp Site	
58-4-0900	Surfside 2 <a href="#">Contact</a>	AGD	56	245960	6046450	Open site	Valid	Shell : -, Artefact : - <a href="#">Permits</a>	Midden	
58-3-0003	N12 <a href="#">Contact</a>	AGD	56	246250	6046700	Open site	Valid	Artefact : - <a href="#">Permits</a>	Open Camp Site	
58-4-1069	PAD 3 (cnr Princes/Kings Highway) <a href="#">Contact</a>	AGD	56	245500	6046500	Open site	Partially Destroyed	Potential Archaeological Deposit (PAD) : 1 <a href="#">Permits</a>		98246,98990
58-4-1070	PAD 4 (cnr Princes/Kings Highway) <a href="#">Contact</a>	AGD	56	245370	6046730	Open site	Partially Destroyed	Potential Archaeological Deposit (PAD) : 1 <a href="#">Permits</a>		98246,98990

Report generated by AHIMS Web Service on 28/09/2018 for Karyn Virgin for the following area at Datum :GDA, Zone : 56, Eastings : 236500 - 246500, Northings : 6046500 - 6056500 with a Buffer of 50 meters. Additional Info : research. Number of Aboriginal sites and Aboriginal objects found is 52

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
58-4-1071	PAD 5 (cnr Princes/Kings Highway)	AGD	56	245335	6047000	Open site	Partially Destroyed	Potential Archaeological Deposit (PAD) : 1		98246,98990
	<u>Contact</u>	<u>Recorders</u>	Ms.Trish Saunders,Doctor.Oliver Macgregor					<u>Permits</u>	1927,1928,2099,2100	
58-4-1072	PAD 6 (cnr Princes/Kings Highway)	AGD	56	245160	6047050	Open site	Partially Destroyed	Potential Archaeological Deposit (PAD) : 1		98246,98990
	<u>Contact</u>	<u>Recorders</u>	Ms.Trish Saunders,Doctor.Oliver Macgregor					<u>Permits</u>	1927,1928,2099,2100	
58-4-1073	PAD 7 (cnr Princes/Kings Highway)	AGD	56	245100	6047340	Open site	Partially Destroyed	Potential Archaeological Deposit (PAD) : 1		98246,98990
	<u>Contact</u>	<u>Recorders</u>	Ms.Trish Saunders,Doctor.Oliver Macgregor					<u>Permits</u>	1927,1928	
58-4-1109	KPH6 (PAD4)	AGD	56	245345	6046707	Open site	Valid	Artefact : 1		98990
	<u>Contact</u> T Russell	<u>Recorders</u>	Ms.Trish Saunders					<u>Permits</u>	2099,2100	
58-4-1110	KPH7 (PAD5)	AGD	56	245360	6046985	Open site	Valid	Artefact : 3, Shell : 1		98990
	<u>Contact</u> T Russell	<u>Recorders</u>	Ms.Trish Saunders					<u>Permits</u>	2099,2100	
58-4-1111	KPH8 (PAD6)	AGD	56	245500	6047045	Open site	Valid	Artefact : 1		98990
	<u>Contact</u> T Russell	<u>Recorders</u>	Ms.Trish Saunders					<u>Permits</u>	2099,2100	
58-4-1263	KPH3A	AGD	56	245370	6046390	Open site	Valid	Artefact : 1		
	<u>Contact</u>	<u>Recorders</u>	Ms.Trish Saunders					<u>Permits</u>		
58-4-1264	CR-1	AGD	56	244860	6047600	Open site	Valid	Artefact : 2		2319
	<u>Contact</u>	<u>Recorders</u>	Mr.Doug Williams					<u>Permits</u>		
58-4-1282	Redgum Camp 1 and 2	GDA	56	242156	6048982	Open site	Valid	Shell : 50		101392
	<u>Contact</u>	<u>Recorders</u>	Miss.Kristine Carriage					<u>Permits</u>	3131	
58-4-1281	Beach Camp Clyde River NP	GDA	56	240317	6046502	Open site	Valid	Shell : -, Artefact : -		101392
	<u>Contact</u>	<u>Recorders</u>	Miss.Kristine Carriage					<u>Permits</u>	3131	
58-4-1378	Old Nelligen Road 1	GDA	56	241942	6051258	Open site	Valid	Artefact : -		
	<u>Contact</u>	<u>Recorders</u>	Doctor.Julie Dibden,NSW Archaeology Pty Ltd					<u>Permits</u>		
58-4-1374	Kings Highway 1 (KH1)	GDA	56	242800	6050053	Open site	Valid	Artefact : -		
	<u>Contact</u>	<u>Recorders</u>	Doctor.Julie Dibden,Doctor.Julie Dibden,NSW Archaeology Pty Ltd,NSW Archaeolog					<u>Permits</u>		
58-4-1375	Old Nelligen Road 1 (OldNR1)	GDA	56	241942	6051258	Open site	Valid	Artefact : -		
	<u>Contact</u>	<u>Recorders</u>	Doctor.Julie Dibden,NSW Archaeology Pty Ltd					<u>Permits</u>		
58-4-0236	89/PK/38;	AGD	56	242850	6050400	Open site	Valid	Artefact : -	Open Camp Site	
	<u>Contact</u>	<u>Recorders</u>	Mr.Peter Kuskie					<u>Permits</u>		
58-4-1160	232/3	AGD	56	236520	6052590	Open site	Valid	Artefact : -		
	<u>Contact</u> T Russell	<u>Recorders</u>	State Forests of NSW - Batemans Bay					<u>Permits</u>		

Report generated by AHIMS Web Service on 28/09/2018 for Karyn Virgin for the following area at Datum : GDA, Zone : 56, Eastings : 236500 - 246500, Northings : 6046500 - 6056500 with a Buffer of 50 meters. Additional Info : research. Number of Aboriginal sites and Aboriginal objects found is 52

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**AHIMS Web Services (AWS)**  
**Extensive search - Site list report**

Your Ref/PO Number : Nelligen

Client Service ID : 373453

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
58-4-1161	232/2	AGD	56	236530	6053080	Open site	Valid	Artefact : -		
	<u>Contact</u> T Russell					<u>Recorders</u> State Forests of NSW - Batemans Bay		<u>Permits</u>		
58-4-1166	232/1	AGD	56	236630	6053060	Open site	Valid	Artefact : -		
	<u>Contact</u> T Russell					<u>Recorders</u> State Forests of NSW - Batemans Bay		<u>Permits</u>		
58-4-1340	Benandarah SU1/L1	GDA	56	241189	6052917	Open site	Valid	Artefact : -		103024,103025
	<u>Contact</u>					<u>Recorders</u> Doctor:Julie Dibden		<u>Permits</u>	3700	
58-4-1341	Benandarah SU1/L2	GDA	56	241696	6052796	Open site	Valid	Artefact : 2		103024,103025
	<u>Contact</u>					<u>Recorders</u> Doctor:Julie Dibden		<u>Permits</u>	3700	
58-4-1352	RMS Nelligen Artefact Scatter 1	GDA	56	241635	6051090	Open site	Valid	Artefact : -		103843
	<u>Contact</u>					<u>Recorders</u> Umwelt (Australia) Pty Limited,Mr.Kirwan Williams		<u>Permits</u>	4206	

Report generated by AHIMS Web Service on 28/09/2018 for Karyn Virgin for the following area at Datum :GDA, Zone : 56, Eastings : 236500 - 246500, Northings : 6046500 - 6056500 with a Buffer of 50 meters. Additional Info : research. Number of Aboriginal sites and Aboriginal objects found is 52

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#### Newcastle

75 York Street  
Terong NSW 2294

Ph: (02) 4950 5332

#### Perth

10 Ross Way  
West Perth WA 6005  
Level 1  
12 Thistle Street  
West Perth WA 6005

Ph: (08) 762 367

#### Canberra

10 Ross Way  
58 Blackall Street  
O'Connor ACT 2602

Ph: (02) 6263 9456

#### Sydney

10 York Street  
Sydney NSW 2000

Ph: (02) 762 367

#### Brisbane

Level 11  
570 Queen Street  
Brisbane QLD 4000

Ph: (07) 792 367

[www.umwelt.com.au](http://www.umwelt.com.au)

## Appendix E

### Predicted noise levels to all sensitive receivers

Predicted construction noise levels: Standard construction hours

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
<b>Residential:</b> Noticeable / Clearly audible <b>Moderately intrusive</b> <b>Highly intrusive</b> <b>Bold</b> Highly noise affected <b>Non-residential:</b> Exceeds noise management level							
C01	Lot 1 Wharf Street	Commercial	NCA01	74	59	50	-
C02	Lot 1 Wharf Street	Commercial	NCA01	71	59	50	-
C03	7 Braidwood Street	Commercial	NCA01	97	60	51	N, V
C04	8 Braidwood Street	Commercial	NCA01	100	56	47	N, V
C05	9 Braidwood Street	Commercial	NCA01	105	56	47	N, V
H01	Kings Highway	Residential	NCA01	63	40	31	N, V
H02	Kings Highway	Residential	NCA01	60	42	33	N, V
H03	Kings Highway	Residential	NCA01	63	41	32	N, V
H04	Kings Highway	Residential	NCA01	63	41	32	N, V
H05	Kings Highway	Residential	NCA01	62	46	37	N, V
H06	Kings Highway	Residential	NCA01	63	46	37	N, V
H07	Kings Highway	Residential	NCA01	63	47	37	N, V
H08	Kings Highway	Residential	NCA01	63	46	36	N, V
H09	Kings Highway	Residential	NCA01	62	44	35	N, V
H10	Kings Highway	Residential	NCA01	62	45	36	N, V
H11	Kings Highway	Residential	NCA01	62	46	37	N, V
H12	Kings Highway	Residential	NCA01	61	46	37	N, V
H13	Kings Highway	Residential	NCA01	62	46	37	N, V
H14	Kings Highway	Residential	NCA01	61	45	36	N, V
H15	Kings Highway	Residential	NCA01	62	43	34	N, V
H16	Kings Highway	Residential	NCA01	58	46	37	N, V
H17	Kings Highway	Residential	NCA01	57	44	35	N, V
H18	Kings Highway	Residential	NCA01	59	43	34	N, V
H19	Kings Highway	Residential	NCA01	59	44	34	N, V
H20	Kings Highway	Residential	NCA01	57	45	36	N, V
H21	Kings Highway	Residential	NCA01	57	43	34	N, V
H22	Kings Highway	Residential	NCA01	59	42	33	N, V
H23	Kings Highway	Residential	NCA01	55	45	36	N, V
H24	Kings Highway	Residential	NCA01	57	42	33	N, V
H25	Kings Highway	Residential	NCA01	56	45	36	N, V
H26	Kings Highway	Residential	NCA01	55	45	36	N, V
H27	Kings Highway	Residential	NCA01	55	45	36	N, V
H28	Kings Highway	Residential	NCA01	55	45	35	N, V
H29	Kings Highway	Residential	NCA01	55	43	34	N, V
H30	Kings Highway	Residential	NCA01	56	43	34	N, V
H31	Kings Highway	Residential	NCA01	56	43	34	N, V
H32	Kings Highway	Residential	NCA01	59	45	36	N, V
H33	Kings Highway	Residential	NCA01	57	41	32	N, V
H34	Kings Highway	Residential	NCA01	58	42	33	N, V
H35	Kings Highway	Residential	NCA01	57	42	33	N, V
R01	11 Wharf Street	Residential	NCA01	61	58	49	N, V
R02	3-9 Wharf Street	Residential	NCA01	67	59	50	N, V
R03	Lot 1 Wharf Street	Residential	NCA01	65	59	50	N, V
R04	4 Braidwood Street	Residential	NCA01	73	57	48	N, V
R05	6 Braidwood Street	Residential	NCA01	64	51	42	N, V
R06	9 Braidwood Street	Residential	NCA01	70	56	47	N, V
R07	12 Braidwood Street	Residential	NCA01	64	49	40	N, V
R08	14 Braidwood Street	Residential	NCA01	68	56	47	N, V
R09	14a Braidwood Street	Residential	NCA01	59	49	40	N, V
R10	11 Braidwood Street	Residential	NCA01	77	54	45	N, V
R11	13 Braidwood Street	Residential	NCA01	78	52	43	N, V
R12	15 Braidwood Street	Residential	NCA01	74	50	41	N, V
R13	16 Braidwood Street	Residential	NCA01	60	54	45	N, V
R14	18 Braidwood Street	Residential	NCA01	58	52	43	N, V
R15	20 Braidwood Street	Residential	NCA01	58	50	41	N, V
R16	17 Braidwood Street	Residential	NCA01	75	50	40	N, V
R17	19 Braidwood Street	Residential	NCA01	73	46	37	N, V
R18	2 Runnyford Rd	Residential	NCA01	48	46	38	-
R19	4 Cowper Street	Residential	NCA01	67	44	35	N, V
R20	2 Cowper Street	Residential	NCA01	71	46	37	N, V



Predicted construction noise levels: Standard construction hours

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
<b>Residential:</b> Noticeable / Clearly audible Moderately intrusive Highly intrusive <b>Bold</b> Highly noise affected							
<b>Non-residential:</b> Exceeds noise management level							
R21	7 Murray Street	Residential	NCA01	87	49	40	N, V
R22	27 Braidwood Street	Residential	NCA01	72	37	28	N, V
R23	24 Braidwood Street	Residential	NCA01	60	47	38	N, V
R24	28 Braidwood Street	Residential	NCA01	63	44	35	N, V
R25	30 Braidwood Street	Residential	NCA01	62	37	28	N, V
R26	1 Runnyford Rd	Residential	NCA01	56	47	38	N, V
R27	3 Runnyford Rd	Residential	NCA01	56	47	38	N, V
R28	8 Runnyford Rd	Residential	NCA01	60	41	32	N, V
R29	12 Runnyford Rd	Residential	NCA01	56	46	37	N, V
R30	13 Runnyford Rd	Residential	NCA01	59	39	31	N, V
R31	13 Runnyford Rd	Residential	NCA01	59	46	37	N, V
R32	11 Runnyford Rd	Residential	NCA01	58	44	35	N, V
R33	11 Runnyford Rd	Residential	NCA01	57	44	35	N, V
R34	15 Runnyford Rd	Residential	NCA01	57	43	34	N, V
R35	17 Runnyford Rd	Residential	NCA01	57	41	32	N, V
R36	17b Runnyford Rd	Residential	NCA01	55	42	33	N, V
R37	19 Runnyford Rd	Residential	NCA01	53	39	30	-
R38	21 Runnyford Rd	Residential	NCA01	53	39	30	-
R39	23 Runnyford Rd	Residential	NCA01	56	40	31	N, V
R40	25Runnyford Rd	Residential	NCA01	53	40	31	-
R41	27 Runnyford Rd	Residential	NCA01	53	40	31	-
R42	27 Runnyford Rd	Residential	NCA01	51	39	30	-
R43	22-24 Reid Street	Residential	NCA01	54	41	32	-
R44	40 Runnyford Rd	Residential	NCA01	50	40	31	-
R45	38 Runnyford Rd	Residential	NCA01	48	43	34	-
R46	36 Runnyford Rd	Residential	NCA01	49	46	37	-
R47	34 Runnyford Rd	Residential	NCA01	48	46	37	-
R48	32 Runnyford Rd	Residential	NCA01	49	44	35	-
R49	30 Runnyford Rd	Residential	NCA01	49	47	38	-
R50	26 Runnyford Rd	Residential	NCA01	45	41	32	-
R51	24b Runnyford Rd	Residential	NCA01	52	44	35	-
R52	24 Runnyford Rd	Residential	NCA01	48	45	36	-
R53	1a Currowan Street	Residential	NCA01	53	48	39	-
R54	1 Currowan Street	Residential	NCA01	54	49	40	-
R55	2 Currowan Street	Residential	NCA01	54	50	41	-
R56	2b Currowan Street	Residential	NCA01	54	47	38	-
R57	18 Runnyford Rd	Residential	NCA01	51	50	41	-
R58	16 Runnyford Rd	Residential	NCA01	49	49	40	-
R59	14 Runnyford Rd	Residential	NCA01	48	49	40	-
R60	12 Runnyford Rd	Residential	NCA01	49	49	40	-
R61	10 Runnyford Rd	Residential	NCA01	50	48	39	-
R62	8 Runnyford Rd	Residential	NCA01	49	48	39	-
R63	4 Currowan Street	Residential	NCA01	50	49	40	-
R64	6 Currowan Street	Residential	NCA01	50	49	40	-
R65	8 Currowan Street	Residential	NCA01	50	49	40	-
R66	3 Currowan Street	Residential	NCA01	52	49	40	-
R67	5 Currowan Street	Residential	NCA01	52	49	40	-
R68	3 Nelligen Pl	Residential	NCA01	51	50	41	-
R69	5 Nelligen Pl	Residential	NCA01	51	46	37	-
R70	5b Nelligen Pl	Residential	NCA01	49	46	37	-
R71	7 Nelligen Pl	Residential	NCA01	49	48	39	-
R72	9 Nelligen Pl	Residential	NCA01	50	48	39	-
R73	11 Nelligen Pl	Residential	NCA01	51	48	39	-
R74	13 Nelligen Pl	Residential	NCA01	50	48	39	-
R75	13b Nelligen Pl	Residential	NCA01	47	45	36	-
R76	15 Nelligen Pl	Residential	NCA01	48	48	39	-
R77	17 Nelligen Pl	Residential	NCA01	50	43	34	-
R78	21 Nelligen Pl	Residential	NCA01	45	43	34	-
R79	23 Nelligen Pl	Residential	NCA01	44	42	33	-
R80	25 Nelligen Pl	Residential	NCA01	42	39	30	-

Predicted construction noise levels: Standard construction hours

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
Residential: Noticeable / Clearly audible Moderately intrusive Highly intrusive <b>Bold</b> Highly noise affected Non-residential: Exceeds noise management level							
R81	27 Nelligen Pl	Residential	NCA01	49	48	39	-
R82	24 Nelligen Pl	Residential	NCA01	51	50	41	-
R83	22 Nelligen Pl	Residential	NCA01	52	51	42	-
R84	20 Nelligen Pl	Residential	NCA01	50	49	40	-
R85	18 Nelligen Pl	Residential	NCA01	50	49	40	-
R86	16 Nelligen Pl	Residential	NCA01	52	51	42	-
R87	14 Nelligen Pl	Residential	NCA01	50	49	40	-
R88	12 Nelligen Pl	Residential	NCA01	50	49	40	-
R89	6 Nelligen Pl	Residential	NCA01	48	46	37	-
R90	7 Currowan Street	Residential	NCA01	52	50	41	-
R91	9 Currowan St	Residential	NCA01	52	51	42	-
R92	11 Currowan St	Residential	NCA01	52	51	42	-
R93	21 Currowan St	Residential	NCA01	52	51	42	-
R94	23 Clyde Blvd	Residential	NCA01	51	50	41	-
R95	25 Clyde Blvd	Residential	NCA01	49	47	38	-
R96	10 Currowan Street	Residential	NCA01	51	50	41	-
R97	14 Currowan St	Residential	NCA01	50	50	41	-
R98	14b Currowan St	Residential	NCA01	51	49	40	-
R99	16 Currowan St	Residential	NCA01	54	52	43	-
R100	17 Clyde Blvd	Residential	NCA01	55	54	45	N, V
R101	15 Clyde Blvd	Residential	NCA01	52	51	42	-
R102	13b Clyde Blvd	Residential	NCA01	50	50	41	-
R103	13 Clyde Blvd	Residential	NCA01	49	47	38	-
R104	9 Clyde Blvd	Residential	NCA01	51	51	42	-
R105	7 Clyde Blvd	Residential	NCA01	60	54	45	N, V
R106	5 Clyde Blvd	Residential	NCA01	62	55	46	N, V
R107	3 Clyde Blvd	Residential	NCA01	60	50	41	N, V
R108	3b Clyde Blvd	Residential	NCA01	61	58	49	N, V
R109	1 Clyde Blvd	Residential	NCA01	68	58	49	N, V
R110	11a Wharf Street	Residential	NCA01	62	57	48	N, V
R111	29b Reid Street	Residential	NCA01	43	38	29	-
R112	29 Reid Street	Residential	NCA01	53	40	31	-
R113	16 Reid Street	Residential	NCA01	55	35	26	-
R114	14b Reid Street	Residential	NCA01	59	35	26	N, V
R115	14 Reid Street	Residential	NCA01	57	38	29	N, V
R116	12 Reid Street	Residential	NCA01	60	37	28	N, V
R117	3b Reid Street	Residential	NCA01	57	40	31	N, V
R118	3 Reid Street	Residential	NCA01	60	39	30	N, V
R119	3a Reid Street	Residential	NCA01	58	40	31	N, V
R120	46a Reid Street	Residential	NCA01	54	40	31	-
R121	46 Reid Street	Residential	NCA01	55	40	31	N, V
R122	33a Reid Street	Residential	NCA01	70	44	35	N, V
R123	33b Reid Street	Residential	NCA01	66	40	31	N, V
R124	33c Reid Street	Residential	NCA01	51	40	31	-
R125	969 Kings Highway	Residential	NCA01	62	40	31	N, V
R126	969a Kings Highway	Residential	NCA01	46	32	23	-
R127	2 Thule Rd	Residential	NCA01	88	83	74	N, V
R128	4b Thule Rd	Residential	NCA01	86	84	75	N, V
R129	4 Thule Rd	Residential	NCA01	82	78	69	N, V
R130	6 Thule Rd	Residential	NCA01	75	73	64	N, V
R131	6b Thule Rd	Residential	NCA01	76	76	67	N, V
R132	8 Thule Rd	Residential	NCA01	72	70	61	N, V
R133	35 Old Nelligen Rd	Residential	NCA01	71	68	58	N, V
R134	33b Old Nelligen Rd	Residential	NCA01	76	65	56	N, V
R135	33a Old Nelligen Rd	Residential	NCA01	77	59	50	N, V
R136	31a Old Nelligen Rd	Residential	NCA01	78	63	53	N, V
R137	31b Old Nelligen Rd	Residential	NCA01	68	57	48	N, V
R138	10 Thule Rd	Residential	NCA01	79	66	57	N, V
R139	35 Thule Rd	Residential	NCA01	75	62	52	N, V
R140	41 Thule Rd	Residential	NCA01	83	64	52	N, V

Predicted construction noise levels: Standard construction hours

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
Residential: Noticeable / Clearly audible Moderately intrusive Highly intrusive <b>Bold</b> Highly noise affected Non-residential: Exceeds noise management level							
R141	37 Thule Rd	Residential	NCA01	78	64	51	N, V
R142	Lot 21a Thule Rd	Residential	NCA01	64	55	46	N, V
R143	Lot 21b Thule Rd	Residential	NCA01	62	55	46	N, V
R144	Lot 21c Thule Rd	Residential	NCA01	60	57	48	N, V
R145	Lot 21d Thule Rd	Residential	NCA01	64	55	46	N, V
R146	Lot 21e Thule Rd	Residential	NCA01	64	56	47	N, V
R147	4 Bridge View Rd	Residential	NCA01	71	59	50	N, V
R148	6 Bridge View Rd	Residential	NCA01	66	56	47	N, V
R149	3 Sproxton Ln	Residential	NCA01	61	57	48	N, V
R150	5 Sproxton Ln	Residential	NCA01	62	54	45	N, V
R151	5b Sproxton Ln	Residential	NCA01	58	53	44	N, V
R152	7 Sproxton Ln	Residential	NCA01	56	51	42	N, V
R153	9b Sproxton Ln	Residential	NCA01	58	55	46	N, V
R154	9 Sproxton Ln	Residential	NCA01	55	52	43	N, V
R155	Sproxton Ln	Residential	NCA01	53	52	43	-
R156	11 Sproxton Ln	Residential	NCA01	59	55	46	N, V
R157	13a Sproxton Ln	Residential	NCA01	54	51	42	-
R158	13b Sproxton Ln	Residential	NCA01	57	55	46	N, V
R159	17b Sproxton Ln	Residential	NCA01	57	54	45	N, V
R160	17c Sproxton Ln	Residential	NCA01	54	51	42	-
R161	17 Sproxton Ln	Residential	NCA01	52	51	42	-
R162	19 Sproxton Ln	Residential	NCA01	51	49	40	-
R163	21 Sproxton Ln	Residential	NCA01	54	52	43	-
R164	25 Sproxton Ln	Residential	NCA01	53	51	42	-
R165	27 Sproxton Ln	Residential	NCA01	52	50	41	-
R166	29b Sproxton Ln	Residential	NCA01	53	51	42	-
R167	29 Sproxton Ln	Residential	NCA01	51	49	40	-
R168	31 Sproxton Ln	Residential	NCA01	52	46	37	-
R169	35 Sproxton Ln	Residential	NCA01	51	47	38	-
R170	30 Sproxton Ln	Residential	NCA01	53	49	40	-
R171	28 Sproxton Ln	Residential	NCA01	56	52	43	N, V
R172	26 Sproxton Ln	Residential	NCA01	55	51	42	N, V
R173	24 Sproxton Ln	Residential	NCA01	55	49	40	N, V
R174	22 Sproxton Ln	Residential	NCA01	58	55	46	N, V
R175	20 Sproxton Ln	Residential	NCA01	58	54	45	N, V
R176	18 Sproxton Ln	Residential	NCA01	57	54	45	N, V
R177	12 Sproxton Ln	Residential	NCA01	60	54	45	N, V
R178	8 Sproxton Ln	Residential	NCA01	60	54	45	N, V
R179	74a Bridge View Rd	Residential	NCA01	57	48	39	N, V
R180	74b Bridge View Rd	Residential	NCA01	61	49	40	N, V
R181	74c Bridge View Rd	Residential	NCA01	60	45	36	N, V
R182	74d Bridge View Rd	Residential	NCA01	59	46	37	N, V
R183	74e Bridge View Rd	Residential	NCA01	60	46	37	N, V
R184	983 Kings Hwy	Residential	NCA01	54	41	32	-

Predicted construction noise levels: OOHW Period 1 (Day)

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
<b>Residential:</b> Noticeable Clearly audible Moderately intrusive Highly intrusive <b>Bold</b> Highly noise affected							
<b>Non-residential:</b> Exceeds noise management level							
C01	Lot 1 Wharf Street	Commercial	NCA01	74	59	50	-
C02	Lot 1 Wharf Street	Commercial	NCA01	71	59	50	-
C03	7 Braidwood Street	Commercial	NCA01	97	60	51	V, IB, N, R1, DR, PC, SN
C04	8 Braidwood Street	Commercial	NCA01	100	56	47	V, IB, N, R1, DR, PC, SN
C05	9 Braidwood Street	Commercial	NCA01	105	56	47	V, IB, N, R1, DR, PC, SN
H01	Kings Highway	Residential	NCA01	63	40	31	V, N, R1, DR
H02	Kings Highway	Residential	NCA01	60	42	33	V, N, R1, DR
H03	Kings Highway	Residential	NCA01	63	41	32	V, N, R1, DR
H04	Kings Highway	Residential	NCA01	63	41	32	V, N, R1, DR
H05	Kings Highway	Residential	NCA01	62	46	37	V, N, R1, DR
H06	Kings Highway	Residential	NCA01	63	46	37	V, N, R1, DR
H07	Kings Highway	Residential	NCA01	63	47	37	V, N, R1, DR
H08	Kings Highway	Residential	NCA01	63	46	36	V, N, R1, DR
H09	Kings Highway	Residential	NCA01	62	44	35	V, N, R1, DR
H10	Kings Highway	Residential	NCA01	62	45	36	V, N, R1, DR
H11	Kings Highway	Residential	NCA01	62	46	37	V, N, R1, DR
H12	Kings Highway	Residential	NCA01	61	46	37	V, N, R1, DR
H13	Kings Highway	Residential	NCA01	62	46	37	V, N, R1, DR
H14	Kings Highway	Residential	NCA01	61	45	36	V, N, R1, DR
H15	Kings Highway	Residential	NCA01	62	43	34	V, N, R1, DR
H16	Kings Highway	Residential	NCA01	58	46	37	V, N, R1, DR
H17	Kings Highway	Residential	NCA01	57	44	35	V, N, R1, DR
H18	Kings Highway	Residential	NCA01	59	43	34	V, N, R1, DR
H19	Kings Highway	Residential	NCA01	59	44	34	V, N, R1, DR
H20	Kings Highway	Residential	NCA01	57	45	36	V, N, R1, DR
H21	Kings Highway	Residential	NCA01	57	43	34	V, N, R1, DR
H22	Kings Highway	Residential	NCA01	59	42	33	V, N, R1, DR
H23	Kings Highway	Residential	NCA01	55	45	36	V, N, R1, DR
H24	Kings Highway	Residential	NCA01	57	42	33	V, N, R1, DR
H25	Kings Highway	Residential	NCA01	56	45	36	V, N, R1, DR
H26	Kings Highway	Residential	NCA01	55	45	36	V, N, R1, DR
H27	Kings Highway	Residential	NCA01	55	45	36	V, N, R1, DR
H28	Kings Highway	Residential	NCA01	55	45	35	V, N, R1, DR
H29	Kings Highway	Residential	NCA01	55	43	34	V, N, R1, DR
H30	Kings Highway	Residential	NCA01	56	43	34	V, N, R1, DR
H31	Kings Highway	Residential	NCA01	56	43	34	V, N, R1, DR
H32	Kings Highway	Residential	NCA01	59	45	36	V, N, R1, DR
H33	Kings Highway	Residential	NCA01	57	41	32	V, N, R1, DR
H34	Kings Highway	Residential	NCA01	58	42	33	V, N, R1, DR
H35	Kings Highway	Residential	NCA01	57	42	33	V, N, R1, DR
R01	11 Wharf Street	Residential	NCA01	61	58	49	V, N, R1, DR
R02	3-9 Wharf Street	Residential	NCA01	67	59	50	V, IB, N, R1, DR, PC, SN
R03	Lot 1 Wharf Street	Residential	NCA01	65	59	50	V, IB, N, R1, DR, PC, SN
R04	4 Braidwood Street	Residential	NCA01	73	57	48	V, IB, N, R1, DR, PC, SN
R05	6 Braidwood Street	Residential	NCA01	64	51	42	V, N, R1, DR
R06	9 Braidwood Street	Residential	NCA01	70	56	47	V, IB, N, R1, DR, PC, SN
R07	12 Braidwood Street	Residential	NCA01	64	49	40	V, N, R1, DR
R08	14 Braidwood Street	Residential	NCA01	68	56	47	V, IB, N, R1, DR, PC, SN
R09	14a Braidwood Street	Residential	NCA01	59	49	40	V, N, R1, DR
R10	11 Braidwood Street	Residential	NCA01	77	54	45	V, IB, N, R1, DR, PC, SN
R11	13 Braidwood Street	Residential	NCA01	78	52	43	V, IB, N, R1, DR, PC, SN
R12	15 Braidwood Street	Residential	NCA01	74	50	41	V, IB, N, R1, DR, PC, SN
R13	16 Braidwood Street	Residential	NCA01	60	54	45	V, N, R1, DR
R14	18 Braidwood Street	Residential	NCA01	58	52	43	V, N, R1, DR
R15	20 Braidwood Street	Residential	NCA01	58	50	41	V, N, R1, DR
R16	17 Braidwood Street	Residential	NCA01	75	50	40	V, IB, N, R1, DR, PC, SN
R17	19 Braidwood Street	Residential	NCA01	73	46	37	V, IB, N, R1, DR, PC, SN
R18	2 Runnyford Rd	Residential	NCA01	48	46	38	N, R1, DR
R19	4 Cowper Street	Residential	NCA01	67	44	35	V, IB, N, R1, DR, PC, SN
R20	2 Cowper Street	Residential	NCA01	71	46	37	V, IB, N, R1, DR, PC, SN



Predicted construction noise levels: OOHW Period 1 (Day)

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
<b>Residential:</b> Noticeable Clearly audible Moderately intrusive Highly intrusive <b>Bold</b> Highly noise affected <b>Non-residential:</b> Exceeds noise management level							
R21	7 Murray Street	Residential	NCA01	87	49	40	V, IB, N, R1, DR, PC, SN
R22	27 Braidwood Street	Residential	NCA01	72	37	28	V, IB, N, R1, DR, PC, SN
R23	24 Braidwood Street	Residential	NCA01	60	47	38	V, N, R1, DR
R24	28 Braidwood Street	Residential	NCA01	63	44	35	V, N, R1, DR
R25	30 Braidwood Street	Residential	NCA01	62	37	28	V, N, R1, DR
R26	1 Runnyford Rd	Residential	NCA01	56	47	38	V, N, R1, DR
R27	3 Runnyford Rd	Residential	NCA01	56	47	38	V, N, R1, DR
R28	8 Runnyford Rd	Residential	NCA01	60	41	32	V, N, R1, DR
R29	12 Runnyford Rd	Residential	NCA01	56	46	37	V, N, R1, DR
R30	13 Runnyford Rd	Residential	NCA01	59	39	31	V, N, R1, DR
R31	13 Runnyford Rd	Residential	NCA01	59	46	37	V, N, R1, DR
R32	11 Runnyford Rd	Residential	NCA01	58	44	35	V, N, R1, DR
R33	11 Runnyford Rd	Residential	NCA01	57	44	35	V, N, R1, DR
R34	15 Runnyford Rd	Residential	NCA01	57	43	34	V, N, R1, DR
R35	17 Runnyford Rd	Residential	NCA01	57	41	32	V, N, R1, DR
R36	17b Runnyford Rd	Residential	NCA01	55	42	33	V, N, R1, DR
R37	19 Runnyford Rd	Residential	NCA01	53	39	30	N, R1, DR
R38	21 Runnyford Rd	Residential	NCA01	53	39	30	N, R1, DR
R39	23 Runnyford Rd	Residential	NCA01	56	40	31	V, N, R1, DR
R40	25Runnyford Rd	Residential	NCA01	53	40	31	N, R1, DR
R41	27 Runnyford Rd	Residential	NCA01	53	40	31	N, R1, DR
R42	27 Runnyford Rd	Residential	NCA01	51	39	30	N, R1, DR
R43	22-24 Reid Street	Residential	NCA01	54	41	32	N, R1, DR
R44	40 Runnyford Rd	Residential	NCA01	50	40	31	N, R1, DR
R45	38 Runnyford Rd	Residential	NCA01	48	43	34	N, R1, DR
R46	36 Runnyford Rd	Residential	NCA01	49	46	37	N, R1, DR
R47	34 Runnyford Rd	Residential	NCA01	48	46	37	N, R1, DR
R48	32 Runnyford Rd	Residential	NCA01	49	44	35	N, R1, DR
R49	30 Runnyford Rd	Residential	NCA01	49	47	38	N, R1, DR
R50	26 Runnyford Rd	Residential	NCA01	45	41	32	N, R1, DR
R51	24b Runnyford Rd	Residential	NCA01	52	44	35	N, R1, DR
R52	24 Runnyford Rd	Residential	NCA01	48	45	36	N, R1, DR
R53	1a Currowan Street	Residential	NCA01	53	48	39	N, R1, DR
R54	1 Currowan Street	Residential	NCA01	54	49	40	N, R1, DR
R55	2 Currowan Street	Residential	NCA01	54	50	41	N, R1, DR
R56	2b Currowan Street	Residential	NCA01	54	47	38	N, R1, DR
R57	18 Runnyford Rd	Residential	NCA01	51	50	41	N, R1, DR
R58	16 Runnyford Rd	Residential	NCA01	49	49	40	N, R1, DR
R59	14 Runnyford Rd	Residential	NCA01	48	49	40	N, R1, DR
R60	12 Runnyford Rd	Residential	NCA01	49	49	40	N, R1, DR
R61	10 Runnyford Rd	Residential	NCA01	50	48	39	N, R1, DR
R62	8 Runnyford Rd	Residential	NCA01	49	48	39	N, R1, DR
R63	4 Currowan Street	Residential	NCA01	50	49	40	N, R1, DR
R64	6 Currowan Street	Residential	NCA01	50	49	40	N, R1, DR
R65	8 Currowan Street	Residential	NCA01	50	49	40	N, R1, DR
R66	3 Currowan Street	Residential	NCA01	52	49	40	N, R1, DR
R67	5 Currowan Street	Residential	NCA01	52	49	40	N, R1, DR
R68	3 Nelligen Pl	Residential	NCA01	51	50	41	N, R1, DR
R69	5 Nelligen Pl	Residential	NCA01	51	46	37	N, R1, DR
R70	5b Nelligen Pl	Residential	NCA01	49	46	37	N, R1, DR
R71	7 Nelligen Pl	Residential	NCA01	49	48	39	N, R1, DR
R72	9 Nelligen Pl	Residential	NCA01	50	48	39	N, R1, DR
R73	11 Nelligen Pl	Residential	NCA01	51	48	39	N, R1, DR
R74	13 Nelligen Pl	Residential	NCA01	50	48	39	N, R1, DR
R75	13b Nelligen Pl	Residential	NCA01	47	45	36	N, R1, DR
R76	15 Nelligen Pl	Residential	NCA01	48	48	39	N, R1, DR
R77	17 Nelligen Pl	Residential	NCA01	50	43	34	N, R1, DR
R78	21 Nelligen Pl	Residential	NCA01	45	43	34	N, R1, DR
R79	23 Nelligen Pl	Residential	NCA01	44	42	33	-
R80	25 Nelligen Pl	Residential	NCA01	42	39	30	-

Predicted construction noise levels: OOHV Period 1 (Day)

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
Residential: Noticeable Clearly audible Moderately intrusive Highly intrusive <b>Highly noise affected</b> Non-residential: Exceeds noise management level							
R81	27 Nelligen Pl	Residential	NCA01	49	48	39	N, R1, DR
R82	24 Nelligen Pl	Residential	NCA01	51	50	41	N, R1, DR
R83	22 Nelligen Pl	Residential	NCA01	52	51	42	N, R1, DR
R84	20 Nelligen Pl	Residential	NCA01	50	49	40	N, R1, DR
R85	18 Nelligen Pl	Residential	NCA01	50	49	40	N, R1, DR
R86	16 Nelligen Pl	Residential	NCA01	52	51	42	N, R1, DR
R87	14 Nelligen Pl	Residential	NCA01	50	49	40	N, R1, DR
R88	12 Nelligen Pl	Residential	NCA01	50	49	40	N, R1, DR
R89	6 Nelligen Pl	Residential	NCA01	48	46	37	N, R1, DR
R90	7 Currowan Street	Residential	NCA01	52	50	41	N, R1, DR
R91	9 Currowan St	Residential	NCA01	52	51	42	N, R1, DR
R92	11 Currowan St	Residential	NCA01	52	51	42	N, R1, DR
R93	21 Currowan St	Residential	NCA01	52	51	42	N, R1, DR
R94	23 Clyde Blvd	Residential	NCA01	51	50	41	N, R1, DR
R95	25 Clyde Blvd	Residential	NCA01	49	47	38	N, R1, DR
R96	10 Currowan Street	Residential	NCA01	51	50	41	N, R1, DR
R97	14 Currowan St	Residential	NCA01	50	50	41	N, R1, DR
R98	14b Currowan St	Residential	NCA01	51	49	40	N, R1, DR
R99	16 Currowan St	Residential	NCA01	54	52	43	N, R1, DR
R100	17 Clyde Blvd	Residential	NCA01	55	54	45	V, N, R1, DR
R101	15 Clyde Blvd	Residential	NCA01	52	51	42	N, R1, DR
R102	13b Clyde Blvd	Residential	NCA01	50	50	41	N, R1, DR
R103	13 Clyde Blvd	Residential	NCA01	49	47	38	N, R1, DR
R104	9 Clyde Blvd	Residential	NCA01	51	51	42	N, R1, DR
R105	7 Clyde Blvd	Residential	NCA01	60	54	45	V, N, R1, DR
R106	5 Clyde Blvd	Residential	NCA01	62	55	46	V, N, R1, DR
R107	3 Clyde Blvd	Residential	NCA01	60	50	41	V, N, R1, DR
R108	3b Clyde Blvd	Residential	NCA01	61	58	49	V, N, R1, DR
R109	1 Clyde Blvd	Residential	NCA01	68	58	49	V, IB, N, R1, DR, PC, SN
R110	11a Wharf Street	Residential	NCA01	62	57	48	V, N, R1, DR
R111	29b Reid Street	Residential	NCA01	43	38	29	-
R112	29 Reid Street	Residential	NCA01	53	40	31	N, R1, DR
R113	16 Reid Street	Residential	NCA01	55	35	26	N, R1, DR
R114	14b Reid Street	Residential	NCA01	59	35	26	V, N, R1, DR
R115	14 Reid Street	Residential	NCA01	57	38	29	V, N, R1, DR
R116	12 Reid Street	Residential	NCA01	60	37	28	V, N, R1, DR
R117	3b Reid Street	Residential	NCA01	57	40	31	V, N, R1, DR
R118	3 Reid Street	Residential	NCA01	60	39	30	V, N, R1, DR
R119	3a Reid Street	Residential	NCA01	58	40	31	V, N, R1, DR
R120	46a Reid Street	Residential	NCA01	54	40	31	N, R1, DR
R121	46 Reid Street	Residential	NCA01	55	40	31	V, N, R1, DR
R122	33a Reid Street	Residential	NCA01	70	44	35	V, IB, N, R1, DR, PC, SN
R123	33b Reid Street	Residential	NCA01	66	40	31	V, IB, N, R1, DR, PC, SN
R124	33c Reid Street	Residential	NCA01	51	40	31	N, R1, DR
R125	969 Kings Highway	Residential	NCA01	62	40	31	V, N, R1, DR
R126	969a Kings Highway	Residential	NCA01	46	32	23	N, R1, DR
R127	2 Thule Rd	Residential	NCA01	88	83	74	V, IB, N, R1, DR, PC, SN
R128	4b Thule Rd	Residential	NCA01	86	84	75	V, IB, N, R1, DR, PC, SN
R129	4 Thule Rd	Residential	NCA01	82	78	69	V, IB, N, R1, DR, PC, SN
R130	6 Thule Rd	Residential	NCA01	75	73	64	V, IB, N, R1, DR, PC, SN
R131	6b Thule Rd	Residential	NCA01	76	76	67	V, IB, N, R1, DR, PC, SN
R132	8 Thule Rd	Residential	NCA01	72	70	61	V, IB, N, R1, DR, PC, SN
R133	35 Old Nelligen Rd	Residential	NCA01	71	68	58	V, IB, N, R1, DR, PC, SN
R134	33b Old Nelligen Rd	Residential	NCA01	76	65	56	V, IB, N, R1, DR, PC, SN
R135	33a Old Nelligen Rd	Residential	NCA01	77	59	50	V, IB, N, R1, DR, PC, SN
R136	31a Old Nelligen Rd	Residential	NCA01	78	63	53	V, IB, N, R1, DR, PC, SN
R137	31b Old Nelligen Rd	Residential	NCA01	68	57	48	V, IB, N, R1, DR, PC, SN
R138	10 Thule Rd	Residential	NCA01	79	66	57	V, IB, N, R1, DR, PC, SN
R139	35 Thule Rd	Residential	NCA01	75	62	52	V, IB, N, R1, DR, PC, SN
R140	41 Thule Rd	Residential	NCA01	83	64	52	V, IB, N, R1, DR, PC, SN

Predicted construction noise levels: OOHW Period 1 (Day)

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
Residential: <span>Noticeable</span> <span>Clearly audible</span> <span>Moderately intrusive</span> <span>Highly intrusive</span> <span>Highly noise affected</span>							
Non-residential: <span>Exceeds noise management level</span>							
R141	37 Thule Rd	Residential	NCA01	78	64	51	V, IB, N, R1, DR, PC, SN
R142	Lot 21a Thule Rd	Residential	NCA01	64	55	46	V, N, R1, DR
R143	Lot 21b Thule Rd	Residential	NCA01	62	55	46	V, N, R1, DR
R144	Lot 21c Thule Rd	Residential	NCA01	60	57	48	V, N, R1, DR
R145	Lot 21d Thule Rd	Residential	NCA01	64	55	46	V, N, R1, DR
R146	Lot 21e Thule Rd	Residential	NCA01	64	56	47	V, N, R1, DR
R147	4 Bridge View Rd	Residential	NCA01	71	59	50	V, IB, N, R1, DR, PC, SN
R148	6 Bridge View Rd	Residential	NCA01	66	56	47	V, IB, N, R1, DR, PC, SN
R149	3 Sproxton Ln	Residential	NCA01	61	57	48	V, N, R1, DR
R150	5 Sproxton Ln	Residential	NCA01	62	54	45	V, N, R1, DR
R151	5b Sproxton Ln	Residential	NCA01	58	53	44	V, N, R1, DR
R152	7 Sproxton Ln	Residential	NCA01	56	51	42	V, N, R1, DR
R153	9b Sproxton Ln	Residential	NCA01	58	55	46	V, N, R1, DR
R154	9 Sproxton Ln	Residential	NCA01	55	52	43	V, N, R1, DR
R155	Sproxton Ln	Residential	NCA01	53	52	43	N, R1, DR
R156	11 Sproxton Ln	Residential	NCA01	59	55	46	V, N, R1, DR
R157	13a Sproxton Ln	Residential	NCA01	54	51	42	N, R1, DR
R158	13b Sproxton Ln	Residential	NCA01	57	55	46	V, N, R1, DR
R159	17b Sproxton Ln	Residential	NCA01	57	54	45	V, N, R1, DR
R160	17c Sproxton Ln	Residential	NCA01	54	51	42	N, R1, DR
R161	17 Sproxton Ln	Residential	NCA01	52	51	42	N, R1, DR
R162	19 Sproxton Ln	Residential	NCA01	51	49	40	N, R1, DR
R163	21 Sproxton Ln	Residential	NCA01	54	52	43	N, R1, DR
R164	25 Sproxton Ln	Residential	NCA01	53	51	42	N, R1, DR
R165	27 Sproxton Ln	Residential	NCA01	52	50	41	N, R1, DR
R166	29b Sproxton Ln	Residential	NCA01	53	51	42	N, R1, DR
R167	29 Sproxton Ln	Residential	NCA01	51	49	40	N, R1, DR
R168	31 Sproxton Ln	Residential	NCA01	52	46	37	N, R1, DR
R169	35 Sproxton Ln	Residential	NCA01	51	47	38	N, R1, DR
R170	30 Sproxton Ln	Residential	NCA01	53	49	40	N, R1, DR
R171	28 Sproxton Ln	Residential	NCA01	56	52	43	V, N, R1, DR
R172	26 Sproxton Ln	Residential	NCA01	55	51	42	V, N, R1, DR
R173	24 Sproxton Ln	Residential	NCA01	55	49	40	V, N, R1, DR
R174	22 Sproxton Ln	Residential	NCA01	58	55	46	V, N, R1, DR
R175	20 Sproxton Ln	Residential	NCA01	58	54	45	V, N, R1, DR
R176	18 Sproxton Ln	Residential	NCA01	57	54	45	V, N, R1, DR
R177	12 Sproxton Ln	Residential	NCA01	60	54	45	V, N, R1, DR
R178	8 Sproxton Ln	Residential	NCA01	60	54	45	V, N, R1, DR
R179	74a Bridge View Rd	Residential	NCA01	57	48	39	V, N, R1, DR
R180	74b Bridge View Rd	Residential	NCA01	61	49	40	V, N, R1, DR
R181	74c Bridge View Rd	Residential	NCA01	60	45	36	V, N, R1, DR
R182	74d Bridge View Rd	Residential	NCA01	59	46	37	V, N, R1, DR
R183	74e Bridge View Rd	Residential	NCA01	60	46	37	V, N, R1, DR
R184	983 Kings Hwy	Residential	NCA01	54	41	32	N, R1, DR

Predicted construction noise levels: OOHV Period 1 (Evening)

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
Residential: <span>Noticeable</span> <span>Clearly audible</span> <span>Moderately intrusive</span> <span>Highly intrusive</span> <span>Highly noise affected</span>							
Non-residential: <span>Exceeds noise management level</span>							
C01	Lot 1 Wharf Street	Commercial	NCA01	74	59	50	-
C02	Lot 1 Wharf Street	Commercial	NCA01	71	59	50	-
C03	7 Braidwood Street	Commercial	NCA01	97	60	51	-
C04	8 Braidwood Street	Commercial	NCA01	100	56	47	-
C05	9 Braidwood Street	Commercial	NCA01	105	56	47	-
H01	Kings Highway	Residential	NCA01	63	40	31	V, IB, N, R1, DR, PC, SN
H02	Kings Highway	Residential	NCA01	60	42	33	V, IB, N, R1, DR, PC, SN
H03	Kings Highway	Residential	NCA01	63	41	32	V, IB, N, R1, DR, PC, SN
H04	Kings Highway	Residential	NCA01	63	41	32	V, IB, N, R1, DR, PC, SN
H05	Kings Highway	Residential	NCA01	62	46	37	V, IB, N, R1, DR, PC, SN
H06	Kings Highway	Residential	NCA01	63	46	37	V, IB, N, R1, DR, PC, SN
H07	Kings Highway	Residential	NCA01	63	47	37	V, IB, N, R1, DR, PC, SN
H08	Kings Highway	Residential	NCA01	63	46	36	V, IB, N, R1, DR, PC, SN
H09	Kings Highway	Residential	NCA01	62	44	35	V, IB, N, R1, DR, PC, SN
H10	Kings Highway	Residential	NCA01	62	45	36	V, IB, N, R1, DR, PC, SN
H11	Kings Highway	Residential	NCA01	62	46	37	V, IB, N, R1, DR, PC, SN
H12	Kings Highway	Residential	NCA01	61	46	37	V, IB, N, R1, DR, PC, SN
H13	Kings Highway	Residential	NCA01	62	46	37	V, IB, N, R1, DR, PC, SN
H14	Kings Highway	Residential	NCA01	61	45	36	V, IB, N, R1, DR, PC, SN
H15	Kings Highway	Residential	NCA01	62	43	34	V, IB, N, R1, DR, PC, SN
H16	Kings Highway	Residential	NCA01	58	46	37	V, N, R1, DR
H17	Kings Highway	Residential	NCA01	57	44	35	V, N, R1, DR
H18	Kings Highway	Residential	NCA01	59	43	34	V, N, R1, DR
H19	Kings Highway	Residential	NCA01	59	44	34	V, N, R1, DR
H20	Kings Highway	Residential	NCA01	57	45	36	V, N, R1, DR
H21	Kings Highway	Residential	NCA01	57	43	34	V, N, R1, DR
H22	Kings Highway	Residential	NCA01	59	42	33	V, N, R1, DR
H23	Kings Highway	Residential	NCA01	55	45	36	V, N, R1, DR
H24	Kings Highway	Residential	NCA01	57	42	33	V, N, R1, DR
H25	Kings Highway	Residential	NCA01	56	45	36	V, N, R1, DR
H26	Kings Highway	Residential	NCA01	55	45	36	V, N, R1, DR
H27	Kings Highway	Residential	NCA01	55	45	36	V, N, R1, DR
H28	Kings Highway	Residential	NCA01	55	45	35	V, N, R1, DR
H29	Kings Highway	Residential	NCA01	55	43	34	V, N, R1, DR
H30	Kings Highway	Residential	NCA01	56	43	34	V, N, R1, DR
H31	Kings Highway	Residential	NCA01	56	43	34	V, N, R1, DR
H32	Kings Highway	Residential	NCA01	59	45	36	V, N, R1, DR
H33	Kings Highway	Residential	NCA01	57	41	32	V, N, R1, DR
H34	Kings Highway	Residential	NCA01	58	42	33	V, N, R1, DR
H35	Kings Highway	Residential	NCA01	57	42	33	V, N, R1, DR
R01	11 Wharf Street	Residential	NCA01	61	58	49	V, IB, N, R1, DR, PC, SN
R02	3-9 Wharf Street	Residential	NCA01	67	59	50	V, IB, N, R1, DR, PC, SN
R03	Lot 1 Wharf Street	Residential	NCA01	65	59	50	V, IB, N, R1, DR, PC, SN
R04	4 Braidwood Street	Residential	NCA01	73	57	48	V, IB, N, R1, DR, PC, SN
R05	6 Braidwood Street	Residential	NCA01	64	51	42	V, IB, N, R1, DR, PC, SN
R06	9 Braidwood Street	Residential	NCA01	70	56	47	V, IB, N, R1, DR, PC, SN
R07	12 Braidwood Street	Residential	NCA01	64	49	40	V, IB, N, R1, DR, PC, SN
R08	14 Braidwood Street	Residential	NCA01	68	56	47	V, IB, N, R1, DR, PC, SN
R09	14a Braidwood Street	Residential	NCA01	59	49	40	V, N, R1, DR
R10	11 Braidwood Street	Residential	NCA01	77	54	45	V, IB, N, R1, DR, PC, SN
R11	13 Braidwood Street	Residential	NCA01	78	52	43	V, IB, N, R1, DR, PC, SN
R12	15 Braidwood Street	Residential	NCA01	74	50	41	V, IB, N, R1, DR, PC, SN
R13	16 Braidwood Street	Residential	NCA01	60	54	45	V, IB, N, R1, DR, PC, SN
R14	18 Braidwood Street	Residential	NCA01	58	52	43	V, N, R1, DR
R15	20 Braidwood Street	Residential	NCA01	58	50	41	V, N, R1, DR
R16	17 Braidwood Street	Residential	NCA01	75	50	40	V, IB, N, R1, DR, PC, SN
R17	19 Braidwood Street	Residential	NCA01	73	46	37	V, IB, N, R1, DR, PC, SN
R18	2 Runnyford Rd	Residential	NCA01	48	46	38	N, R1, DR
R19	4 Cowper Street	Residential	NCA01	67	44	35	V, IB, N, R1, DR, PC, SN
R20	2 Cowper Street	Residential	NCA01	71	46	37	V, IB, N, R1, DR, PC, SN



Predicted construction noise levels: OOHV Period 1 (Evening)

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
<b>Residential:</b> Noticeable Clearly audible Moderately intrusive Highly intrusive <b>Bold</b> Highly noise affected							
<b>Non-residential:</b> Exceeds noise management level							
R21	7 Murray Street	Residential	NCA01	87	49	40	V, IB, N, R1, DR, PC, SN
R22	27 Braidwood Street	Residential	NCA01	72	37	28	V, IB, N, R1, DR, PC, SN
R23	24 Braidwood Street	Residential	NCA01	60	47	38	V, IB, N, R1, DR, PC, SN
R24	28 Braidwood Street	Residential	NCA01	63	44	35	V, IB, N, R1, DR, PC, SN
R25	30 Braidwood Street	Residential	NCA01	62	37	28	V, IB, N, R1, DR, PC, SN
R26	1 Runnyford Rd	Residential	NCA01	56	47	38	V, N, R1, DR
R27	3 Runnyford Rd	Residential	NCA01	56	47	38	V, N, R1, DR
R28	8 Runnyford Rd	Residential	NCA01	60	41	32	V, IB, N, R1, DR, PC, SN
R29	12 Runnyford Rd	Residential	NCA01	56	46	37	V, N, R1, DR
R30	13 Runnyford Rd	Residential	NCA01	59	39	31	V, N, R1, DR
R31	13 Runnyford Rd	Residential	NCA01	59	46	37	V, N, R1, DR
R32	11 Runnyford Rd	Residential	NCA01	58	44	35	V, N, R1, DR
R33	11 Runnyford Rd	Residential	NCA01	57	44	35	V, N, R1, DR
R34	15 Runnyford Rd	Residential	NCA01	57	43	34	V, N, R1, DR
R35	17 Runnyford Rd	Residential	NCA01	57	41	32	V, N, R1, DR
R36	17b Runnyford Rd	Residential	NCA01	55	42	33	V, N, R1, DR
R37	19 Runnyford Rd	Residential	NCA01	53	39	30	V, N, R1, DR
C01	Lot 1 Wharf Street	Commercial	NCA01	74	59	50	-
C02	Lot 1 Wharf Street	Commercial	NCA01	71	59	50	-
C03	7 Braidwood Street	Commercial	NCA01	97	60	51	-
C04	8 Braidwood Street	Commercial	NCA01	100	56	47	-
C05	9 Braidwood Street	Commercial	NCA01	105	56	47	-
H01	Kings Highway	Residential	NCA01	63	40	31	V, IB, N, R1, DR, PC, SN
H02	Kings Highway	Residential	NCA01	60	42	33	V, IB, N, R1, DR, PC, SN
H03	Kings Highway	Residential	NCA01	63	41	32	V, IB, N, R1, DR, PC, SN
H04	Kings Highway	Residential	NCA01	63	41	32	V, IB, N, R1, DR, PC, SN
H05	Kings Highway	Residential	NCA01	62	46	37	V, IB, N, R1, DR, PC, SN
H06	Kings Highway	Residential	NCA01	63	46	37	V, IB, N, R1, DR, PC, SN
H07	Kings Highway	Residential	NCA01	63	47	37	V, IB, N, R1, DR, PC, SN
H08	Kings Highway	Residential	NCA01	63	46	36	V, IB, N, R1, DR, PC, SN
H09	Kings Highway	Residential	NCA01	62	44	35	V, IB, N, R1, DR, PC, SN
H10	Kings Highway	Residential	NCA01	62	45	36	V, IB, N, R1, DR, PC, SN
H11	Kings Highway	Residential	NCA01	62	46	37	V, IB, N, R1, DR, PC, SN
H12	Kings Highway	Residential	NCA01	61	46	37	V, IB, N, R1, DR, PC, SN
H13	Kings Highway	Residential	NCA01	62	46	37	V, IB, N, R1, DR, PC, SN
H14	Kings Highway	Residential	NCA01	61	45	36	V, IB, N, R1, DR, PC, SN
H15	Kings Highway	Residential	NCA01	62	43	34	V, IB, N, R1, DR, PC, SN
H16	Kings Highway	Residential	NCA01	58	46	37	V, N, R1, DR
H17	Kings Highway	Residential	NCA01	57	44	35	V, N, R1, DR
H18	Kings Highway	Residential	NCA01	59	43	34	V, N, R1, DR
H19	Kings Highway	Residential	NCA01	59	44	34	V, N, R1, DR
H20	Kings Highway	Residential	NCA01	57	45	36	V, N, R1, DR
H21	Kings Highway	Residential	NCA01	57	43	34	V, N, R1, DR
H22	Kings Highway	Residential	NCA01	59	42	33	V, N, R1, DR
H23	Kings Highway	Residential	NCA01	55	45	36	V, N, R1, DR
H24	Kings Highway	Residential	NCA01	57	42	33	V, N, R1, DR
H25	Kings Highway	Residential	NCA01	56	45	36	V, N, R1, DR
H26	Kings Highway	Residential	NCA01	55	45	36	V, N, R1, DR
H27	Kings Highway	Residential	NCA01	55	45	36	V, N, R1, DR
H28	Kings Highway	Residential	NCA01	55	45	35	V, N, R1, DR
H29	Kings Highway	Residential	NCA01	55	43	34	V, N, R1, DR
H30	Kings Highway	Residential	NCA01	56	43	34	V, N, R1, DR
H31	Kings Highway	Residential	NCA01	56	43	34	V, N, R1, DR
H32	Kings Highway	Residential	NCA01	59	45	36	V, N, R1, DR
H33	Kings Highway	Residential	NCA01	57	41	32	V, N, R1, DR
H34	Kings Highway	Residential	NCA01	58	42	33	V, N, R1, DR
H35	Kings Highway	Residential	NCA01	57	42	33	V, N, R1, DR
R01	11 Wharf Street	Residential	NCA01	61	58	49	V, IB, N, R1, DR, PC, SN
R02	3-9 Wharf Street	Residential	NCA01	67	59	50	V, IB, N, R1, DR, PC, SN
R03	Lot 1 Wharf Street	Residential	NCA01	65	59	50	V, IB, N, R1, DR, PC, SN

Predicted construction noise levels: OOHV Period 1 (Evening)

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
Residential: Noticeable Clearly audible Moderately intrusive Highly intrusive Bold Highly noise affected Non-residential: Exceeds noise management level							
R81	27 Nelligen Pl	Residential	NCA01	49	48	39	N, R1, DR
R82	24 Nelligen Pl	Residential	NCA01	51	50	41	V, N, R1, DR
R83	22 Nelligen Pl	Residential	NCA01	52	51	42	V, N, R1, DR
R84	20 Nelligen Pl	Residential	NCA01	50	49	40	V, N, R1, DR
R85	18 Nelligen Pl	Residential	NCA01	50	49	40	V, N, R1, DR
R86	16 Nelligen Pl	Residential	NCA01	52	51	42	V, N, R1, DR
R87	14 Nelligen Pl	Residential	NCA01	50	49	40	V, N, R1, DR
R88	12 Nelligen Pl	Residential	NCA01	50	49	40	V, N, R1, DR
R89	6 Nelligen Pl	Residential	NCA01	48	46	37	N, R1, DR
R90	7 Currowan Street	Residential	NCA01	52	50	41	V, N, R1, DR
R91	9 Currowan St	Residential	NCA01	52	51	42	V, N, R1, DR
R92	11 Currowan St	Residential	NCA01	52	51	42	V, N, R1, DR
R93	21 Currowan St	Residential	NCA01	52	51	42	V, N, R1, DR
R94	23 Clyde Blvd	Residential	NCA01	51	50	41	V, N, R1, DR
R95	25 Clyde Blvd	Residential	NCA01	49	47	38	N, R1, DR
R96	10 Currowan Street	Residential	NCA01	51	50	41	V, N, R1, DR
R97	14 Currowan St	Residential	NCA01	50	50	41	V, N, R1, DR
R98	14b Currowan St	Residential	NCA01	51	49	40	V, N, R1, DR
R99	16 Currowan St	Residential	NCA01	54	52	43	V, N, R1, DR
R100	17 Clyde Blvd	Residential	NCA01	55	54	45	V, N, R1, DR
R101	15 Clyde Blvd	Residential	NCA01	52	51	42	V, N, R1, DR
R102	13b Clyde Blvd	Residential	NCA01	50	50	41	V, N, R1, DR
R103	13 Clyde Blvd	Residential	NCA01	49	47	38	N, R1, DR
R104	9 Clyde Blvd	Residential	NCA01	51	51	42	V, N, R1, DR
R105	7 Clyde Blvd	Residential	NCA01	60	54	45	V, IB, N, R1, DR, PC, SN
R106	5 Clyde Blvd	Residential	NCA01	62	55	46	V, IB, N, R1, DR, PC, SN
R107	3 Clyde Blvd	Residential	NCA01	60	50	41	V, IB, N, R1, DR, PC, SN
R108	3b Clyde Blvd	Residential	NCA01	61	58	49	V, IB, N, R1, DR, PC, SN
R109	1 Clyde Blvd	Residential	NCA01	68	58	49	V, IB, N, R1, DR, PC, SN
R110	11a Wharf Street	Residential	NCA01	62	57	48	V, IB, N, R1, DR, PC, SN
R111	29b Reid Street	Residential	NCA01	43	38	29	N, R1, DR
R112	29 Reid Street	Residential	NCA01	53	40	31	V, N, R1, DR
R113	16 Reid Street	Residential	NCA01	55	35	26	V, N, R1, DR
R114	14b Reid Street	Residential	NCA01	59	35	26	V, N, R1, DR
R115	14 Reid Street	Residential	NCA01	57	38	29	V, N, R1, DR
R116	12 Reid Street	Residential	NCA01	60	37	28	V, IB, N, R1, DR, PC, SN
R117	3b Reid Street	Residential	NCA01	57	40	31	V, N, R1, DR
R118	3 Reid Street	Residential	NCA01	60	39	30	V, IB, N, R1, DR, PC, SN
R119	3a Reid Street	Residential	NCA01	58	40	31	V, N, R1, DR
R120	46a Reid Street	Residential	NCA01	54	40	31	V, N, R1, DR
R121	46 Reid Street	Residential	NCA01	55	40	31	V, N, R1, DR
R122	33a Reid Street	Residential	NCA01	70	44	35	V, IB, N, R1, DR, PC, SN
R123	33b Reid Street	Residential	NCA01	66	40	31	V, IB, N, R1, DR, PC, SN
R124	33c Reid Street	Residential	NCA01	51	40	31	V, N, R1, DR
R125	969 Kings Highway	Residential	NCA01	62	40	31	V, IB, N, R1, DR, PC, SN
R126	969a Kings Highway	Residential	NCA01	46	32	23	N, R1, DR
R127	2 Thule Rd	Residential	NCA01	88	83	74	V, IB, N, R1, DR, PC, SN
R128	4b Thule Rd	Residential	NCA01	86	84	75	V, IB, N, R1, DR, PC, SN
R129	4 Thule Rd	Residential	NCA01	82	78	69	V, IB, N, R1, DR, PC, SN
R130	6 Thule Rd	Residential	NCA01	75	73	64	V, IB, N, R1, DR, PC, SN
R131	6b Thule Rd	Residential	NCA01	76	76	67	V, IB, N, R1, DR, PC, SN
R132	8 Thule Rd	Residential	NCA01	72	70	61	V, IB, N, R1, DR, PC, SN
R133	35 Old Nelligen Rd	Residential	NCA01	71	68	58	V, IB, N, R1, DR, PC, SN
R134	33b Old Nelligen Rd	Residential	NCA01	76	65	56	V, IB, N, R1, DR, PC, SN
R135	33a Old Nelligen Rd	Residential	NCA01	77	59	50	V, IB, N, R1, DR, PC, SN
R136	31a Old Nelligen Rd	Residential	NCA01	78	63	53	V, IB, N, R1, DR, PC, SN
R137	31b Old Nelligen Rd	Residential	NCA01	68	57	48	V, IB, N, R1, DR, PC, SN
R138	10 Thule Rd	Residential	NCA01	79	66	57	V, IB, N, R1, DR, PC, SN
R139	35 Thule Rd	Residential	NCA01	75	62	52	V, IB, N, R1, DR, PC, SN
R140	41 Thule Rd	Residential	NCA01	83	64	52	V, IB, N, R1, DR, PC, SN

Predicted construction noise levels: OOHW Period 1 (Evening)

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
Residential: <span>Noticeable</span> <span>Clearly audible</span> <span>Moderately intrusive</span> <span>Highly intrusive</span> <span>Highly noise affected</span> Non-residential: <span>Exceeds noise management level</span>							
R141	37 Thule Rd	Residential	NCA01	78	64	51	V, IB, N, R1, DR, PC, SN
R142	Lot 21a Thule Rd	Residential	NCA01	64	55	46	V, IB, N, R1, DR, PC, SN
R143	Lot 21b Thule Rd	Residential	NCA01	62	55	46	V, IB, N, R1, DR, PC, SN
R144	Lot 21c Thule Rd	Residential	NCA01	60	57	48	V, IB, N, R1, DR, PC, SN
R145	Lot 21d Thule Rd	Residential	NCA01	64	55	46	V, IB, N, R1, DR, PC, SN
R146	Lot 21e Thule Rd	Residential	NCA01	64	56	47	V, IB, N, R1, DR, PC, SN
R147	4 Bridge View Rd	Residential	NCA01	71	59	50	V, IB, N, R1, DR, PC, SN
R148	6 Bridge View Rd	Residential	NCA01	66	56	47	V, IB, N, R1, DR, PC, SN
R149	3 Sproxton Ln	Residential	NCA01	61	57	48	V, IB, N, R1, DR, PC, SN
R150	5 Sproxton Ln	Residential	NCA01	62	54	45	V, IB, N, R1, DR, PC, SN
R151	5b Sproxton Ln	Residential	NCA01	58	53	44	V, N, R1, DR
R152	7 Sproxton Ln	Residential	NCA01	56	51	42	V, N, R1, DR
R153	9b Sproxton Ln	Residential	NCA01	58	55	46	V, N, R1, DR
R154	9 Sproxton Ln	Residential	NCA01	55	52	43	V, N, R1, DR
R155	Sproxton Ln	Residential	NCA01	53	52	43	V, N, R1, DR
R156	11 Sproxton Ln	Residential	NCA01	59	55	46	V, N, R1, DR
R157	13a Sproxton Ln	Residential	NCA01	54	51	42	V, N, R1, DR
R158	13b Sproxton Ln	Residential	NCA01	57	55	46	V, N, R1, DR
R159	17b Sproxton Ln	Residential	NCA01	57	54	45	V, N, R1, DR
R160	17c Sproxton Ln	Residential	NCA01	54	51	42	V, N, R1, DR
R161	17 Sproxton Ln	Residential	NCA01	52	51	42	V, N, R1, DR
R162	19 Sproxton Ln	Residential	NCA01	51	49	40	V, N, R1, DR
R163	21 Sproxton Ln	Residential	NCA01	54	52	43	V, N, R1, DR
R164	25 Sproxton Ln	Residential	NCA01	53	51	42	V, N, R1, DR
R165	27 Sproxton Ln	Residential	NCA01	52	50	41	V, N, R1, DR
R166	29b Sproxton Ln	Residential	NCA01	53	51	42	V, N, R1, DR
R167	29 Sproxton Ln	Residential	NCA01	51	49	40	V, N, R1, DR
R168	31 Sproxton Ln	Residential	NCA01	52	46	37	V, N, R1, DR
R169	35 Sproxton Ln	Residential	NCA01	51	47	38	V, N, R1, DR
R170	30 Sproxton Ln	Residential	NCA01	53	49	40	V, N, R1, DR
R171	28 Sproxton Ln	Residential	NCA01	56	52	43	V, N, R1, DR
R172	26 Sproxton Ln	Residential	NCA01	55	51	42	V, N, R1, DR
R173	24 Sproxton Ln	Residential	NCA01	55	49	40	V, N, R1, DR
R174	22 Sproxton Ln	Residential	NCA01	58	55	46	V, N, R1, DR
R175	20 Sproxton Ln	Residential	NCA01	58	54	45	V, N, R1, DR
R176	18 Sproxton Ln	Residential	NCA01	57	54	45	V, N, R1, DR
R177	12 Sproxton Ln	Residential	NCA01	60	54	45	V, IB, N, R1, DR, PC, SN
R178	8 Sproxton Ln	Residential	NCA01	60	54	45	V, IB, N, R1, DR, PC, SN
R179	74a Bridge View Rd	Residential	NCA01	57	48	39	V, N, R1, DR
R180	74b Bridge View Rd	Residential	NCA01	61	49	40	V, IB, N, R1, DR, PC, SN
R181	74c Bridge View Rd	Residential	NCA01	60	45	36	V, IB, N, R1, DR, PC, SN
R182	74d Bridge View Rd	Residential	NCA01	59	46	37	V, N, R1, DR
R183	74e Bridge View Rd	Residential	NCA01	60	46	37	V, IB, N, R1, DR, PC, SN
R184	983 Kings Hwy	Residential	NCA01	54	41	32	V, N, R1, DR

Predicted construction noise levels: OOHV Period 2 (Night)

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
Residential: <span>Noticeable</span> <span>Clearly audible</span> <span>Moderately intrusive</span> <span>Highly intrusive</span> <span>Bold Highly noise affected</span>							
Non-residential: <span>Exceeds noise management level</span>							
C01	Lot 1 Wharf Street	Commercial	NCA01	74	59	50	-
C02	Lot 1 Wharf Street	Commercial	NCA01	71	59	50	-
C03	7 Braidwood Street	Commercial	NCA01	97	60	51	-
C04	8 Braidwood Street	Commercial	NCA01	100	56	47	-
C05	9 Braidwood Street	Commercial	NCA01	105	56	47	-
H01	Kings Highway	Residential	NCA01	63	40	31	AA, V, IB, N, PC, SN, R2, DR
H02	Kings Highway	Residential	NCA01	60	42	33	AA, V, IB, N, PC, SN, R2, DR
H03	Kings Highway	Residential	NCA01	63	41	32	AA, V, IB, N, PC, SN, R2, DR
H04	Kings Highway	Residential	NCA01	63	41	32	AA, V, IB, N, PC, SN, R2, DR
H05	Kings Highway	Residential	NCA01	62	46	37	AA, V, IB, N, PC, SN, R2, DR
H06	Kings Highway	Residential	NCA01	63	46	37	AA, V, IB, N, PC, SN, R2, DR
H07	Kings Highway	Residential	NCA01	63	47	37	AA, V, IB, N, PC, SN, R2, DR
H08	Kings Highway	Residential	NCA01	63	46	36	AA, V, IB, N, PC, SN, R2, DR
H09	Kings Highway	Residential	NCA01	62	44	35	AA, V, IB, N, PC, SN, R2, DR
H10	Kings Highway	Residential	NCA01	62	45	36	AA, V, IB, N, PC, SN, R2, DR
H11	Kings Highway	Residential	NCA01	62	46	37	AA, V, IB, N, PC, SN, R2, DR
H12	Kings Highway	Residential	NCA01	61	46	37	AA, V, IB, N, PC, SN, R2, DR
H13	Kings Highway	Residential	NCA01	62	46	37	AA, V, IB, N, PC, SN, R2, DR
H14	Kings Highway	Residential	NCA01	61	45	36	AA, V, IB, N, PC, SN, R2, DR
H15	Kings Highway	Residential	NCA01	62	43	34	AA, V, IB, N, PC, SN, R2, DR
H16	Kings Highway	Residential	NCA01	58	46	37	V, IB, N, PC, SN, R2, DR
H17	Kings Highway	Residential	NCA01	57	44	35	V, IB, N, PC, SN, R2, DR
H18	Kings Highway	Residential	NCA01	59	43	34	V, IB, N, PC, SN, R2, DR
H19	Kings Highway	Residential	NCA01	59	44	34	V, IB, N, PC, SN, R2, DR
H20	Kings Highway	Residential	NCA01	57	45	36	V, IB, N, PC, SN, R2, DR
H21	Kings Highway	Residential	NCA01	57	43	34	V, IB, N, PC, SN, R2, DR
H22	Kings Highway	Residential	NCA01	59	42	33	V, IB, N, PC, SN, R2, DR
H23	Kings Highway	Residential	NCA01	55	45	36	V, IB, N, PC, SN, R2, DR
H24	Kings Highway	Residential	NCA01	57	42	33	V, IB, N, PC, SN, R2, DR
H25	Kings Highway	Residential	NCA01	56	45	36	V, IB, N, PC, SN, R2, DR
H26	Kings Highway	Residential	NCA01	55	45	36	V, IB, N, PC, SN, R2, DR
H27	Kings Highway	Residential	NCA01	55	45	36	V, IB, N, PC, SN, R2, DR
H28	Kings Highway	Residential	NCA01	55	45	35	V, IB, N, PC, SN, R2, DR
H29	Kings Highway	Residential	NCA01	55	43	34	V, IB, N, PC, SN, R2, DR
H30	Kings Highway	Residential	NCA01	56	43	34	V, IB, N, PC, SN, R2, DR
H31	Kings Highway	Residential	NCA01	56	43	34	V, IB, N, PC, SN, R2, DR
H32	Kings Highway	Residential	NCA01	59	45	36	V, IB, N, PC, SN, R2, DR
H33	Kings Highway	Residential	NCA01	57	41	32	V, IB, N, PC, SN, R2, DR
H34	Kings Highway	Residential	NCA01	58	42	33	V, IB, N, PC, SN, R2, DR
H35	Kings Highway	Residential	NCA01	57	42	33	V, IB, N, PC, SN, R2, DR
R01	11 Wharf Street	Residential	NCA01	61	58	49	AA, V, IB, N, PC, SN, R2, DR
R02	3-9 Wharf Street	Residential	NCA01	67	59	50	AA, V, IB, N, PC, SN, R2, DR
R03	Lot 1 Wharf Street	Residential	NCA01	65	59	50	AA, V, IB, N, PC, SN, R2, DR
R04	4 Braidwood Street	Residential	NCA01	73	57	48	AA, V, IB, N, PC, SN, R2, DR
R05	6 Braidwood Street	Residential	NCA01	64	51	42	AA, V, IB, N, PC, SN, R2, DR
R06	9 Braidwood Street	Residential	NCA01	70	56	47	AA, V, IB, N, PC, SN, R2, DR
R07	12 Braidwood Street	Residential	NCA01	64	49	40	AA, V, IB, N, PC, SN, R2, DR
R08	14 Braidwood Street	Residential	NCA01	68	56	47	AA, V, IB, N, PC, SN, R2, DR
R09	14a Braidwood Street	Residential	NCA01	59	49	40	V, IB, N, PC, SN, R2, DR
R10	11 Braidwood Street	Residential	NCA01	77	54	45	AA, V, IB, N, PC, SN, R2, DR
R11	13 Braidwood Street	Residential	NCA01	78	52	43	AA, V, IB, N, PC, SN, R2, DR
R12	15 Braidwood Street	Residential	NCA01	74	50	41	AA, V, IB, N, PC, SN, R2, DR
R13	16 Braidwood Street	Residential	NCA01	60	54	45	AA, V, IB, N, PC, SN, R2, DR
R14	18 Braidwood Street	Residential	NCA01	58	52	43	V, IB, N, PC, SN, R2, DR
R15	20 Braidwood Street	Residential	NCA01	58	50	41	V, IB, N, PC, SN, R2, DR
R16	17 Braidwood Street	Residential	NCA01	75	50	40	AA, V, IB, N, PC, SN, R2, DR
R17	19 Braidwood Street	Residential	NCA01	73	46	37	AA, V, IB, N, PC, SN, R2, DR
R18	2 Runnyford Rd	Residential	NCA01	48	46	38	V, N, R2, DR
R19	4 Cowper Street	Residential	NCA01	67	44	35	AA, V, IB, N, PC, SN, R2, DR
R20	2 Cowper Street	Residential	NCA01	71	46	37	AA, V, IB, N, PC, SN, R2, DR



Predicted construction noise levels: OOHW Period 2 (Night)

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
<b>Residential:</b> Noticeable Clearly audible Moderately intrusive Highly intrusive <b>Bold</b> Highly noise affected <b>Non-residential:</b> Exceeds noise management level							
R21	7 Murray Street	Residential	NCA01	87	49	40	AA, V, IB, N, PC, SN, R2, DR
R22	27 Braidwood Street	Residential	NCA01	72	37	28	AA, V, IB, N, PC, SN, R2, DR
R23	24 Braidwood Street	Residential	NCA01	60	47	38	AA, V, IB, N, PC, SN, R2, DR
R24	28 Braidwood Street	Residential	NCA01	63	44	35	AA, V, IB, N, PC, SN, R2, DR
R25	30 Braidwood Street	Residential	NCA01	62	37	28	AA, V, IB, N, PC, SN, R2, DR
R26	1 Runnyford Rd	Residential	NCA01	56	47	38	V, IB, N, PC, SN, R2, DR
R27	3 Runnyford Rd	Residential	NCA01	56	47	38	V, IB, N, PC, SN, R2, DR
R28	8 Runnyford Rd	Residential	NCA01	60	41	32	AA, V, IB, N, PC, SN, R2, DR
R29	12 Runnyford Rd	Residential	NCA01	56	46	37	V, IB, N, PC, SN, R2, DR
R30	13 Runnyford Rd	Residential	NCA01	59	39	31	V, IB, N, PC, SN, R2, DR
R31	13 Runnyford Rd	Residential	NCA01	59	46	37	V, IB, N, PC, SN, R2, DR
R32	11 Runnyford Rd	Residential	NCA01	58	44	35	V, IB, N, PC, SN, R2, DR
R33	11 Runnyford Rd	Residential	NCA01	57	44	35	V, IB, N, PC, SN, R2, DR
R34	15 Runnyford Rd	Residential	NCA01	57	43	34	V, IB, N, PC, SN, R2, DR
R35	17 Runnyford Rd	Residential	NCA01	57	41	32	V, IB, N, PC, SN, R2, DR
R36	17b Runnyford Rd	Residential	NCA01	55	42	33	V, IB, N, PC, SN, R2, DR
R37	19 Runnyford Rd	Residential	NCA01	53	39	30	V, IB, N, PC, SN, R2, DR
R38	21 Runnyford Rd	Residential	NCA01	53	39	30	V, IB, N, PC, SN, R2, DR
R39	23 Runnyford Rd	Residential	NCA01	56	40	31	V, IB, N, PC, SN, R2, DR
R40	25Runnyford Rd	Residential	NCA01	53	40	31	V, IB, N, PC, SN, R2, DR
R41	27 Runnyford Rd	Residential	NCA01	53	40	31	V, IB, N, PC, SN, R2, DR
R42	27 Runnyford Rd	Residential	NCA01	51	39	30	V, IB, N, PC, SN, R2, DR
R43	22-24 Reid Street	Residential	NCA01	54	41	32	V, IB, N, PC, SN, R2, DR
R44	40 Runnyford Rd	Residential	NCA01	50	40	31	V, IB, N, PC, SN, R2, DR
R45	38 Runnyford Rd	Residential	NCA01	48	43	34	V, N, R2, DR
R46	36 Runnyford Rd	Residential	NCA01	49	46	37	V, N, R2, DR
R47	34 Runnyford Rd	Residential	NCA01	48	46	37	V, N, R2, DR
R48	32 Runnyford Rd	Residential	NCA01	49	44	35	V, N, R2, DR
R49	30 Runnyford Rd	Residential	NCA01	49	47	38	V, N, R2, DR
R50	26 Runnyford Rd	Residential	NCA01	45	41	32	V, N, R2, DR
R51	24b Runnyford Rd	Residential	NCA01	52	44	35	V, IB, N, PC, SN, R2, DR
R52	24 Runnyford Rd	Residential	NCA01	48	45	36	V, N, R2, DR
R53	1a Currowan Street	Residential	NCA01	53	48	39	V, IB, N, PC, SN, R2, DR
R54	1 Currowan Street	Residential	NCA01	54	49	40	V, IB, N, PC, SN, R2, DR
R55	2 Currowan Street	Residential	NCA01	54	50	41	V, IB, N, PC, SN, R2, DR
R56	2b Currowan Street	Residential	NCA01	54	47	38	V, IB, N, PC, SN, R2, DR
R57	18 Runnyford Rd	Residential	NCA01	51	50	41	V, IB, N, PC, SN, R2, DR
R58	16 Runnyford Rd	Residential	NCA01	49	49	40	V, N, R2, DR
R59	14 Runnyford Rd	Residential	NCA01	48	49	40	V, N, R2, DR
R60	12 Runnyford Rd	Residential	NCA01	49	49	40	V, N, R2, DR
R61	10 Runnyford Rd	Residential	NCA01	50	48	39	V, IB, N, PC, SN, R2, DR
R62	8 Runnyford Rd	Residential	NCA01	49	48	39	V, N, R2, DR
R63	4 Currowan Street	Residential	NCA01	50	49	40	V, IB, N, PC, SN, R2, DR
R64	6 Currowan Street	Residential	NCA01	50	49	40	V, IB, N, PC, SN, R2, DR
R65	8 Currowan Street	Residential	NCA01	50	49	40	V, IB, N, PC, SN, R2, DR
R66	3 Currowan Street	Residential	NCA01	52	49	40	V, IB, N, PC, SN, R2, DR
R67	5 Currowan Street	Residential	NCA01	52	49	40	V, IB, N, PC, SN, R2, DR
R68	3 Nelligen Pl	Residential	NCA01	51	50	41	V, IB, N, PC, SN, R2, DR
R69	5 Nelligen Pl	Residential	NCA01	51	46	37	V, IB, N, PC, SN, R2, DR
R70	5b Nelligen Pl	Residential	NCA01	49	46	37	V, N, R2, DR
R71	7 Nelligen Pl	Residential	NCA01	49	48	39	V, N, R2, DR
R72	9 Nelligen Pl	Residential	NCA01	50	48	39	V, IB, N, PC, SN, R2, DR
R73	11 Nelligen Pl	Residential	NCA01	51	48	39	V, IB, N, PC, SN, R2, DR
R74	13 Nelligen Pl	Residential	NCA01	50	48	39	V, IB, N, PC, SN, R2, DR
R75	13b Nelligen Pl	Residential	NCA01	47	45	36	V, N, R2, DR
R76	15 Nelligen Pl	Residential	NCA01	48	48	39	V, N, R2, DR
R77	17 Nelligen Pl	Residential	NCA01	50	43	34	V, IB, N, PC, SN, R2, DR
R78	21 Nelligen Pl	Residential	NCA01	45	43	34	V, N, R2, DR
R79	23 Nelligen Pl	Residential	NCA01	44	42	33	V, N, R2, DR
R80	25 Nelligen Pl	Residential	NCA01	42	39	30	V, N, R2, DR

Predicted construction noise levels: OOHW Period 2 (Night)

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
Residential: Noticeable Clearly audible Moderately intrusive Highly intrusive Bold Highly noise affected Non-residential: Exceeds noise management level							
R81	27 Nelligen Pl	Residential	NCA01	49	48	39	V, N, R2, DR
R82	24 Nelligen Pl	Residential	NCA01	51	50	41	V, IB, N, PC, SN, R2, DR
R83	22 Nelligen Pl	Residential	NCA01	52	51	42	V, IB, N, PC, SN, R2, DR
R84	20 Nelligen Pl	Residential	NCA01	50	49	40	V, IB, N, PC, SN, R2, DR
R85	18 Nelligen Pl	Residential	NCA01	50	49	40	V, IB, N, PC, SN, R2, DR
R86	16 Nelligen Pl	Residential	NCA01	52	51	42	V, IB, N, PC, SN, R2, DR
R87	14 Nelligen Pl	Residential	NCA01	50	49	40	V, IB, N, PC, SN, R2, DR
R88	12 Nelligen Pl	Residential	NCA01	50	49	40	V, IB, N, PC, SN, R2, DR
R89	6 Nelligen Pl	Residential	NCA01	48	46	37	V, N, R2, DR
R90	7 Currowan Street	Residential	NCA01	52	50	41	V, IB, N, PC, SN, R2, DR
R91	9 Currowan St	Residential	NCA01	52	51	42	V, IB, N, PC, SN, R2, DR
R92	11 Currowan St	Residential	NCA01	52	51	42	V, IB, N, PC, SN, R2, DR
R93	21 Currowan St	Residential	NCA01	52	51	42	V, IB, N, PC, SN, R2, DR
R94	23 Clyde Blvd	Residential	NCA01	51	50	41	V, IB, N, PC, SN, R2, DR
R95	25 Clyde Blvd	Residential	NCA01	49	47	38	V, N, R2, DR
R96	10 Currowan Street	Residential	NCA01	51	50	41	V, IB, N, PC, SN, R2, DR
R97	14 Currowan St	Residential	NCA01	50	50	41	V, IB, N, PC, SN, R2, DR
R98	14b Currowan St	Residential	NCA01	51	49	40	V, IB, N, PC, SN, R2, DR
R99	16 Currowan St	Residential	NCA01	54	52	43	V, IB, N, PC, SN, R2, DR
R100	17 Clyde Blvd	Residential	NCA01	55	54	45	V, IB, N, PC, SN, R2, DR
R101	15 Clyde Blvd	Residential	NCA01	52	51	42	V, IB, N, PC, SN, R2, DR
R102	13b Clyde Blvd	Residential	NCA01	50	50	41	V, IB, N, PC, SN, R2, DR
R103	13 Clyde Blvd	Residential	NCA01	49	47	38	V, N, R2, DR
R104	9 Clyde Blvd	Residential	NCA01	51	51	42	V, IB, N, PC, SN, R2, DR
R105	7 Clyde Blvd	Residential	NCA01	60	54	45	AA, V, IB, N, PC, SN, R2, DR
R106	5 Clyde Blvd	Residential	NCA01	62	55	46	AA, V, IB, N, PC, SN, R2, DR
R107	3 Clyde Blvd	Residential	NCA01	60	50	41	AA, V, IB, N, PC, SN, R2, DR
R108	3b Clyde Blvd	Residential	NCA01	61	58	49	AA, V, IB, N, PC, SN, R2, DR
R109	1 Clyde Blvd	Residential	NCA01	68	58	49	AA, V, IB, N, PC, SN, R2, DR
R110	11a Wharf Street	Residential	NCA01	62	57	48	AA, V, IB, N, PC, SN, R2, DR
R111	29b Reid Street	Residential	NCA01	43	38	29	V, N, R2, DR
R112	29 Reid Street	Residential	NCA01	53	40	31	V, IB, N, PC, SN, R2, DR
R113	16 Reid Street	Residential	NCA01	55	35	26	V, IB, N, PC, SN, R2, DR
R114	14b Reid Street	Residential	NCA01	59	35	26	V, IB, N, PC, SN, R2, DR
R115	14 Reid Street	Residential	NCA01	57	38	29	V, IB, N, PC, SN, R2, DR
R116	12 Reid Street	Residential	NCA01	60	37	28	AA, V, IB, N, PC, SN, R2, DR
R117	3b Reid Street	Residential	NCA01	57	40	31	V, IB, N, PC, SN, R2, DR
R118	3 Reid Street	Residential	NCA01	60	39	30	AA, V, IB, N, PC, SN, R2, DR
R119	3a Reid Street	Residential	NCA01	58	40	31	V, IB, N, PC, SN, R2, DR
R120	46a Reid Street	Residential	NCA01	54	40	31	V, IB, N, PC, SN, R2, DR
R121	46 Reid Street	Residential	NCA01	55	40	31	V, IB, N, PC, SN, R2, DR
R122	33a Reid Street	Residential	NCA01	70	44	35	AA, V, IB, N, PC, SN, R2, DR
R123	33b Reid Street	Residential	NCA01	66	40	31	AA, V, IB, N, PC, SN, R2, DR
R124	33c Reid Street	Residential	NCA01	51	40	31	V, IB, N, PC, SN, R2, DR
R125	969 Kings Highway	Residential	NCA01	62	40	31	AA, V, IB, N, PC, SN, R2, DR
R126	969a Kings Highway	Residential	NCA01	46	32	23	V, N, R2, DR
R127	2 Thule Rd	Residential	NCA01	88	83	74	AA, V, IB, N, PC, SN, R2, DR
R128	4b Thule Rd	Residential	NCA01	86	84	75	AA, V, IB, N, PC, SN, R2, DR
R129	4 Thule Rd	Residential	NCA01	82	78	69	AA, V, IB, N, PC, SN, R2, DR
R130	6 Thule Rd	Residential	NCA01	75	73	64	AA, V, IB, N, PC, SN, R2, DR
R131	6b Thule Rd	Residential	NCA01	76	76	67	AA, V, IB, N, PC, SN, R2, DR
R132	8 Thule Rd	Residential	NCA01	72	70	61	AA, V, IB, N, PC, SN, R2, DR
R133	35 Old Nelligen Rd	Residential	NCA01	71	68	58	AA, V, IB, N, PC, SN, R2, DR
R134	33b Old Nelligen Rd	Residential	NCA01	76	65	56	AA, V, IB, N, PC, SN, R2, DR
R135	33a Old Nelligen Rd	Residential	NCA01	77	59	50	AA, V, IB, N, PC, SN, R2, DR
R136	31a Old Nelligen Rd	Residential	NCA01	78	63	53	AA, V, IB, N, PC, SN, R2, DR
R137	31b Old Nelligen Rd	Residential	NCA01	68	57	48	AA, V, IB, N, PC, SN, R2, DR
R138	10 Thule Rd	Residential	NCA01	79	66	57	AA, V, IB, N, PC, SN, R2, DR
R139	35 Thule Rd	Residential	NCA01	75	62	52	AA, V, IB, N, PC, SN, R2, DR
R140	41 Thule Rd	Residential	NCA01	83	64	52	AA, V, IB, N, PC, SN, R2, DR

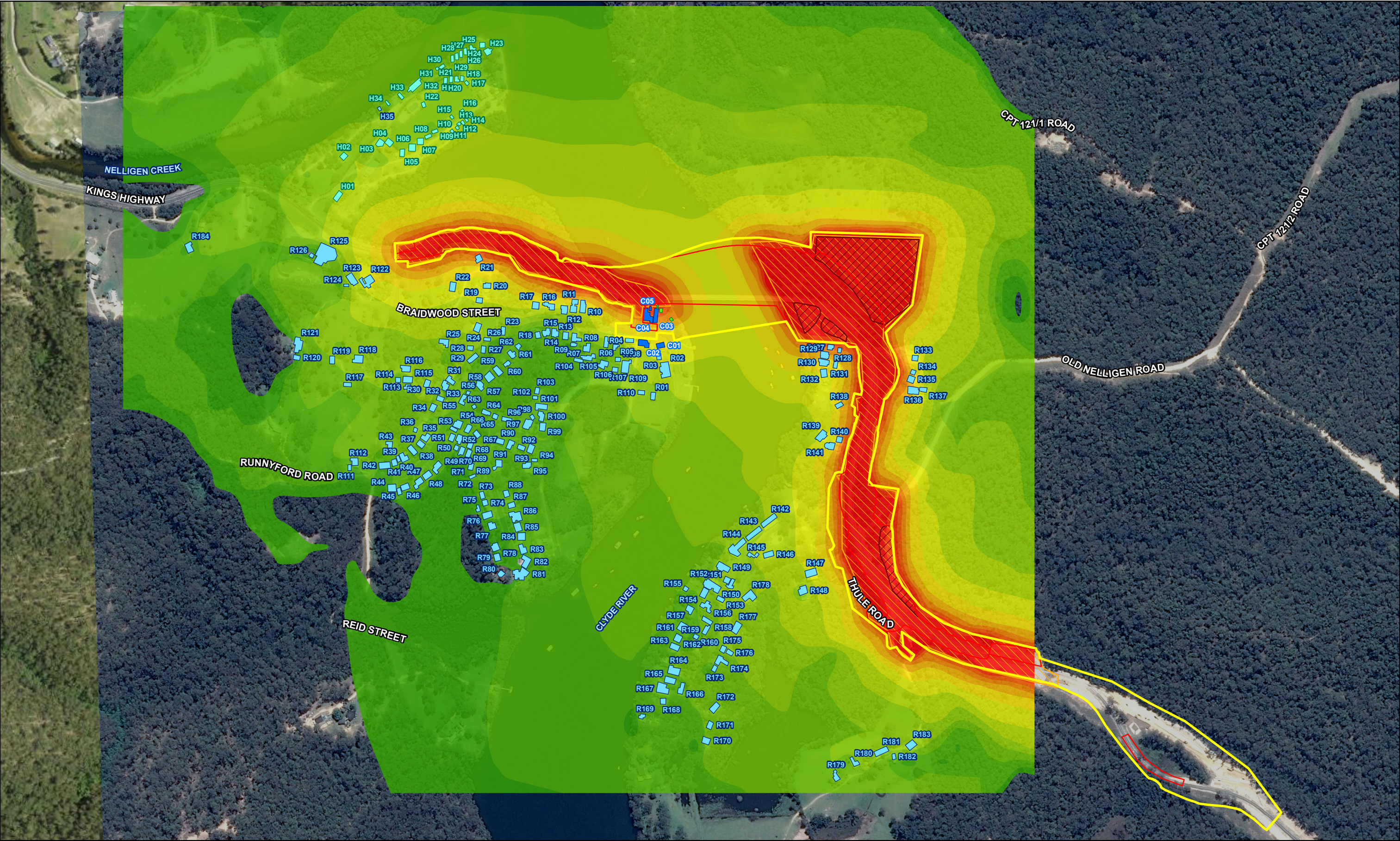
Predicted construction noise levels: OOHW Period 2 (Night)

Receiver ID	Address	Receiver Type	NCA	CS01	CS02	CS15	Additional management measures
Residential: <span>Noticeable</span> <span>Clearly audible</span> <span>Moderately intrusive</span> <span>Highly intrusive</span> <b>Highly noise affected</b> Non-residential: <span>Exceeds noise management level</span>							
R141	37 Thule Rd	Residential	NCA01	78	64	51	AA, V, IB, N, PC, SN, R2, DR
R142	Lot 21a Thule Rd	Residential	NCA01	64	55	46	AA, V, IB, N, PC, SN, R2, DR
R143	Lot 21b Thule Rd	Residential	NCA01	62	55	46	AA, V, IB, N, PC, SN, R2, DR
R144	Lot 21c Thule Rd	Residential	NCA01	60	57	48	AA, V, IB, N, PC, SN, R2, DR
R145	Lot 21d Thule Rd	Residential	NCA01	64	55	46	AA, V, IB, N, PC, SN, R2, DR
R146	Lot 21e Thule Rd	Residential	NCA01	64	56	47	AA, V, IB, N, PC, SN, R2, DR
R147	4 Bridge View Rd	Residential	NCA01	71	59	50	AA, V, IB, N, PC, SN, R2, DR
R148	6 Bridge View Rd	Residential	NCA01	66	56	47	AA, V, IB, N, PC, SN, R2, DR
R149	3 Sproxton Ln	Residential	NCA01	61	57	48	AA, V, IB, N, PC, SN, R2, DR
R150	5 Sproxton Ln	Residential	NCA01	62	54	45	AA, V, IB, N, PC, SN, R2, DR
R151	5b Sproxton Ln	Residential	NCA01	58	53	44	V, IB, N, PC, SN, R2, DR
R152	7 Sproxton Ln	Residential	NCA01	56	51	42	V, IB, N, PC, SN, R2, DR
R153	9b Sproxton Ln	Residential	NCA01	58	55	46	V, IB, N, PC, SN, R2, DR
R154	9 Sproxton Ln	Residential	NCA01	55	52	43	V, IB, N, PC, SN, R2, DR
R155	Sproxton Ln	Residential	NCA01	53	52	43	V, IB, N, PC, SN, R2, DR
R156	11 Sproxton Ln	Residential	NCA01	59	55	46	V, IB, N, PC, SN, R2, DR
R157	13a Sproxton Ln	Residential	NCA01	54	51	42	V, IB, N, PC, SN, R2, DR
R158	13b Sproxton Ln	Residential	NCA01	57	55	46	V, IB, N, PC, SN, R2, DR
R159	17b Sproxton Ln	Residential	NCA01	57	54	45	V, IB, N, PC, SN, R2, DR
R160	17c Sproxton Ln	Residential	NCA01	54	51	42	V, IB, N, PC, SN, R2, DR
R161	17 Sproxton Ln	Residential	NCA01	52	51	42	V, IB, N, PC, SN, R2, DR
R162	19 Sproxton Ln	Residential	NCA01	51	49	40	V, IB, N, PC, SN, R2, DR
R163	21 Sproxton Ln	Residential	NCA01	54	52	43	V, IB, N, PC, SN, R2, DR
R164	25 Sproxton Ln	Residential	NCA01	53	51	42	V, IB, N, PC, SN, R2, DR
R165	27 Sproxton Ln	Residential	NCA01	52	50	41	V, IB, N, PC, SN, R2, DR
R166	29b Sproxton Ln	Residential	NCA01	53	51	42	V, IB, N, PC, SN, R2, DR
R167	29 Sproxton Ln	Residential	NCA01	51	49	40	V, IB, N, PC, SN, R2, DR
R168	31 Sproxton Ln	Residential	NCA01	52	46	37	V, IB, N, PC, SN, R2, DR
R169	35 Sproxton Ln	Residential	NCA01	51	47	38	V, IB, N, PC, SN, R2, DR
R170	30 Sproxton Ln	Residential	NCA01	53	49	40	V, IB, N, PC, SN, R2, DR
R171	28 Sproxton Ln	Residential	NCA01	56	52	43	V, IB, N, PC, SN, R2, DR
R172	26 Sproxton Ln	Residential	NCA01	55	51	42	V, IB, N, PC, SN, R2, DR
R173	24 Sproxton Ln	Residential	NCA01	55	49	40	V, IB, N, PC, SN, R2, DR
R174	22 Sproxton Ln	Residential	NCA01	58	55	46	V, IB, N, PC, SN, R2, DR
R175	20 Sproxton Ln	Residential	NCA01	58	54	45	V, IB, N, PC, SN, R2, DR
R176	18 Sproxton Ln	Residential	NCA01	57	54	45	V, IB, N, PC, SN, R2, DR
R177	12 Sproxton Ln	Residential	NCA01	60	54	45	AA, V, IB, N, PC, SN, R2, DR
R178	8 Sproxton Ln	Residential	NCA01	60	54	45	AA, V, IB, N, PC, SN, R2, DR
R179	74a Bridge View Rd	Residential	NCA01	57	48	39	V, IB, N, PC, SN, R2, DR
R180	74b Bridge View Rd	Residential	NCA01	61	49	40	AA, V, IB, N, PC, SN, R2, DR
R181	74c Bridge View Rd	Residential	NCA01	60	45	36	AA, V, IB, N, PC, SN, R2, DR
R182	74d Bridge View Rd	Residential	NCA01	59	46	37	V, IB, N, PC, SN, R2, DR
R183	74e Bridge View Rd	Residential	NCA01	60	46	37	AA, V, IB, N, PC, SN, R2, DR
R184	983 Kings Hwy	Residential	NCA01	54	41	32	V, IB, N, PC, SN, R2, DR

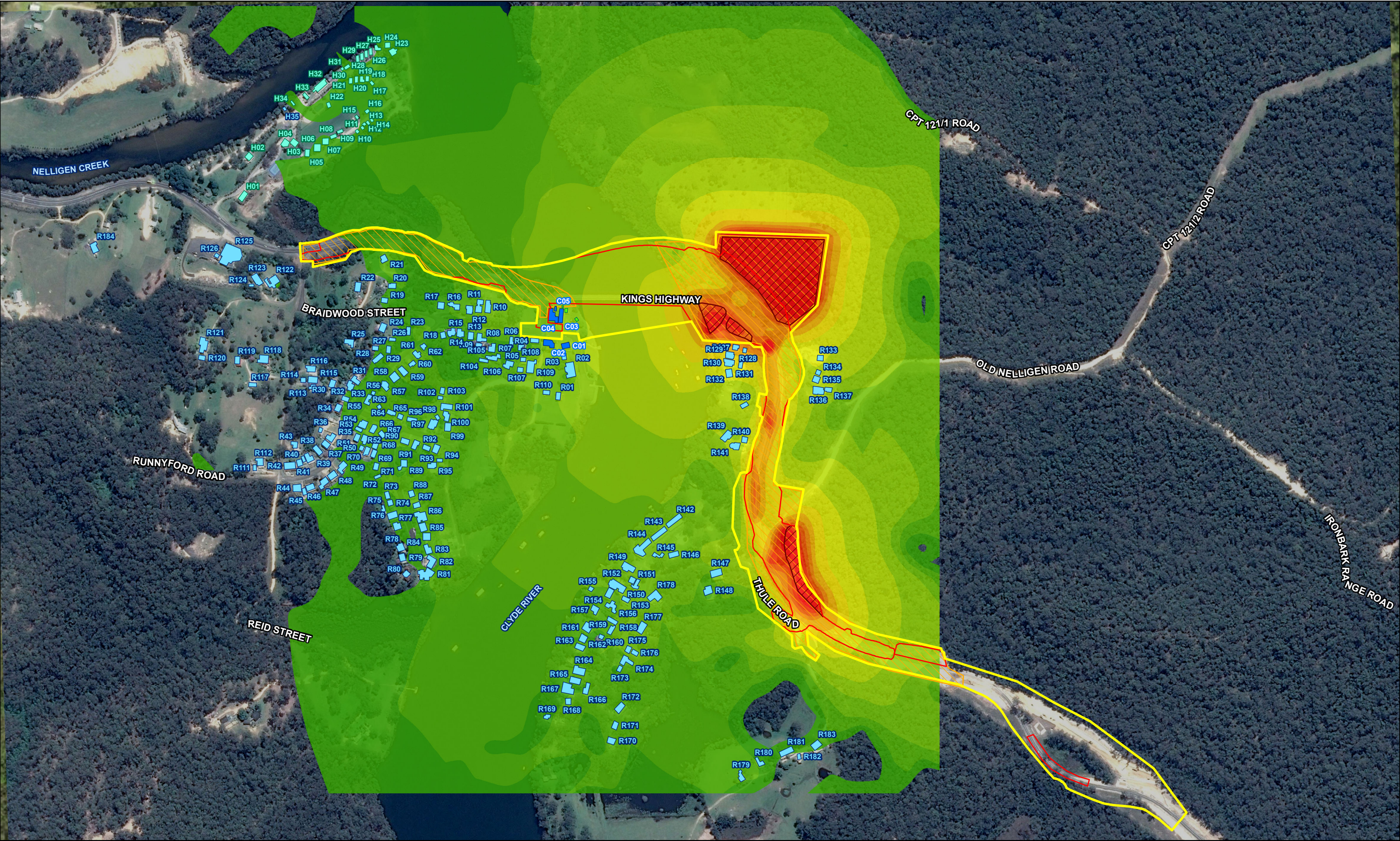
## Appendix F

### $LA_{eq(15min)}$ noise contours

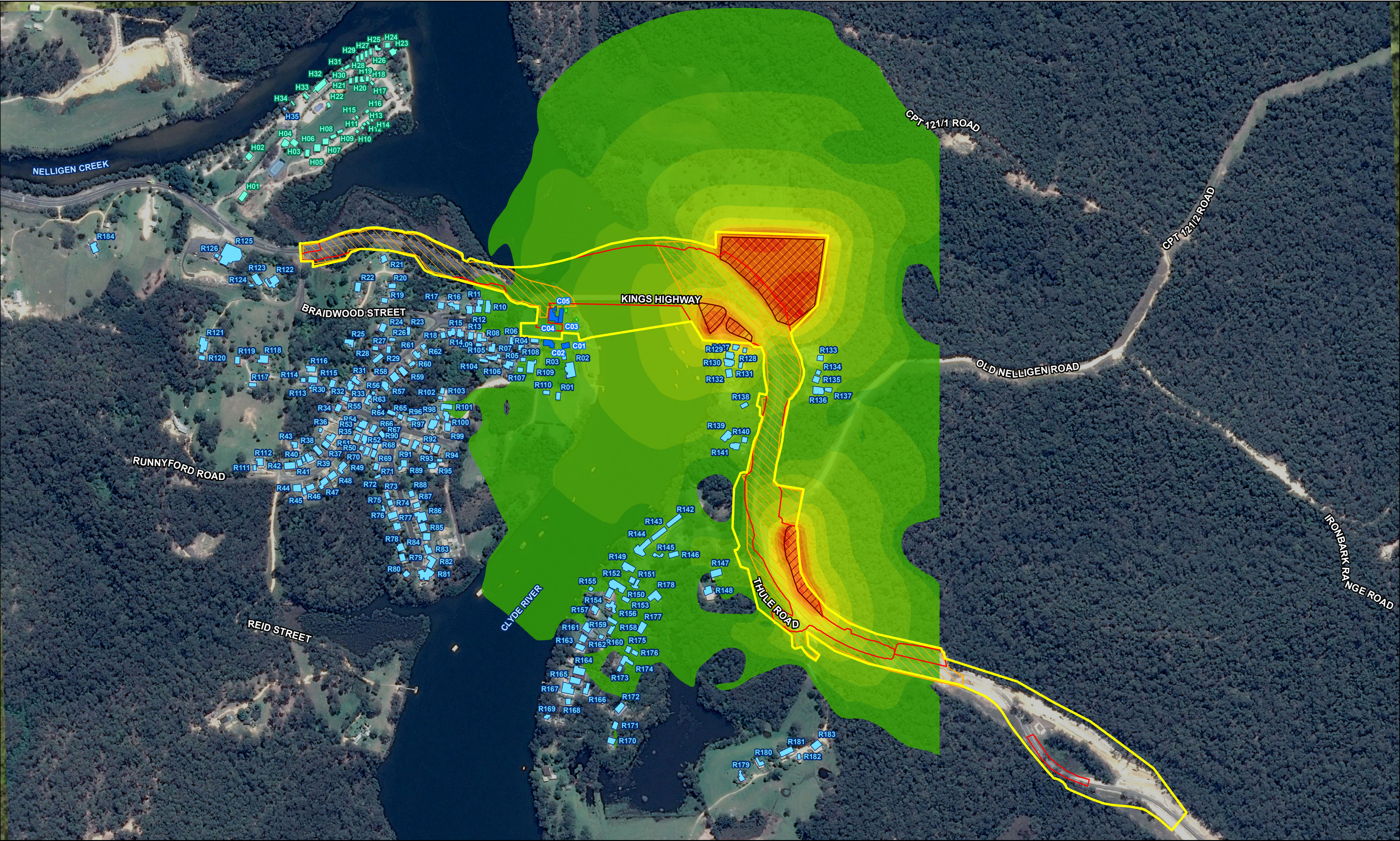












Paper Size A3

0 50 100 200

Metres

Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56

N

**LEGEND**

- Revised project boundary (2018)
- Existing project boundary
- Clearing and site compounds
- Site compound and lay down areas

**Sensitive receiver buildings**

- Commercial
- Non-sensitive
- Residential
- Residential - Holiday Park

**Noise Contours - Sound pressure level,  $L_{Aeq}$  dBA**

40	55	80
45	60	85
50	65	90
	70	95
	75	

**SUBJECT TO DETAILED DESIGN**

Roads and Maritime Services  
Replacement of the Kings Highway  
Bridge over the Clyde River at Nelligen

Job Number 21-25173  
Revision A  
Date 27 Nov 2018

**CS15 Noise contours**

**Appendix F**

N:\AU\Sydney\Projects\21\25173\GIS\Maps\Deliverables\Addendum\REF\Noise\21\_25173\_2050\_Noise\_LAeq\NoiseContours\_CS15.mxd

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Data source: Aerial Imagery - sixmaps 2014 & Google Earth 2015; General topo - NSW LPI DTDB 2015 & 2012. Created by:jprice

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmil@ghd.com.au W www.ghd.com.au



## Appendix G

### Exceedances of the sleep disturbance criteria



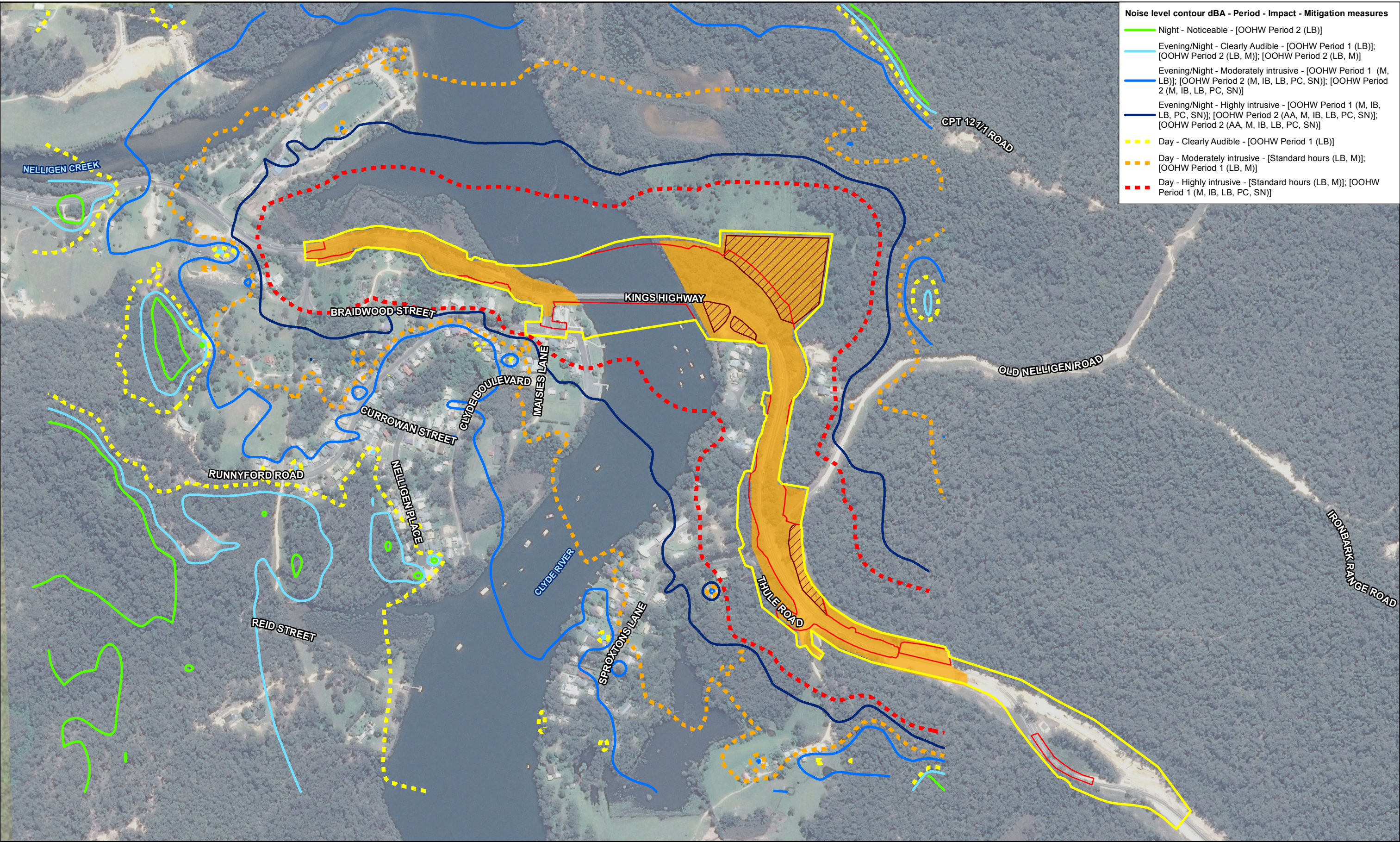
## Exceedances of the sleep disturbance criteria at residences

Receiver ID	Address	Type	CS01	CS02	CS15
<b>Bold</b> indicates an exceedance of the sleep disturbance criteria					
R02	3-9 Wharf Street	Residential	<b>57</b>	49	40
R03	Lot 1 Wharf Street	Residential	<b>55</b>	49	40
R04	4 Braidwood Street	Residential	<b>63</b>	47	38
R06	9 Braidwood Street	Residential	<b>60</b>	46	37
R08	14 Braidwood Street	Residential	<b>58</b>	46	37
R10	11 Braidwood Street	Residential	<b>67</b>	44	35
R11	13 Braidwood Street	Residential	<b>68</b>	42	33
R12	15 Braidwood Street	Residential	<b>64</b>	40	31
R16	17 Braidwood Street	Residential	<b>65</b>	40	30
R17	19 Braidwood Street	Residential	<b>63</b>	36	27
R19	4 Cowper Street	Residential	<b>57</b>	34	25
R20	2 Cowper Street	Residential	<b>61</b>	36	27
R21	7 Murray Street	Residential	<b>77</b>	39	30
R22	27 Braidwood Street	Residential	<b>62</b>	27	18
R109	1 Clyde Blvd	Residential	<b>58</b>	48	39
R122	33a Reid Street	Residential	<b>60</b>	34	25
R123	33b Reid Street	Residential	<b>56</b>	30	21
R127	2 Thule Rd	Residential	<b>78</b>	<b>73</b>	<b>64</b>
R128	4b Thule Rd	Residential	<b>76</b>	<b>74</b>	<b>65</b>
R129	4 Thule Rd	Residential	<b>72</b>	<b>68</b>	<b>59</b>
R130	6 Thule Rd	Residential	<b>65</b>	<b>63</b>	54
R131	6b Thule Rd	Residential	<b>66</b>	<b>66</b>	<b>57</b>
R132	8 Thule Rd	Residential	<b>62</b>	<b>60</b>	51
R133	35 Old Nelligen Rd	Residential	<b>61</b>	<b>58</b>	48
R134	33b Old Nelligen Rd	Residential	<b>66</b>	<b>55</b>	46
R135	33a Old Nelligen Rd	Residential	<b>67</b>	49	40
R136	31a Old Nelligen Rd	Residential	<b>68</b>	53	43
R137	31b Old Nelligen Rd	Residential	<b>58</b>	47	38
R138	10 Thule Rd	Residential	<b>69</b>	<b>56</b>	47
R139	35 Thule Rd	Residential	<b>65</b>	52	42
R140	41 Thule Rd	Residential	<b>73</b>	54	42
R141	37 Thule Rd	Residential	<b>68</b>	54	41
R147	4 Bridge View Rd	Residential	<b>61</b>	49	40
R148	6 Bridge View Rd	Residential	<b>56</b>	46	37

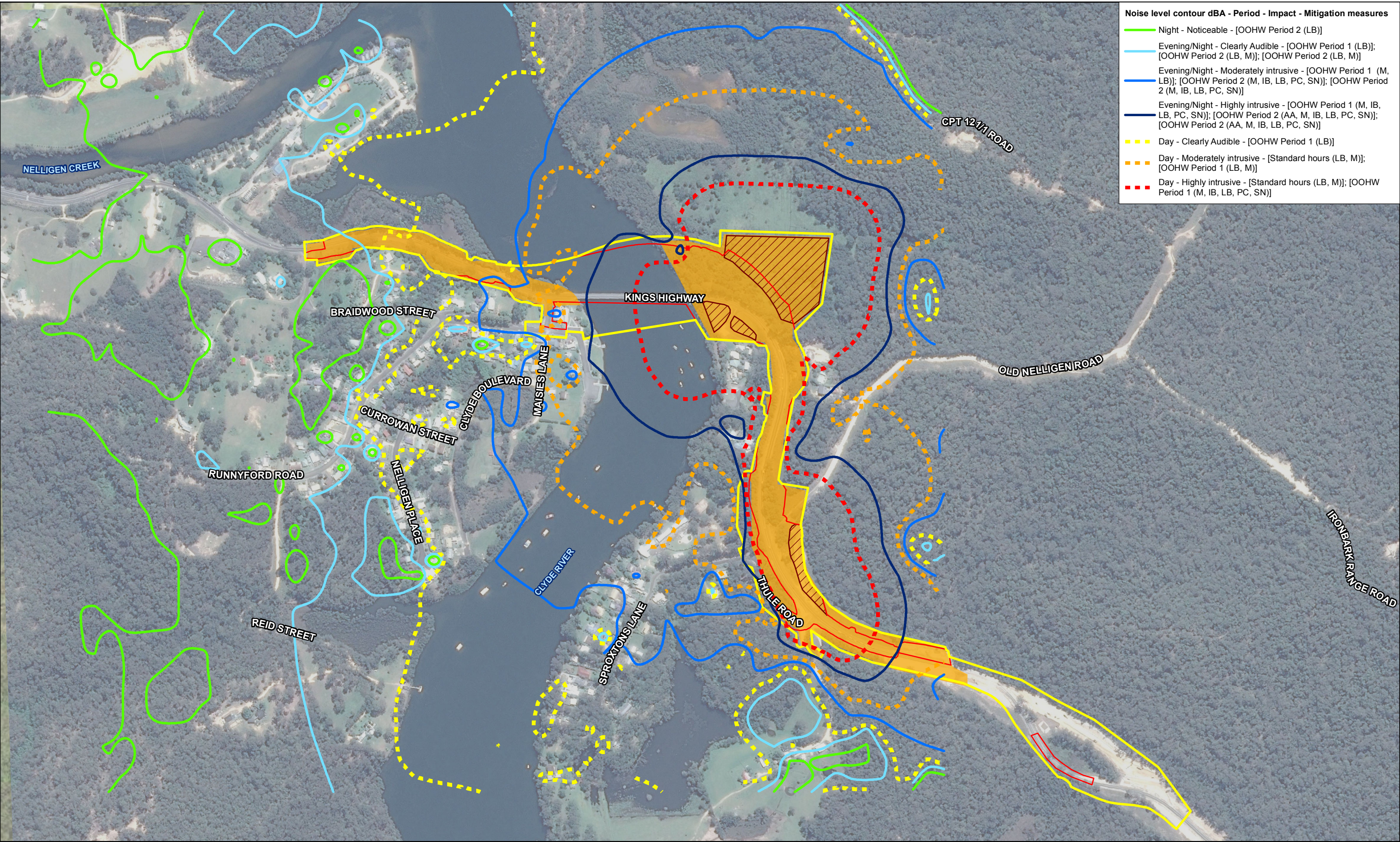
## Appendix H

### Contour plots for construction scenarios



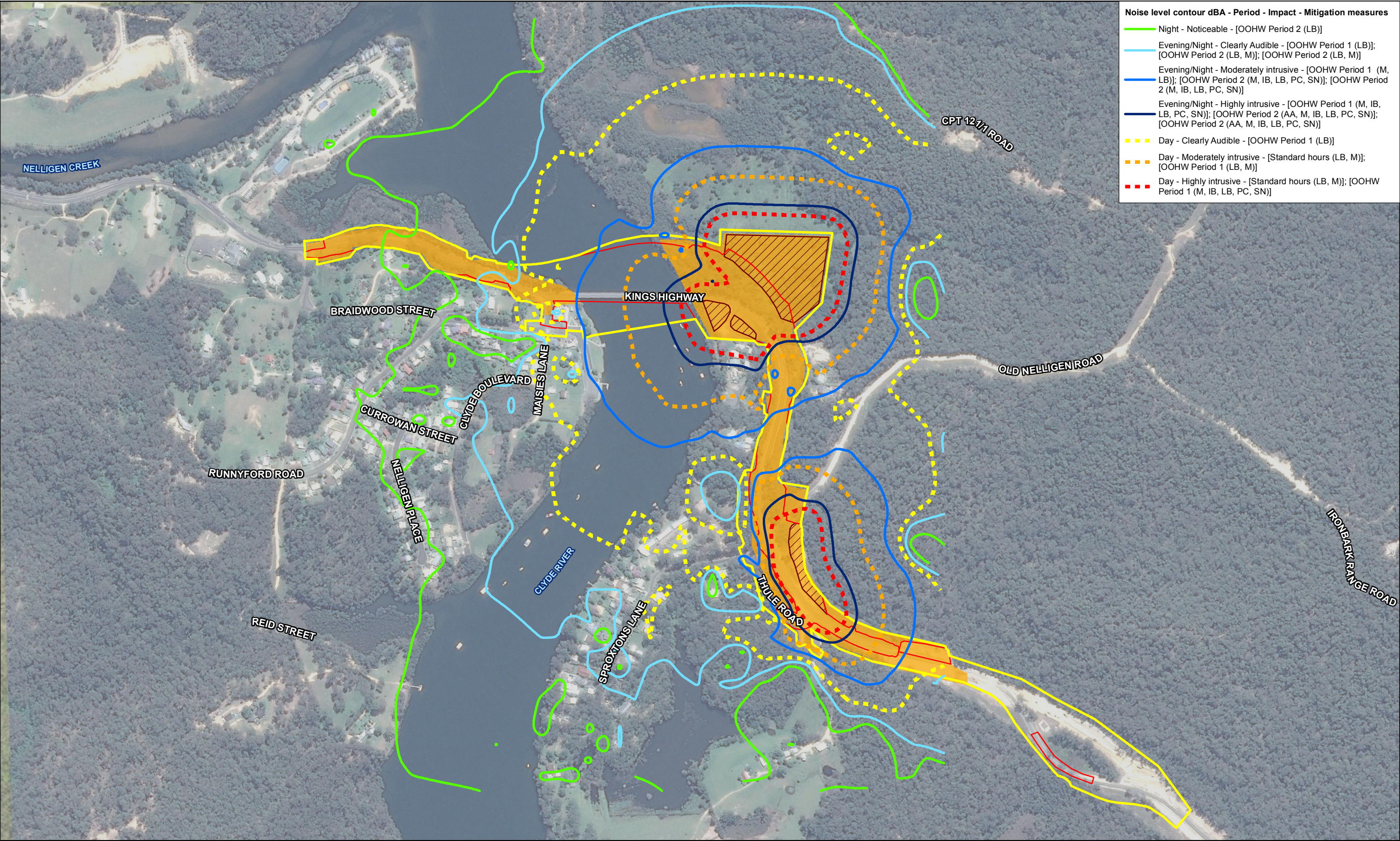






Noise level contour dBA - Period - Impact - Mitigation measures			
Green line	Night - Noticeable	- [OOHW Period 2 (LB)]	
Light blue line	Evening/Night - Clearly Audible	- [OOHW Period 1 (LB)]; [OOHW Period 2 (LB, M)]; [OOHW Period 2 (LB, M)]	
Blue line	Evening/Night - Moderately intrusive	- [OOHW Period 1 (M, LB)]; [OOHW Period 2 (M, IB, LB, PC, SN)]; [OOHW Period 2 (M, IB, LB, PC, SN)]	
Dark blue line	Evening/Night - Highly intrusive	- [OOHW Period 1 (M, IB, LB, PC, SN)]; [OOHW Period 2 (AA, M, IB, LB, PC, SN)]; [OOHW Period 2 (AA, M, IB, LB, PC, SN)]	
Yellow dashed line	Day - Clearly Audible	- [OOHW Period 1 (LB)]	
Orange dashed line	Day - Moderately intrusive	- [Standard hours (LB, M)]; [OOHW Period 1 (LB, M)]	
Red dashed line	Day - Highly intrusive	- [Standard hours (LB, M)]; [OOHW Period 1 (M, IB, LB, PC, SN)]	









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Customer feedback  
Roads and Maritime  
Locked Bag 928,  
North Sydney NSW 2059

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