Nowra Bridge Project

Addendum review of environmental factors

Transport for NSW | April 2020

NSW GOVERNMENT

Nowra Bridge Project

Addendum review of environmental factors

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Approval and authorisation

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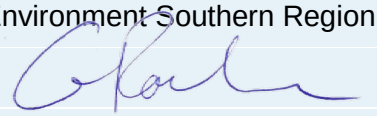
Signed:	
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Executive summary

The proposed modification

In 2018, Transport for NSW (TfNSW, formerly Roads and Maritime Services) determined a review of environmental factors (REF) for the Nowra Bridge Project (the project REF). During public display of the project REF and detailed design development, TfNSW identified a number of additional works that needed to be included and assessed as part of the project. The proposed modification is required to accommodate these additional works, which are integral to achieving the strategic need of the project.

TfNSW proposes to modify the Nowra Bridge Project through changes to construction activities. The proposed modification would include:

- Construction of a roundabout at the existing intersection of Fairway Drive / Illaroo Road and car parking
- Construction of temporary rock working platforms in Shoalhaven River and Bomaderry Creek
- Pre-construction activities
- Additional ancillary sites to support construction activities
- Construction works outside the project study area and the construction boundary defined in the project REF.
- Changes to the construction methodology for the installation of the bridge piers.

To address these proposed changes, this addendum REF has been prepared to document potential environmental impacts of the proposed modification.

Background

The project REF was prepared for the Nowra Bridge Project on 22 August 2018. The project REF was placed on public display between 27 August and 28 September 2018 for community and stakeholder comment. A submissions report, dated May 2019, was prepared by TfNSW to respond to issues raised.

The proposed modification was identified by TfNSW and would facilitate the delivery of the project.

Need for the proposed modification

Section 2 of the project REF addresses the strategic need of the project, the project objectives and an analysis of strategic alternatives. The proposed modification described and assessed in this addendum REF is consistent with the strategic need and project objectives.

The proposed modification is required to facilitate the delivery of the project and ultimately improve the efficiency of traffic movements along a key section of the Princes Highway. The new roundabout would allow site vehicles and trucks to perform a U-turn during construction of the project and improve traffic flow on Fairway Drive. Furthermore, the temporary rock working platforms in Shoalhaven River and Bomaderry Creek would improve construction access, and hence safety, for water-based bridge and pier construction activities Finally, additional ancillary sites would support construction works and the out of hours construction works would reduce the project completion time.

Proposal objectives

Section 2.3 of the project REF identified the project objectives that apply to the proposed modification.

The proposed modification would facilitate the overall project objectives while minimising adverse environmental and socio-economic impacts.

Options considered

In developing alternatives and options for key features of the proposed modification, TfNSW sought to meet project objectives while minimising adverse environmental and socio-economic impacts.

Section 2.4 of the project REF discussed the options considered for the project.

Section 2.3 of this addendum REF discusses the options considered for the proposed modification resulting from additional works that needed to be included and assessed as part of the project.

Statutory and planning framework

The Nowra Bridge Project was assessed and approved pursuant to the *Environmental Planning and Assessment Act 1979* (EP&A Act).

TfNSW 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 undertaken on behalf of TfNSW, it can be assessed under Division 5.1 of the EP&A Act.

Development consent from Shoalhaven City Council is not required.

Community and stakeholder consultation

The proposed modification requires consultation under the ISEPP in accordance with the statutory consultation checklist in Appendix B.

TfNSW has undertaken consultation with Shoalhaven City Council and relevant government agencies in relation to the proposed modification. Consultation was also undertaken with the local community in relation to out of hours construction works for night work scheduling.

Environmental impacts

The main environmental impacts for the proposed modification are:

- **Traffic and transport.** Construction activities would have additional impacts on local road and public transport services. Construction vehicle traffic movements would increase travel times for road users on regional and local roads for the duration of construction. Maritime traffic, commercial and recreational boat operators, and shared paths for pedestrians and cyclists would also be restricted for the duration of construction.
- **Noise and vibration.** Construction activities such as bulk earthworks, demolition, new pavement and the use of ancillary sites would generate additional localised noise impacts at surrounding sensitive receivers. The installation of driven steel tubular piles for bridge piers would also increase noise levels.
- **Water quality.** Construction activities such as the temporary rock working platforms, ground disturbance, vegetation removal and new pavement pose a risk to overall water quality through increased run-off and sedimentation. Water quality impacts of the installation of driven steel tubular piles are considered to be generally consistent with the bored piles assessed in the project REF, which includes changes in sedimentation and turbidity levels. Minor groundwater ingress would be expected during piling.
- **Biodiversity.** The removal of some trees and/or vegetation would be required on Illaroo Road and within the Bomaderry Creek riparian vegetation corridor belonging to the plant community type (PCT) Spotted Gum – Blackbutt shrubby open forest on the coastal foothills, southern Sydney Basin Bioregion and northern South East Corner Bioregion (PCT1206). Construction works in Shoalhaven River would impact seagrass *(Zoster muelleri)* located on the southern bank and at Greys Beach. The temporary rock working platform within the Shoalhaven River is estimated to restrict the cross-sectional area of the waterway by approximately less than 24%. Similarly, the temporary rock working platforms within

Bomaderry Creek is estimated to restrict the cross-sectional area of the waterway by approximately less than 10%. This would still allow for tidal movements and therefore fish passage would be maintained for the duration of construction. The installation of driven steel tubular piles for bridge piers would result in minor increases in underwater noise for aquatic species.

- **Flooding.** The Shoalhaven River and Bomaderry Creek are susceptible to flooding. The temporary rock working platforms have the potential to result in additional localised flooding which may inundate the platform itself, nearby construction areas, local roads, exposed ground areas and surrounding commercial and residential premises, particularly on Scenic Drive.
- **Coastal processes.** Considering the nature and scale of the temporary rock working platform in Shoalhaven River, it would slightly increase velocity flows within specified limits and may impact on tides and currents and the natural transportation of sediment down Shoalhaven River to the coast for the duration of construction. Similarly, the waterway restriction caused by the platforms in Bomaderry Creek would increase velocity flows within specified limits and would temporarily impact on the natural transportation of sediment.

These impacts would be managed through the implementation of safeguards and management measures described in this addendum REF.

Justification and conclusion

The proposed modification is subject to assessment under Division 5.1 of the EP&A Act. This addendum REF has assessed and considered to the fullest extent possible all matters impacting or likely to impact the environment by reason of the proposed modification.

The safeguards and management measures described in this addendum REF would ameliorate or minimise identified potential impacts to the extent that the proposed modification would outweigh potential impacts. In accordance with the project REF, the proposed modification would facilitate the delivery of the project and is consistent with the project objectives. Therefore, the proposed modification is considered to be justified.

The environmental impacts of the proposed modification are not likely to be significant and therefore the preparation of an environmental impact statement (EIS) and approval from the Minister for Planning under Division 5.2 of the EP&A Act are not required. The proposed modification is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the *Biodiversity Conservation Act 2016* or *Fisheries Management Act 1994* and therefore a 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. A referral to the Australian Government Department of the Environment and Energy is not required.

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Appendices

1. Introduction

1.1 Proposed modification overview

A review of environmental factors (REF) was prepared for the Nowra Bridge Project on 22 August 2018 (referred to in this addendum REF as the project REF). The project REF was placed on public display between 27 August and 28 September 2018 for community and stakeholder comment. A submissions report, dated May 2019, was prepared by TfNSW to respond to issues raised.

Transport for NSW (TfNSW, formerly Roads and Maritime Services) proposes to modify the Nowra Bridge Project through changes to the construction activities (proposed modification). The proposed modification would include:

- Construction of a roundabout at the existing intersection of Fairway Drive / Illaroo Road and car parking
- Construction of temporary rock working platforms in Shoalhaven River and Bomaderry Creek
- Pre-construction activities
- Additional ancillary sites to support construction activities
- Construction works outside the project study area and the construction boundary defined in the project REF
- Changes to the construction methodology for the installation of the bridge piers

Section 3 of this addendum REF describes the proposed modification in more detail.

1.2 Purpose of the report

This addendum review of environmental factors (REF) has been prepared by Advisian on behalf of TfNSW Regional Project Office – Southern. For the purposes of these works, TfNSW 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 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 fulfils the requirements of:

- Section 5.5 of the EP&A Act including that TfNSW 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 TfNSW'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

Section 2 of the project REF addressed 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 public display of the REF and detailed design development, TfNSW identified a number of additional works that needed to be included and assessed as part of the project.

The proposed modification is required to facilitate the delivery of the project and ultimately improve the efficiency of traffic movements along a key section of the Princes Highway. It would:

- Provide a new roundabout at the existing intersection of Fairway Drive / Illaroo Road to allow site vehicles and trucks to perform a U-turn during construction of the project and improve traffic flow on Fairway Drive
- Provide temporary rock working platforms in Shoalhaven River and Bomaderry Creek to improve construction access for water-based bridge and pier construction activities. It would also support the installation of driven steel tubular piles for bridge piers in Shoalhaven River
- Establish out of hours construction works to reduce the project completion time and provide further opportunities to set up more established worksites with more effective temporary noise mitigation
- Involve pre-construction activities completed under an Environmental Work Method Statement (EWMS) prior to approval of the Construction Environmental Management Plan (CEMP) for the project
- Provide additional ancillary sites for potential uses including offices and amenities, parking and storage / laydown of plant and materials
- Involve construction works outside the construction boundary defined in the project REF. This would include the demolition of existing structures at ancillary sites. Property works would also involve demolition of the Bomaderry Creek footbridge to facilitate construction of the project.
- Involve construction works outside the project study area defined in the project REF. This would include utility works, and temporary and permanent signage and line-marking. Maritime navigation aids and moorings in Shoalhaven River would also be required to support construction barges in the delivery of the project. These works would be completed under an EWMS.

2.2 Proposal objectives and development criteria

Section 2.3 of the project REF identified the project objectives and development criteria that apply to the proposed modification. The primary project objectives are to:

- Reduce crash rates on the Princes Highway between Bolong Road and Bridge Road
- Support future traffic growth accessing the Princes Highway associated with planned land use in the Nowra Bomaderry area
- Provide southbound access for over-height vehicles and higher mass limit vehicles on the Princes Highway across the Shoalhaven River
- Reduce delays and queuing on the Princes Highway between Bolong Road and Bridge Road
- Enable safe and efficient maintenance activities on the Shoalhaven River crossings without causing extended delays to the road network.

The proposed modification would facilitate the overall project objectives while minimising adverse environmental and socio-economic impacts.

2.3 Alternatives and options considered

In developing alternatives and options for key features of the proposed modification, TfNSW sought to meet project objectives while minimising adverse environmental and socio-economic impacts.

Section 2.4 of the project REF discussed the options considered for the project. The options considered for the proposed modification are considered below.

Option 1 – Do nothing

This option would not facilitate the strategic need and project objectives identified in the project REF.

The unfavourable implications of this option would include the following:

- Site vehicles and trucks would need to travel further west on Illaroo Road during construction of the project to make a U-turn and traffic flow on Fairway Drive would not improve
- Construction access on Shoalhaven River for the installation of bridge piers would be limited to construction barges only. Activities undertaken from construction barges would be dependent on favourable weather conditions. Furthermore, the movement of construction barges would be limited by the depth of Shoalhaven River
- Construction of the project within standard construction hours only would not meet the community's preference for night work scheduling and would lengthen the project duration
- Additional ancillary sites at key locations would not be available to support construction activities in the effective delivery of the project
- Utility, property and demolition works necessary to facilitate construction of the project would not be undertaken. The demolition of Bomaderry Creek footbridge, at the landowner's request, would also not be undertaken
- The movement of construction barges in Shoalhaven River and the undertaking of associated construction activities would be limited without appropriate maritime navigation aids and moorings.

Option 2 – Proposed modification

This option would facilitate the delivery of the project and ultimately improve the efficiency of traffic movements along a key section of the Princes Highway. The benefits of this option are described in Section 2.1 of this addendum REF. Construction works in Shoalhaven River and Bomaderry Creek

The following three options were considered for construction works in Shoalhaven River:

- Option 1 – a temporary piled bridge structure.

This option would have the capacity to support a crane that would lift heavy components for bridge construction including pre-cast concrete tubs, driven steel tubular piles, reinforcement and concrete. The existing ground conditions with soft silty clays and the significant depth to bedrock (typically greater than 40 metres) would create significant constraints on the construction and operation of the piled structure. Furthermore, the structure would only allow enough width for a single crane and the construction of additional structures would be required, extending out to new bridge piers to position piling rigs. Construction movements would be limited with no available width for passing. Finally, the limited workable area would increase the duration of works and the potential for environmental leaks and spills.

- Option 2 – undertaking works at the new bridge piers (piers 6, 7 and 8) from barges.

The Shoalhaven River is shallower at these locations. Access to these locations by barges may be restricted during construction works due to the movement of estuarine sands in the tidal cycle. A temporary load-out facility would be required to be constructed on the southern bank of Shoalhaven River to load materials onto barges from the construction compound off Scenic Drive. The facility would impact on seagrass beds. Furthermore, barges have a limited workable area which would require barges or shuttle

barges to make regular movements between the new bridge piers and the shore to load construction materials. Each of these loads would be classified as a high-risk activity. Finally, works on barges would be slower than Option 1 and Option 3 and would increase the duration of works and the potential for environmental impacts.

- Option 3 – temporary rock working platform.

This option has a potential to obstruct the free passage of fish and would have an impact on seagrass beds. This option is considered to best improve construction access to the location of the new bridge piers in Shoalhaven River. The size of the platform would enable the safe and efficient undertaking of construction activities and minimise program risks associated with Option 1 and Option 2.

The preferred option was Option 3.

Temporary rock working platforms were also selected for construction works in Bomaderry Creek to improve construction access to support the widening of the existing Bomaderry Creek Bridge.

Further detail on the need for the temporary rock working platforms is provided in Section 3.2.3.

3. Description of the proposed modification

3.1 The proposed modification

During public display of the REF and detailed design development, TfNSW identified a number of additional works that needed to be included and assessed as part of the project. TfNSW proposes to modify the Nowra Bridge Project through changes to construction activities.

Key features of the proposed modification would include:

- Fairway Drive roundabout and car parking
- Construction works in Shoalhaven River and Bomaderry Creek
- Temporary rock working platform
- Pre-construction activities
- Changes to ancillary sites
  - Gateway Park
  - Illaroo Road Compound
  - Paddock south of Bolong Road
  - Fish Shop east of Nowra Bridge abutment
  - 16 Moss Street
- Works outside the project study area defined in the project REF
  - Temporary and permanent signage and line-marking
  - Utility works including electrical connections
  - Maritime navigation aids and moorings
- Works outside the construction boundary defined in the project REF
  - Property works including demolition of existing structures at ancillary sites
  - Property works which includes but not limited to driveway access ways, hardstand turnarounds and removal and resealing of existing pavement
  - Demolition of Bomaderry Creek footbridge
- Changes to the construction methodology
  - Driven steel tubular piling for the installation of the bridge piers

A more detailed description of the proposed modification is provided in Section 3.2.3.

3.2 Design

3.2.1 Design criteria

The proposed modification would be designed to be consistent with TfNSW design criteria and other specifications including the requirements of this addendum REF.

3.2.2 Engineering constraints

Engineering constraints are identified in Section 3.2.2 of the project REF. No further engineering constraints have been considered and included in this addendum REF.

3.2.3 Main features of the modification

Fairway Drive roundabout

The proposed roundabout at the existing intersection of Fairway Drive / Illaroo Road would include:

- Removal of the existing T-intersection at Fairway Drive / Illaroo Road
- Alignment adjustment on the upgraded Illaroo Road and car parking for five vehicles
- Revised combined property and maintenance access
- Additional upgrades to the pavement and drainage for the proposed infrastructure
- Landscape replanting using native vegetation
- Additional property acquisitions by TfNSW.

Need for modification:

Section 5.1 of the submissions report described the following potential management measures to improve future intersection performance:

- Installing a 'keep clear' line-marking at the existing intersection to allow a sufficient clearway for vehicles exiting Fairway Drive to join the rear of the eastbound queue on Illaroo Road.
- Banning the right turn out of Fairway Drive and onto Illaroo Road. Vehicles wanting to access the Princes Highway would travel west on Illaroo Road and perform a U-turn at the roundabout on McMahons Road further west.

The proposed roundabout would improve construction travel times for site vehicles and trucks by eliminating the need to drive about 1.4km each way along Illaroo Road to perform a U-turn at the roundabout on McMahons Road further west. This would also prevent site vehicles and trucks travelling past Illaroo Road Public School which would be a sensitive receiver. The proposed roundabout would also improve traffic flow on Fairway Drive.

Initially, the Fairway Drive roundabout design included perpendicular car parking for 14 vehicles. However, considering the geometry of the roundabout, this arrangement would create site distance issues for vehicles leaving the car parking spaces. The design was subsequently revised on a risk and safety basis in consultation with Shoalhaven City Council to provide parallel car parking for five vehicles.

The Fairway Drive roundabout is shown in Figure 3-1.

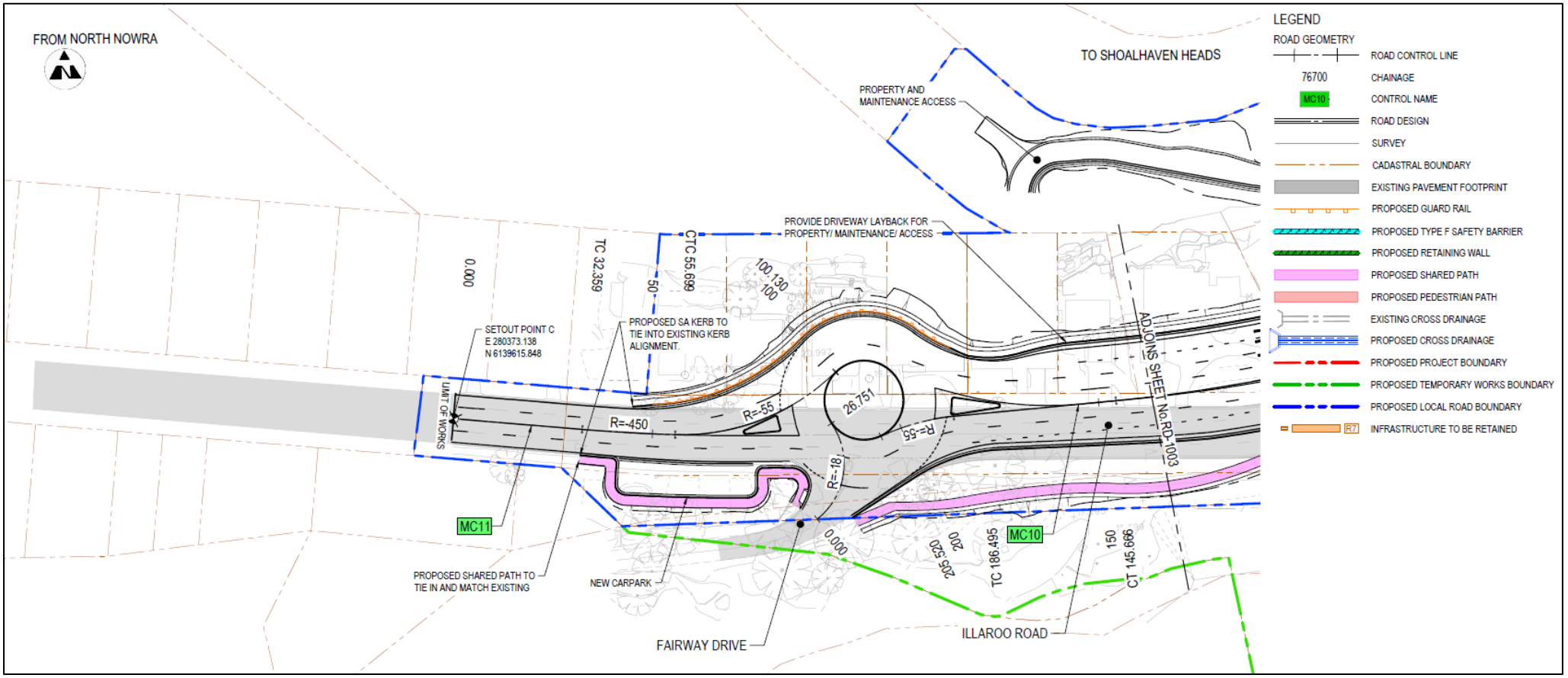

Figure 3-1: The Fairway Drive roundabout works (not to scale) (Source: Fulton Hogan, 2020).

Construction works in Shoalhaven River and Bomaderry Creek

Temporary rock working platform in Shoalhaven River

The project REF previously described the use of construction barges to provide temporary working platforms for water-based bridge and pier construction activities. Barges would be moored in suitable locations to facilitate the piling and installation of the bridge piers and headstocks.

The proposed temporary rock working platform is the preferred option for construction works in Shoalhaven River and would limit works undertaken from construction barges. The proposed temporary rock working platform would be approximately 130 metres in length and 45 metres in width at the top of the platform. In total, it is anticipated the proposed temporary rock working platform would only restrict the cross-sectional area of the waterway by approximately less than 24%. It would extend north from the southern bank of the Shoalhaven River to facilitate construction of the new permanent bridge.

The temporary rock working platform would generally be designed to:

- Incorporate large rock armour for durability and scour protection
- Include a sacrificial layer of rock to remain in Shoalhaven River
- Comply with afflux requirements
- Incorporate retaining structures such as sheet piles to reduce the required area footprint
- Account for flow velocities, as a result of the 10-year and 20-year Average Recurrence Interval (ARI) flood events, and the associated potential scour impacts

Need for modification:

The temporary rock working platform would provide all-weather access to the Shoalhaven River for water-based bridge and pier construction activities. It would deliver the following benefits:

- Improved construction access to the location of the new bridge piers in Shoalhaven River, some of which are to be located in shallower sections of water
- Reduce risks associated with water-based construction activities
- Reduce program risk of construction activities undertaken on barges
- Reduce the overall duration of the project and associated duration of construction impacts
- Provide an area for the safe and efficient splicing of reinforcement and driven tubular steel piles.

A brief construction methodology is provided below:

- The first layer of rock material would be laid on the bank, extending out into Shoalhaven River. Successive layers of rock material would then be added until the platform is raised to an appropriate height above the water.
- Retaining structures such as sheet piles would then be installed at the end of the platform to provide a suitable interface with water-based construction vessels.
- The surface of the platform would be stabilised using either rock, gravel or a stable, interlocking aggregate.
- A geotextile wrapped rock filter bund would then be placed around the edges of the platform to capture run-off.
- Finally, a drum roller may be used to further compact the platform surface prior to loading with relevant plant and equipment.
- Following substantial completion of the new bridge, the platform would be removed. During removal, a sacrificial layer of rock would be left in place in order to reduce the disturbance of the existing riverbed and sediment.

Finally, it is estimated that the platform would remain in Shoalhaven River for about two years.

Temporary rock working platforms in Bomaderry Creek

The platforms in Bomaderry Creek are required to support the widening of the existing Bomaderry Creek Bridge. The widening works have been assessed in the project REF.

The proposed temporary rock working platforms in Bomaderry Creek would extend from both the northern and southern banks of Bomaderry Creek, about two metres beyond the location of the new water-based bridge piers. The piers would support the widened section of the Bomaderry Creek Bridge. It is noted that the platforms would be constructed using the same construction materials and methodology as the platform in Shoalhaven River.

Finally, it is estimated that the platforms would remain in Bomaderry Creek for about nine months.

The typical platform detail is shown in Figure 3-2.

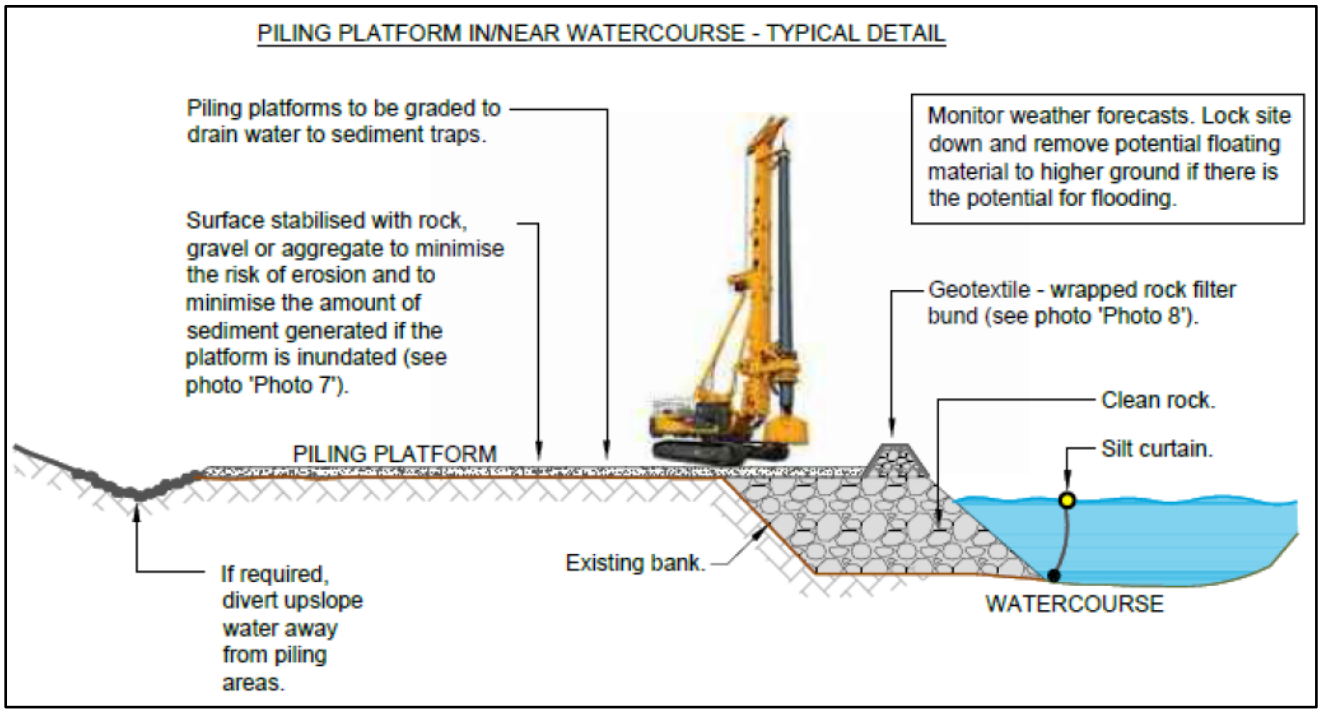

Figure 3-2: Typical detail of the temporary rock working platform in Shoalhaven River and Bomaderry Creek (not to scale) (Source: Fulton Hogan, 2019).

Out of hours construction works

Out of hours construction works involving night work scheduling would be required to facilitate the construction of the project. Refer to Section 3.3.2.

Pre-construction activities

No impact assessment has been undertaken in this addendum REF for the following pre-construction activities that were assessed in the project REF.

Pre-construction activities would be completed under an Environmental Work Method Statement (EWMS) prior to approval of the Construction Environmental Management Plan (CEMP). The activities include:

- Detailed survey
- Background noise and vibration monitoring
- Soil and water contamination assessments
- Seagrass monitoring
- Background dust monitoring

- Geotechnical assessments to determine potential acid sulfate soils (PASS)
- Background and water quality testing
- Potholing for coal tar detection
- Property demolition
- Site establishment
- Service works and earthworks to enable service works
- Preloading for soft soil treatment

Changes to ancillary sites

In the submissions report, TfNSW identified four additional sites for assessment as potential additional construction ancillary facilities. Shoalhaven City Council also identified a further two potential additional construction ancillary sites.

The proposed modification would involve the establishment and use of the following ancillary sites:

- Gateway Park
- Illaroo Road compound
- Paddock south of Bolong Road
- Fish shop east of Nowra Bridge abutment
- 16 Moss Street

An assessment of the use of the Illaroo Road compound ancillary site is required in this addendum REF even though it is located within the construction boundary defined in the project REF. Furthermore, an assessment of the 16 Moss Street ancillary site is not required in this addendum REF as the property is a commercial lot and is consistent with existing use. The 16 Moss Street ancillary site would be used for the purposes of a main office and parking.

The proposed ancillary sites would be used for one or a combination of the following potential uses:

- Offices and amenities
- Main site compound in the event that alternative commercial premises cannot be secured
- Storage / laydown of plant and materials.
- Stockpiling
- Parking
- Acid sulfate soils (ASS) treatment and stockpiling area.

Proposed ancillary sites would be restored upon completion of construction, including the removal of all construction plant, equipment, buildings and site vehicles.

Indicative locations of the proposed ancillary sites are shown in Figure 3-3 and Figure 3-4.

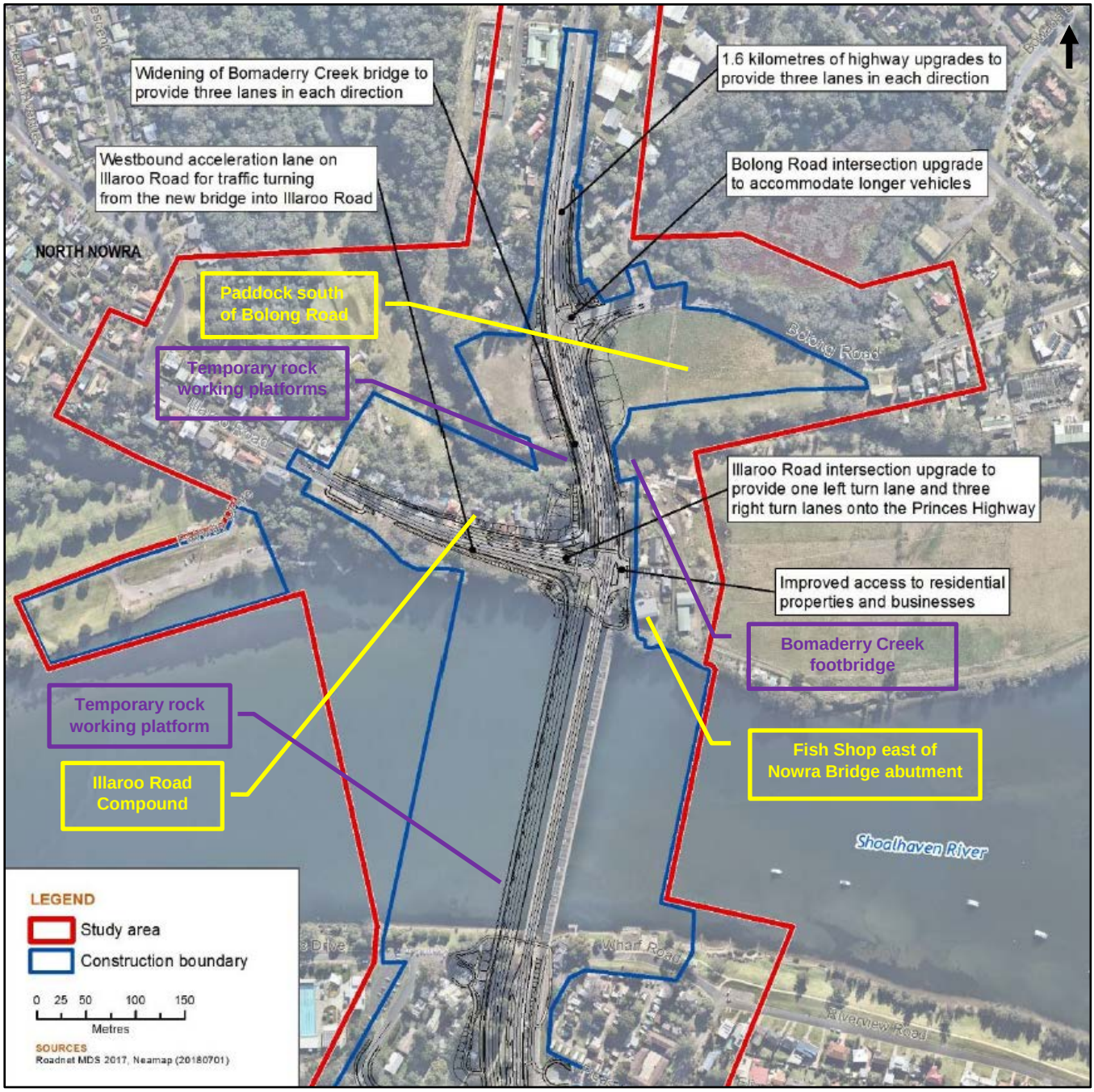

Figure 3-3: Location of ancillary sites (yellow), temporary rock working platforms and the Bomaderry Creek footbridge (purple) (Source: Roads and Maritime, 2019).

Figure 3-4: Location of ancillary sites (yellow) (Source: Roads and Maritime, 2019).

Works outside the project study area defined in the project REF

The proposed modification would require the following works outside the project study area defined in the project REF:

- Temporary and permanent signage and line-marking such as advanced warning or direction signage on Illaroo Road west of the Fairway Drive roundabout. Signage and line-marking would be located within the road corridor. The installation of signage may require excavation, concrete footings, elevated work platforms or crane operations and traffic control.
- Utility works would likely include traffic control, elevated working platforms, access to manholes or fibre access points for cable hauling and cutover at the fibre joints. Connection to overhead poles outside the boundary may also be required. Where these works are undertaken there would be no ground disturbance.
- Maritime navigation aids and moorings in Shoalhaven River in an area extending about 400 metres west and 200 metres east of Nowra Bridge.

These works would be completed under an Environmental Work Method Statement (EWMS) (Table 7-1).

Works outside the construction boundary defined in the project REF

The proposed modification would require property works located outside the construction boundary defined in the project REF. These works are still located within the project study area defined in the project REF.

Property works would involve the demolition of existing structures at the following ancillary sites:

- Fish shop east of Nowra Bridge abutment – local business
- 16 Moss Street – commercial lot
- Gateway Park – largely cleared land

As mentioned previously, an assessment of the Illaroo Road compound and 16 Moss Street ancillary sites are not required in this addendum REF.

In addition, property works would include but not limited to driveway access ways, hardstand turnarounds and removal and resealing of existing pavement.

Finally, property works would involve demolition of the Bomaderry Creek footbridge, east of Bomaderry Creek Bridge, at the landowner's consent. A brief construction methodology is provided below:

- Minor clearing within the Bomaderry Creek riparian vegetation corridor would be required to install crane pads on the creek bank.
- The footbridge superstructure would be cut into segments and lifted to the ground to be disassembled.
- The water-based piers would then be cut about 200 millimetres above creek bed level and the concrete footings would remain in-situ.
- Finally, the abutments on the creek banks would be removed to ground level.

The Bomaderry Creek footbridge is shown in Figure 3-5 and Figure 3-6.

Figure 3-5: Looking east from Princes Highway to the Bomaderry Creek footbridge (Source: Roads and Maritime, 2019).

Figure 3-6 Looking north to the Bomaderry Creek footbridge (Source: Roads and Maritime, 2019).

Changes to the construction methodology

Driven steel tubular piling for the installation of the bridge piers in Shoalhaven River

The project REF described bored piles in the work methodology for the bridge approaches and bridge construction in Shoalhaven River. The construction noise assessment for the project REF assessed the impact of bored piles. The proposed modification would instead require the installation of driven steel tubular piles for bridge piers using a large hydraulic hammer from a moored barge or the temporary rock working platform in Shoalhaven River. The installation of driven steel tubular piles for bridge piers is generally consistent with the installation of permanent steel casing associated with bored piles assessed in the project REF.

A brief construction methodology is provided below:

- Casings would be delivered to the site in half lengths and pile segments welded together in a horizontal splicing bed on the temporary rock working platform in Shoalhaven River
- Full pile length would be lifted onto a trailer and moved to the pier location(s) from the temporary rock working platform in Shoalhaven River
- Alternatively, full-length steel tubular piles may be delivered to site by road or water
- The pile would be installed with a hydraulic hammer

3.3 Construction activities

This section describes the likely construction activities required to undertake the proposed modification.

The proposed modification would involve areas for construction activities, namely at the:

- Ancillary sites
- Temporary rock working platforms in Shoalhaven River and Bomaderry Creek

The location of proposed ancillary sites is shown in Figure 3-3 and Figure 3-4 and would involve the demolition of existing structures to facilitate a range of potential uses. Furthermore, the temporary rock working platforms in Shoalhaven River and Bomaderry Creek would enable water-based bridge and pier construction activities. This includes the installation of driven steel tubular piles for the bridge piers in Shoalhaven River.

3.3.1 Work methodology

The work methodology was described in Section 3.3.1 of the project REF. Construction activities would be carried out in accordance with the construction environmental management plan (CEMP) prepared for the project REF and this addendum REF to ensure compliance with TfNSW's commitments and legislative requirements.

Detailed work methodologies for construction activities would be identified by the Construction Contractor. The proposed modification is anticipated to involve the following main construction activities:

- Pre-construction activities
- Establishment of ancillary sites
- Works outside the project study area and construction boundary defined in the project REF
- Construction of the roundabout including new pavement and landscaping
- Construction of the temporary rock working platforms.

These construction activities are described in further detail in Section 3.2.3.

3.3.2 Construction hours and duration

It is considered that construction of the proposed modification would be undertaken in conjunction with the construction of the project. Accordingly, it is anticipated that construction would commence in mid-2020 with the new bridge targeted to be open to traffic in 2024.

It is anticipated that the majority of construction would be undertaken during standard construction working hours in accordance with the Interim Construction Noise Guideline (DECC, 2009):

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

However, the project REF noted that works will need to be undertaken outside of the standard construction working hours, in instances where works would interrupt the operation of the Princes Highway such as utility relocations. Any similar out of hours works for the proposed modification would be undertaken in accordance with the Construction Noise and Vibration Guidelines (Roads and Maritime, 2016).

Section 6.2.4 of the project REF identified exceedances of the construction noise management levels (NMLs) at a large number of sensitive receivers during the evening and night period. The proposed modification would be generally consistent with the likely activities occurring outside standard working hours for the project REF. Work with impulsive or tonal noise emissions, and out of hours construction

works would be undertaken in accordance with the Construction Noise and Vibration Guideline (Roads and Maritime, 2016).

Between July and August 2019, TfNSW consulted with the community on out of hours construction works to determine their preference. The community provided their feedback on three options for night work scheduling primarily through an online survey as well as two community drop-in sessions held on 25 July and 1 August.

The three options were:

- Option 1 – Two nights per week, six nights per month for life of the project, working at individual locations only two nights a week for the life of the project
- Option 2 – Two weeks on, one week off for life of the project, working no more than two weeks continually at an individual location
- Option 3 – up to three months of work at a time in one location, five nights a week.

The online survey revealed that the majority of respondents selected 'multiple focused blocks of night work' as their preferred option for night work scheduling (Option 3). This would involve 'up to three months of work at a time in one location, five nights a week'. Residents may experience disruption for a longer concentrated period of time, but this would result in longer term respite once work is completed at individual locations. The work would be completed much faster and would provide further opportunities to set up more established worksites with more effective temporary noise mitigation. This option would reduce the project completion time by up to 12 months.

3.3.3 Plant and equipment

The indicative plant and equipment likely to be used during construction of the proposed modification would generally be consistent with Section 3.3.3 of the project REF. The type and number of plant and equipment for the proposed modification would be determined by the Construction Contractor.

In addition, a large hydraulic hammer would be required for the installation of driven steel tubular piles at the bridge piers from a moored barge or the temporary rock working platform in Shoalhaven River. A drum roller may also be used to compact the platform surface prior to its use during construction.

3.3.4 Earthworks

The estimated quantities of earthwork materials are described in Section 3.3.4 of the project REF. The construction of the Fairway Drive roundabout may require additional excavation.

3.3.5 Source and quantity of materials

The source and quantity of materials are described in Section 3.3.5 of the project REF.

The quantity of concrete and asphalt required for the proposed modification would be greater than the quantities described in the project REF. Typical waste materials for the proposed modification such as asphalt, concrete, demolition materials and vegetation would also be greater than the quantities described in the project REF.

In addition, the temporary rock working platforms would require medium and large sized rock that would not result in fine sediment material entering the waterway. Rock used would be hard, sound, durable rock, free of fine particles and not contaminated with foreign materials. The surface of the platform would be stabilised using either rock, gravel or a stable, interlocking aggregate.

The platform in Shoalhaven River would require about 15,000 cubic metres of rock material and the platform footprint would extend out approximately five metres on either side of the platform. It is noted that the width of the platform on the riverbed would depend on the size of the rock material.

3.3.6 Traffic management and access

The traffic management and access requirements are described in Section 3.3.6 of the project REF.

A traffic management plan (TMP) would be prepared and approved by TfNSW for the project and the proposed modification prior to implementation as part of an approved CEMP. The TMP would provide details of the traffic management measures to be implemented during construction to manage and regulate traffic movements on the surrounding network, maintain vehicular, pedestrian and cyclist access and minimise traffic congestion where possible. Access to local properties would be maintained as far as practicable for the duration of construction and traffic control would be required for out of hours construction works during the night period.

Furthermore, in the event that temporary restrictions on maritime traffic movements are required during construction, the community will be notified in advance and any temporary restrictions will be in accordance with applicable TfNSW requirements.

3.4 Ancillary facilities

Section 3.4 of the project REF identified a number of ancillary facilities required for the project.

The proposed changes to ancillary facilities are described in Section 3.2.3. The activities associated with the use of the proposed additional ancillary sites would generally be consistent with the project REF.

3.5 Public utility adjustment

Public utility adjustment would generally be consistent with Section 3.5 of the project REF.

Additional utility adjustments outside the project study area defined in the project REF would be undertaken. These would likely include access to manholes or fibre access points for cable hauling and cutover at the fibre joints.

It is noted that electrical utility works located outside the project study area defined in the project REF would result in no ground disturbance.

3.6 Property acquisitions

TfNSW would acquire and lease additional property to facilitate construction of the proposed modification. The extent of property acquisition and leasing arrangements would be refined and confirmed during detailed design, and in consultation with the affected property owners.

4. Statutory and planning framework

4.1 Environmental Planning and Assessment Act 1979

4.1.1 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 a road and/or road infrastructure facilities and is to be carried out on behalf of TfNSW, it can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Development consent from Shoalhaven City Council is not required.

Part 2 of 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 the ISEPP (where applicable), is discussed in Section 5 of this addendum REF.

The proposed modification is not located on land reserved under the *National Parks and Wildlife Act 1974*.

State Environmental Planning Policy (Coastal Management) 2018

State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP) commenced on 3 April 2018. It consolidates and consequently repeals SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection). The CM SEPP aims to promote an integrated and coordinated approach to land use planning in the coastal zone consistent with the objects of the *Coastal Management Act 2016.*

The proposed modification is located on land mapped as ‘coastal environment area’ and ‘coastal use area’. Development consent on land within these coastal areas must be in accordance with clauses 13 and 14 of the CM SEPP.

As the proposed modification is not designated development under the CM SEPP and is development without consent pursuant to clause 94 of the ISEPP, consent is not required from Shoalhaven City Council; therefore, the requirements of clauses 13 and 14 do not apply to the proposed modification. However, the proposed modification would be generally consistent with the requirements of these coastal management areas in the coastal zone. Refer to Table 4-1 and 4-2 of the project REF.

Other SEPPs

The proposed modification does not trigger the need for consent to be sought for state significant development or state significant infrastructure from the Minister for Planning under State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (State Significant Precincts) 2005.

4.1.2 Local Environmental Plans

Shoalhaven Local Environmental Plan 2014

The proposed modification is located within the Shoalhaven Local Government Area (LGA). The Shoalhaven Local Environmental Plan 2014 (the LEP) is the relevant local environmental planning instrument under the EP&A Act. The proposed modification is compatible with the objectives of the land use zones in the LEP. Consent is not required from Shoalhaven City Council.

The key features of the proposed modification are located on the land use zones in Table 4-1.

Table 4-1: Land use zones.

Location of proposed modification	Land Use Zone
Fairway Drive roundabout	SP2 Infrastructure, RE1 Public Recreation, R2 Low Density Residential
Construction works in Shoalhaven River and Bomaderry Creek	W2 Recreational Waterways and E2 Environmental Conservation
Changes to ancillary sites	RE1 Public Recreation, R2 Low Density Residential, RU1 Primary Production, B4 Mixed Use
Works outside the project study area defined in the project REF	SP2 Infrastructure, W2 Recreational Waterways, RU1 Primary Production, B4 Mixed Use, RE1 Public Recreation
Works outside the construction boundary defined in the project REF	SP2 Infrastructure, W2 Recreational Waterways, RU1 Primary Production, B4 Mixed Use, RE1 Public Recreation
Changes to the construction methodology	W2 Recreational Waterways

Shoalhaven Local Environmental Plan 1985

The Shoalhaven Local Environmental Plan 1985 is still in effect and applies to land identified as ‘Deferred Matter’ in the abovementioned LEP. There are no areas of ‘Deferred Matter’ within the study area.

4.2 Other relevant NSW legislation

4.2.1 Coastal Management Act 2016

The *Coastal Management Act 2016* (CM Act) commenced on 3 April 2018. The objectives are to manage the coastal environment of New South Wales (NSW) consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of NSW.

As described in Section 4.1.1, the proposed modification is located on land mapped as ‘coastal environment area’ and ‘coastal use area’. The four coastal management areas in the coastal zone are defined in the CM Act and identified in the CM SEPP. The management objectives of these coastal management areas support the objects of the CM Act and are provided in Section 4.2.1 of the project REF.

4.2.2 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) commenced on 25 August 2017. The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development.

The BC Act repeals the *Threatened Species Conservation Act 1995* (TSC Act). However, the transitional provisions of the Biodiversity Conservation (Savings and Transitional) Regulation 2017 apply to the project as the project REF began under Division 5.1 of the EP&A Act prior to the commencement of the BC Act; therefore, the project was assessed in accordance with the TSC Act. Accordingly, the proposed modification has also been assessed in accordance with the TSC Act.

4.2.3 Threatened Species Conservation Act 1995

The TSC Act was repealed by the BC Act which commenced on 25 August 2017. As described in Section 4.2.2, the project REF and the proposed modification are assessed in accordance with the TSC Act.

The objects of the TSC Act include the conservation and protection of biological diversity such as threatened species, populations, ecological communities and their habitat in NSW, and the promotion of ecologically sustainable development.

The potential impacts of the proposed modification on threatened species are discussed in Section 6.4.

The proposed modification is not expected to significantly impact on threatened species and consequently a Species Impact Statement (SIS) is not required.

4.2.4 National Parks and Wildlife Act 1974

The objects of the *National Parks and Wildlife Act 1974* (NPW Act) include the conservation of nature and objects, places or features of cultural value. The latter includes places, objects and features of significance to Aboriginal people. The NPW Act is the primary legislation protecting Aboriginal cultural heritage in NSW. Section 86 of the NPW Act provides for the protection of Aboriginal objects and places. Section 90 provides for an Aboriginal heritage impact permit (AHIP). An AHIP will be required as part of the project REF.

The proposed modification would not likely impact Aboriginal sites.

4.2.5 Protection of the Environment Operations Act 1997

The objects of the *Protection of the Environment Operations Act 1997* (POEO Act) include the protection, restoration and enhancement of the quality of the environment in NSW. Part 3.2 requires an Environment Protection Licence (EPL) for scheduled development work and scheduled activities identified in Schedule 1.

Section 4.2.6 of the project REF listed scheduled activities that potentially apply to the project. A licence is required for the project pursuant to Schedule 1, Part 1, clause 19 of the POEO Act.

4.2.6 Roads Act 1993

The objects of the *Roads Act 1993* include the regulation of activities undertaken on public roads, to establish procedures for the opening and closing of a public road as well as providing for the classification of roads and identifying the functions of road authorities.

Refer to Section 4.2.7 of the project REF.

4.2.7 Heritage Act 1977

The objects of the *Heritage Act 1977* (Heritage Act) include the conservation of the State's heritage, the identification and registration of items of State heritage significance and to promote an understanding of the State's heritage such as a place, building, relic or precinct.

Under Section 139, an excavation permit is required prior to the disturbance or excavation of land if a relic will or is likely to be discovered, exposed, moved, damaged or destroyed. The project will create direct and indirect impacts on listed heritage items.

The proposed modification would not impact listed heritage items.

4.2.8 Fisheries Management Act 1994

The objects of the *Fisheries Management Act 1994* (FM Act) are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. Part 2 and 7 of the FM Act describes the requirements for permits for dredging and/or reclamation works, to obstruct fish passage and to harm marine vegetation.

The temporary rock working platform within the Shoalhaven River would only restrict the cross-sectional area of the waterway by approximately less than 24%. This would still allow for tidal movements and therefore fish passage would be maintained for the duration of construction. Similarly, the temporary rock working platform within Bomaderry Creek would only restrict the cross-sectional area of the waterway by approximately less than 10%. Therefore, under Section 219 a permit is not required

The temporary rock working platform may require an approval or require for notice to be given to the Minster under Sections 199 and 205 of the FM Act in relation to:

- works that involve reclamation works
- works that involve harm or disturb marine vegetation, such as seagrass.

The requirement for a permit and notification under the FM Act has previously been identified in the Project REF in relation to other construction works.

4.2.9 Crown Land Management Act 2016

The objects of the *Crown Land Management Act 2016* (CLM Act) include providing for the ownership, use and management of the Crown land of NSW. The project as described in the project REF is located on Crown land which occurs along both sides of the Shoalhaven River and is administered under the CLM Act.

In accordance with Division 5.6 of the CLM Act, a licence is required to occupy Crown land.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

Under the 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 A and Section 6 of the addendum REF.

A referral is not required for proposed road actions that may affect nationally listed threatened species, endangered ecological communities and migratory species.

Potential impacts to these biodiversity matters are also considered as part of Section 6 of this 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 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.

4.4 Confirmation of statutory position

The proposed modification is categorised as development for the purpose of a road and/or road infrastructure facilities and is being carried out by or on behalf of a public authority. Under clause 94 of 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 Shoalhaven City Council is not required.

As stated above, no further approvals are required by the Commonwealth under the EPBC Act.

5. Consultation

5.1 Consultation strategy

A Community and Stakeholder Communication Plan was prepared for the project in accordance with the *Community Involvement Practice Notes and Resources Manual: A resource manual for staff* (RTA, 2010). The plan has guided consultation involving TfNSW, other relevant government agencies, organisations, community representatives and residents. As such, four major rounds of consultation with the community and stakeholders were undertaken for the project and are documented in Section 5.2 of the project REF.

5.2 Consultation outcomes

During the development of the project, consultation was undertaken with the local community, the Aboriginal community as well as various government agencies and stakeholders. The project REF was placed on public display between 27 August and 28 September 2018 and submissions relating to the project REF were received by TfNSW. A submissions report, dated May 2019, was prepared by TfNSW to respond to issues raised.

The key outcomes of these discussions and assessments relevant to the proposed modification are summarised in Table 5-1.

Table 5-1: Summary of issues raised by the community.

Group	Issue raised	Response / where addressed in addendum REF
Residents and local business	Out of hours construction works: night work scheduling	The community's preferred option was 'multiple focused blocks of night work' (Section 3.3.2).
Residents and local business	Redistribution of traffic within the local traffic network and potential traffic impact on local roads	In the submissions report, additional surveys and modelling were undertaken in response to a number of concerns raised in the submissions report to assess the long-term demand on the existing intersection at Fairway Drive / Illaroo Road. A number of potential management measures to improve future intersection performance were discussed (Section 3.2.3).
Shoalhaven City Council	Location of potential additional construction ancillary sites	Shoalhaven City Council proposed Gateway Park as a potential additional ancillary site. In the submissions report, an assessment of Gateway Park described the site as having substantial constraints associated with its use and it was not considered further (Section 3.2.3).

The ISEPP consultation checklist in Appendix B describes how ISEPP consultation requirements have been identified. The Shoalhaven City Council has been consulted on the proposed modification as per the ISEPP checklist. Issues raised through ISEPP consultation and how they have been addressed are shown in Table 5-2.

In addition, TfNSW is to consult the NSW State Emergency Services during detailed design to discuss the potential impact of the proposed modification on flood levels and behaviour, and to identify opportunities to mitigate and manage impacts on access.

Finally, it is noted that Aboriginal community consultation was undertaken via an Aboriginal Focus Group meeting on the 21 March 2020 for the proposed modification.

Table 5-2: Issues raised through ISEPP consultation.

Agency	Issue raised	Response / where addressed in addendum REF
Shoalhaven City Council	The Gateway Park ancillary site is not leased from Council.	TfNSW understand that the Gateway Park ancillary site is not likely to be required. However, if it is required, TfNSW would consult with Council to confirm leasing arrangements.

The following government agencies have been consulted about the proposed modification:

- NSW Department of Primary Industries (DPI – Fisheries)
- NSW Department of Planning, Industry & Environment (DPI&E)
- NSW Environment Protection Authority (EPA)

Issues raised through consultation with these government agencies are shown in Table 5-3.

Table 5-3: Issues raised through consultation with government agencies.

Agency	Issue raised	Response / where addressed in addendum REF
DPI – Fisheries (first round comments)	Justification and impact of the temporary rock working platform in Shoalhaven River on seagrass and fish passage.	The need for the temporary rock working platform is provided in Section 3.2.3. Furthermore, a qualitative impact assessment of the platform on seagrass and fish passage is provided in Section 6.
	Consideration of alternative options such as a piled platform.	The Construction Contractor has considered alternative options to the temporary rock working platform in Section 2.3.
	Additional information on sheet pile containment, depth of the river and proposed height of the platform.	The platform would be located at the new bridge piers, some of which are in shallower sections of the Shoalhaven River. The platform would also incorporate retaining structures such as sheet piles as described in Section 3.2.3. The height of

Agency	Issue raised	Response / where addressed in addendum REF
		the platform would not be known until the Construction Contractor has completed detailed design. The Construction Contractor is to comply with site impacts in accordance with the project REF and the Project Deed. Any additional impacts resulting from detailed design would require the Construction Contractor to liaise with TfNSW and relevant stakeholders to develop any additional safeguards and management measures.
	Request additional detail on the demolition methodology of Bomaderry Creek footbridge.	Additional detail on the demolition methodology of Bomaderry Creek footbridge is provided in Section 3.2.3.
(second round comments)	Request that sheet piling is used to contain the platform in Shoalhaven River to reduce the footprint.	The option of using sheet piling to contain the platform in Shoalhaven River to reduce the footprint has been reviewed. It is considered that the overall platform footprint would not be dramatically reduced using sheet piling given the shallow depth of the water and the likely height of the platform. Furthermore, the installation of sheet piling may disturb soft silty clays on the riverbed causing adverse water quality impacts.
	Request that a cofferdam be provided to contain water quality impacts during construction and decommissioning.	It is considered that the use of rock that would not result in fine sediment material entering the waterway, free of fine particles and not contaminated with foreign materials to construct the platforms as well as silt curtains and geotextile wrapped rock filter bund would effectively minimise adverse water quality impacts during construction and decommissioning. It would also remove the need to dewater a cofferdam area.
	The size of the sacrificial layer of rock in Shoalhaven River should be as large as possible whilst meeting any engineering requirements. When removing the platform, rock should be removed to the level of the adjacent waterways, ensuring	Medium and large sized rock material would be used to construct the platforms as per Section 3.3.5. During removal of the platforms, the profile of the sacrificial layer would be consistent across the

Agency	Issue raised	Response / where addressed in addendum REF
	that there is no scour hole, or raised area remaining.	footprint to minimise scouring in the waterways.
	Waterway restrictions caused by the platforms in Shoalhaven River and Bomaderry Creek would not exceed a maximum velocity of 0.3 metres per second. Rudimentary calculations with the blockage in place would be sufficient to determine flows. Flow velocities that do not exceed 0.3 metres per second will not require a permit to block fish passage.	Further consultation was undertaken, and the tidal nature of the waterways reviewed. It was confirmed that a permit is not required to obstruct fish passage due to the tidal nature of the waterways.
	Potential scour impact on the northern bank during construction of the platform in Shoalhaven River. The height of the platform will need to be balanced between remaining above flood waters and allowing larger flood events to pass over the top.	In terms of flooding, temporary scour protection and the platforms in Shoalhaven River and Bomaderry Creek must, at a minimum, be designed for a 5% Annual Exceedance Probability (AEP) event. It is noted that the northern bank of the Shoalhaven River is exposed rock foundation and is unlikely to scour.
	Potential for the platform to result in scour within the waterway due to displaced flows. It is recommended that pre and post-bathymetric surveys are undertaken to ensure that there is no unforeseen impact to adjacent areas from the platform in the Shoalhaven River.	The sacrificial layer of rock will be profiled, and a post-bathymetry survey would be undertaken to demonstrate that there is no unforeseen impact to adjacent areas within five metres of the platform.
DPI&E	Flood behaviour impacts to be considered in accordance with the NSW Floodplain Development Manual (2005).	The Project Deed covers the requirements for temporary works by the Construction Contractor. The Construction Contractor is to comply with site impacts in accordance with the project REF and the Project Deed.
	Update the flooding and hydrology assessment to quantify any flood risk implications and facilitate consultation.	The Construction Contractor is required to assess and consult on the flooding and afflux impacts as a result of the Contractor's Works.
	Undertake consultation with affected property owners in relation to potential changes in flood behaviour.	TfNSW would undertake consultation with the local community regarding the flood impact of permanent works if impacts increase from the levels predicated in the

Agency	Issue raised	Response / where addressed in addendum REF
		project REF. The construction Contractor would undertake consultation for flooding impacts as a result of temporary works (Table 6-15).
	Consideration of impacts that are likely to occur as a result of geomorphic responses to the temporary rock working platform in Shoalhaven River.	During removal of the platforms, the profile of the sacrificial layer would be consistent across the footprint to minimise scouring in the waterways. Also, a post-bathymetry survey would be undertaken to demonstrate that there is no unforeseen impact to adjacent areas within five metres of the platform TfNSW consider that further impacts are unlikely and have not been considered for the temporary works.
	Additional assessment on how the temporary rock working platform in Shoalhaven River may alter physical estuarine processes and erosion and sediment impacts. The assessment would include the sacrificial layer of rock proposed to remain.	A qualitative assessment of potential impacts on coastal processes is provided in Section 6.5.1.
	Recommendation to seek a variation to the approved AHIP to include additional areas.	TfNSW and the Construction Contractor will comply with AHIP boundary. A consistency assessment will be completed for areas of work outside the current boundary.
	Clarification on the apparent significant increase in vegetation removal providing potential foraging habitat for the Regent Honeyeater *(Anthochaera Phrygia)*.	The removal of vegetation is assessed in Section 6.4.3. The removal of vegetation for the proposed modification is considered to be minor in comparison to that assessed in the project REF and described in the submissions report.
	Clarification on any additional impact to the Endangered Ecological Community (EEC).	The proposed modification would not result in additional impact to plant community type (PCT) 1236 (including EEC) located near Fairway Drive.
	Recommendation for 'opting-in' to the Biodiversity Assessment Method and providing appropriate offsets.	TfNSW would determine and implement a suitable offset strategy for impacts to affected key fish habitat in accordance with environmental safeguard B18 in Table 7-1. The safeguard would ensure the strategy is implemented in accordance with relevant TfNSW guidelines and the

Agency	Issue raised	Response / where addressed in addendum REF
		Biodiversity Offsets Scheme administered by DPI&E.
EPA	Implication of works outside the project boundary in relation to the Environmental Protection Licence (EPL) application.	Consultation with the EPA has commenced during the preparation of the project REF to determine their requirements and will be ongoing, where applicable. .

5.3 Ongoing or future consultation

Ongoing consultation for the project and the proposed modification would be undertaken in accordance with the Community and Stakeholder Communication Plan.

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 Nowra Bridge Project. 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.

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

6.1 Traffic and transport

6.1.1 Methodology

A traffic and transport assessment (ARUP, 2018) was undertaken for the project REF to determine the potential impacts on traffic and transport and to describe implementable management measures. The methodology of the traffic and transport assessment is described in Section 6.1.1 of the project REF.

Additional surveys and modelling were undertaken in the submissions report to determine the redistribution of traffic within the local traffic network and potential traffic impacts on local roads including the intersection at Fairway Drive / Illaroo Road. The approach to the assessment generally included modelling of the base scenario at intersections using SIDRA software and forecasting future traffic for AM and PM peak hours.

The additional modelling was prepared in accordance with the following:

- Roads and Maritime Traffic Modelling Guidelines, February 2013 Version 1.0
- Highway Capacity Manual (HCM, 2016)
- Guide to Traffic Generating Developments, Version 2.2 Roads and Maritime, October 2002
- Austroads Guide to Traffic Engineering Practice.

A review of these assessments was undertaken and are still considered to be relevant to the proposed modification.

6.1.2 Existing environment

The existing traffic and transport environment of the project is described in Section 6.1.2 of the project REF. The following summarises key information from the project REF and submissions report relevant to the proposed modification.

Illaroo Road, Fairway Drive and Bolong Road

Illaroo Road and Fairway Drive are local roads at an existing unsignalised T-intersection. Illaroo Road is serviced by a local bus route and has shared paths for pedestrians and cyclists providing access to the North Nowra residential area. Fairway Drive is one lane in each direction and provides access to the Greys Beach public boat ramp and Nowra Golf and Recreation Club. The posted speed limit on Illaroo Road is 60km/h and Fairway Drive is 50km/h. On-street parking is not permitted on Illaroo Road or Fairway Drive however, off-street parking is available at Illaroo Road (North Nowra Rotary Park), Greys Beach public boat ramp, Nowra Golf and Recreation Club. Traffic counts carried out in November 2017 identified the two-way weekday daily traffic volumes on Illaroo Road as 17,600 vehicles. Intersection counts for the observed AM and PM peak hours at Fairway Drive / Illaroo Road are shown in Section 5.1.2 of the submissions report.

Bolong Road is a regional road connecting to the Princes Highway. It provides an alternative access route to towns north of Nowra including Gerroa and Gerringong. The road is predominantly a single lane in each direction with additional lanes at intersections for turning movements. The road is also used by bus services and provides heavy vehicle access to the Bomaderry industrial area. Traffic counts carried out in November 2017 identified the two-way weekday daily traffic volumes on Bolong Road as 15,300 vehicles.

Lyrebird Drive, Hawthorn Avenue, Pleasant Way and Moss Street

Local roads providing access to residential dwellings and the Nowra town center.

Scenic Drive

Scenic Drive is a local road providing access to the river foreshore, Nowra Aquatic Park and the Shoalhaven District Memorial Hospital. Scenic Drive is serviced by a local bus route. On-street parking is permitted on Scenic Drive and the Nowra Aquatic Park provides off-street parking.

Maritime traffic

The maritime use of the Shoalhaven River around Nowra Bridge is moderate to high. Examples of maritime use are fishing, kayaking, river cruises and commercial activities such as charters and hire operations. The Nowra Sailing Club is located on the southern side of the Shoalhaven River and has two boat ramp facilities at the wharf. The speed limit for vessels in the area is four knots.

It is considered that Bomaderry Creek is non-navigable for vessels.

6.1.3 Potential impacts

Construction

A summary of potential traffic and transport impacts during construction are described in Table 6-1.

Table 6-1 Summary of potential traffic and transport impacts during construction.

Other main features of the proposed modification	Construction impacts
Fairway Drive roundabout	The works would improve construction travel times for site vehicles and trucks by eliminating the need to perform a U-turn at the roundabout on McMahons Road further west. The works are not considered to generate significantly more construction vehicle movements relative to the daily traffic movements described in Section 6.1.3 of the project REF. Property access and parking arrangements for residents on Illaroo Road may be restricted for the duration of construction. To minimise potential impacts on residents, consultation would be undertaken directly with affected property owners and temporary access or parking arrangements would be developed. Furthermore, local bus services may experience minor delays and shared paths for pedestrians and cyclists would be disrupted during construction. As a result, pedestrians and cyclists would be directed to appropriate locations due to necessary shared path closures for the duration of construction. Finally, on-street

Other main features of the proposed modification	Construction impacts
	parking is not permitted on Illaroo Road or Fairway Drive, therefore there would be no additional impacts to on-street parking.
Construction works in Shoalhaven River and Bomaderry Creek	The transport of materials, plant and equipment to the platform in Shoalhaven River would have minor impact on local traffic and public transport services on Scenic Drive. However, the platform would restrict maritime traffic and commercial and recreational boat operators in Shoalhaven River near the southern bank for the duration of construction. The transport of materials, plant and equipment to the platforms in Bomaderry Creek would have minor additional impact on local traffic during construction.
Out of hours construction works	Night work scheduling may reduce the number of lanes on the Princes Highway and local roads for the duration of construction to facilitate some construction activities as described in the project REF.
Changes to ancillary sites	Ancillary sites would increase travel times for road users on regional and local roads for the duration of construction as a result of heavy construction vehicle traffic movements between ancillary sites and the Princes Highway. The potential impact would be minor. In addition, on-site parking would be provided at ancillary sites thereby maintaining public parking.
Works outside the project study area defined in the project REF	Utility works and new signage would generally require similar plant and equipment described in the project REF and would not have a significant adverse impact on traffic and transport. New signage and line-marking may improve the coordination of construction vehicles moving to and from ancillary sites.
Works outside the construction boundary defined in the project REF	Potential traffic impacts from property works including the demolition of existing structures at ancillary sites and the construction of driveway access ways, hardstand turnarounds and new pavement would be effectively managed through the TMP. In addition, demolition of Bomaderry Creek footbridge which is located on privately-owned land would not impact on local traffic and transport arrangements.
Changes to the construction methodology	The large hydraulic hammer required for the installation of the driven steel tubular piles at the bridge piers would be delivered to site in accordance with the TMP. Casings would be delivered to the site in half lengths with driving shoes already installed to reduce additional impact on the local transport network.

Operation

A summary of potential traffic and transport impacts during operation are described in Table 6-2.

Table 6-2: Summary of potential traffic and transport impacts during operation.

Other main features of the proposed modification	Operational impacts
Fairway Drive roundabout	The works would improve conditions for pedestrian and cyclists by reinstating and providing improvements to the shared path near North Nowra Rotary Park. The construction of parallel car parking for five vehicles immediately west of the roundabout would replace the existing car park located on the southern side of Illaroo Road, further east. The new car parking would reduce the available number of parking spaces compared to the existing car park near North Nowra Rotary Park. Furthermore, the proximity of new car parking to the roundabout may reduce traffic flow heading westbound on Illaroo Road as cars attempt to enter leave available parking spaces.
Construction works in Shoalhaven River and Bomaderry Creek	The platforms would be removed upon completion of bridge construction activities, including the removal of all construction plant and equipment. Watercraft movements on Shoalhaven River would also be restored. As a result, there would be no adverse impact during operation.
Changes to ancillary sites	Ancillary sites would be restored upon completion of construction, including the removal of all construction plant, equipment, buildings and site vehicles. As a result, there would be no adverse impact during operation.

6.1.4 Safeguards and management measures

Traffic and transport safeguards and management measures for the proposed modification are outlined in Table 6-3. These are in addition to those previously described in the project REF and submissions report.

Table 6-3: Additional traffic and transport safeguards and management measures.

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	In the event that temporary restrictions on maritime traffic movements are required during construction, the community will be notified in advance and any temporary restrictions will be in accordance with applicable TfNSW requirements.	Construction Contractor	Construction	Project specific control

Other safeguards and management measures that would address traffic and transport impacts are identified in Section 7.

6.2 Noise and vibration

6.2.1 Methodology

A noise and vibration assessment (Renzo Tonin & Associates, 2018) was undertaken for the project REF to determine potential noise and vibration impacts and to describe implementable management measures.

The methodology of the noise and vibration assessment is described in Section 6.2.1 of the project REF. This information was reviewed and is still considered to be relevant to the proposed modification.

The Batemans Bay Bridge Project involved the installation of driven piles as described in this proposed modification. Therefore, the noise assessment undertaken for the Batemans Bay Bridge Project was reviewed to determine likely potential increases in noise levels and impacts at sensitive receivers.

6.2.2 Existing environment

The existing noise environment is described in Section 6.2.2 of the project REF. The following summarises key information from the project REF relevant to the proposed modification.

Long-term noise monitoring was undertaken to quantify ambient noise level within the study area and in proximity to the construction boundary. Between 7 and 18 December 2017, noise monitoring was conducted at five locations amongst seven Noise Catchment Areas (NCAs) (Figure 6-1) to determine background noise levels and existing traffic noise on the Princes Highway.

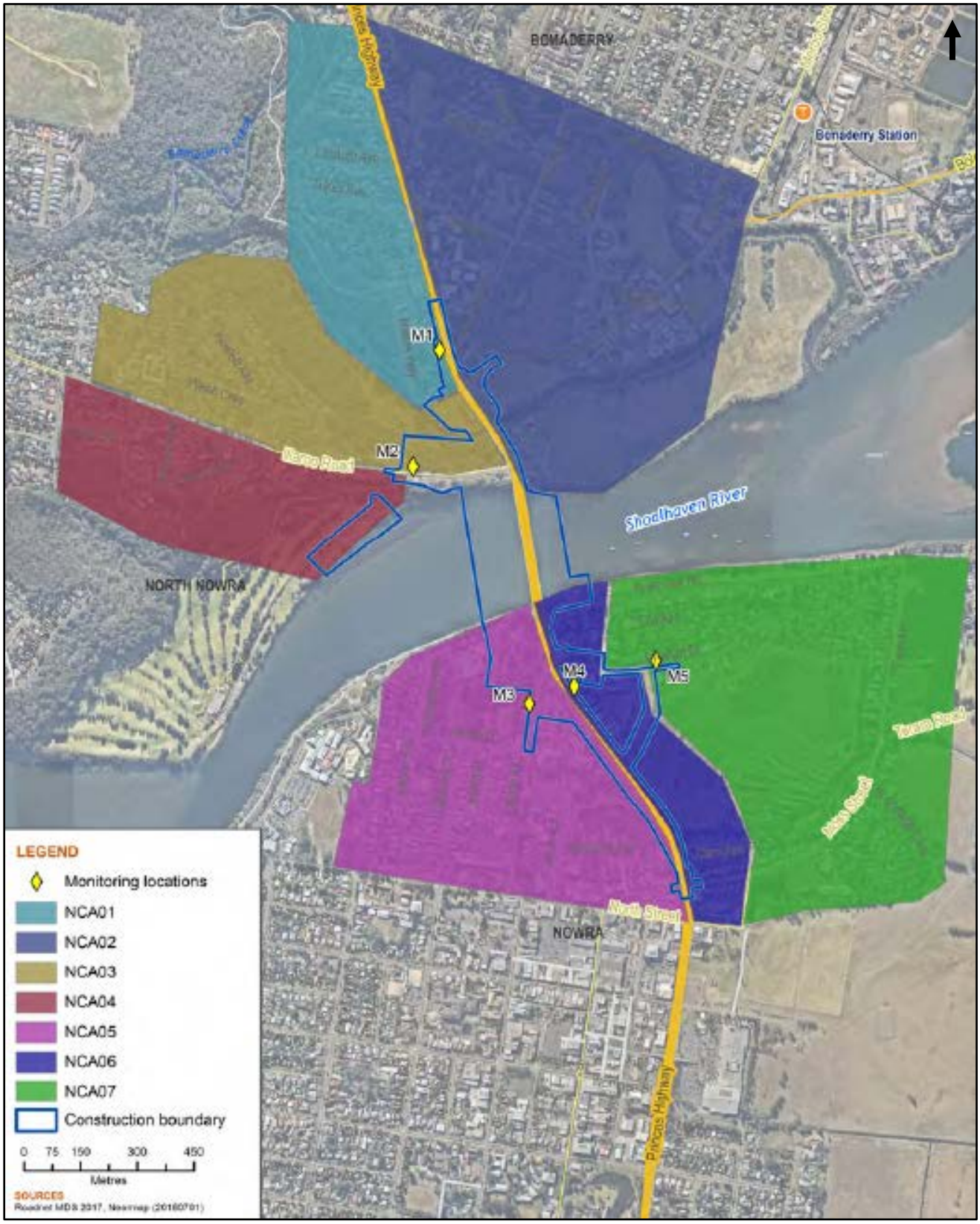

Figure 6-1: Noise Catchment Areas (NCAs) established for the project REF (Source: Roads and Maritime, 2018).

Using the relevant guidelines, project-specific construction noise management levels (NMLs) were developed for construction works within and outside the standard construction hours at each noise catchment area (Table 6-4). Operational noise assessment criteria were also adopted for residential receivers and sensitive land uses using relevant guidelines for specific types of road development.

Table 6-4: Specific construction noise management levels (NMLs) (Source: Roads and Maritime, 2018).

NCA	Logger ID	L_{A90} RBL			Noise management level $L_{Aeq(15min)}$		
					Standard hours (RBL + 10dB)	Extended/out-of-hours work (OOHW) (RBL+5dB)	
		Day	Evening	Night	Day	Evening	Night
NCA01	M1	62	56	35	72	61	40
NCA02	M2	62	56	35	72	61	40
NCA03	M3	52	46	31	62	51	36
NCA04	M4	52	46	31	62	51	36
NCA05	M5	51	46	34	61	51	39
NCA06	M6	57	53	36	67	58	41
NCA07	M7	39	38	31	49	43	36

6.2.3 Potential impacts

Construction

A summary of potential noise and vibration impacts during construction are described in Table 6-5.

Table 6-5: Summary of potential noise and vibration impacts during construction.

Other main features of the proposed modification	Construction impacts
Fairway Drive roundabout	The project REF predicted exceedances of the NMLs for each NCA for most construction activities, particularly bulk earthworks and new pavement. The proposed works would involve similar activities that would likely generate additional minor construction noise at sensitive receivers. Individual receivers would likely experience predicted noise levels and/or exceedances during periods where the works are occurring directly outside affected properties on Illaroo Road.
Construction works in Shoalhaven River and Bomaderry Creek	Construction of the platforms may have additional minor construction noise impacts on nearby sensitive receivers. The likely noise generating activities include laying of rock material and the installation of retaining structures such as sheet piles.

Other main features of the proposed modification	Construction impacts
Changes to ancillary sites	The use of ancillary sites may generate additional noise disturbances at surrounding sensitive receivers from construction activities. For instance, 46 residential dwellings including the Greenwell Gardens Aged Care Facility are within 50 metres of the Gateway Park ancillary site[1]. Neighbouring properties located in the immediate vicinity of the Fish shop east of Nowra Bridge abutment and Paddock south of Bolong Road ancillary sites may be impacted for the duration of construction.
Works outside the project study area defined in the project REF	The undertaking of utility works and new signage would generally be consistent with the construction noise assessment described in the project REF.
Works outside the construction boundary defined in the project REF	Potential noise impacts from property works including the demolition of existing structures at ancillary sites to facilitate their use during construction would be effectively managed through the NVMP. In addition, demolition of Bomaderry Creek footbridge would likely generate minor noise disturbance to a small number of sensitive receivers located approximately 80 metres to the south.
Changes to the construction methodology	Driven steel tubular piles would be installed using a large hydraulic hammer which would create additional noise disturbance to surrounding sensitive receivers. Table 37 of the noise and vibration assessment undertaken for the project REF identified that driven piling in place of bored piling would result in a 10-15dB increase in generated noise[2]. In addition, the noise assessment undertaken for the submissions report[3] for the Batemans Bay Bridge Project identified an increase in noise levels by 4dB(A) from assessed levels and increased noise levels for surrounding sensitive receivers. Despite a likely increase in noise levels at sensitive receivers, it is considered that additional noise and vibration impacts generated by the proposed modification would be managed through existing safeguards and management measures. As identified in the project REF, measures in the Roads and Maritime *Construction Noise and Vibration Guideline* (2016) would be implemented to minimise construction noise impacts. Finally, piling works would result in increased underwater noise for aquatic biodiversity in Shoalhaven River. However, the potential impacts would be relatively minor as they would be short-term and occur over a small individual footprint area.

[1] Roads and Maritime (2019), Nowra Bridge Project Submissions Report.
[2] Renzo Tonin & Associates (2018), Nowra Bridge Project – Princes Highway Upgrade Noise and Vibration Assessment, August 2018.
[3] Roads and Maritime (2018), Batemans Bay Bridge Replacement Review of Environmental Factors Submissions Report, May 2018.

Operation

A summary of potential noise and vibration impacts during operation are described in Table 6-6.

Table 6-6: Summary of other potential noise and vibration impacts during operation.

Other main features of the proposed modification	Operational impacts
Fairway Drive roundabout	The use of new car parking at Illaroo Road would not generate significant noise impact.
Construction works in Shoalhaven River and Bomaderry Creek	The platforms would be removed upon completion of bridge construction activities, including the removal of all construction plant and equipment. As a result, there would be no adverse impact during operation.
Changes to ancillary sites	Ancillary sites would be restored upon completion of construction, including the removal of all construction plant, equipment, buildings and site vehicles. As a result, there would be no adverse impact during operation.

6.2.4 Safeguards and management measures

Noise and vibration safeguards and management measures for the proposed modification are outlined in Table 6-7. These are in addition to those previously described in the project REF and submissions report.

Table 6-7: Additional noise and vibration safeguards and management measures.

Impact	Environmental safeguards	Responsibility	Timing	Reference
High noise generating activities during construction	As part of the NVMP, works likely to be high noise generating during construction will be managed in accordance with the Construction Noise and Vibration Guideline (RMS, 2016) and should consider: • Respite periods • Further community consultation • Notifications • Project specific mitigation measures including the outcomes of community consultation undertaken	Construction Contractor	Construction	Project specific control

Other safeguards and management measures that would address noise and vibration impacts are identified in Section 7.

6.3 Water quality

6.3.1 Methodology

A construction soil and water assessment and an operational water quality assessment (SMEC, 2018) were undertaken for the project REF to determine water quality impacts and to describe implementable management measures.

The methodology of these assessments is described in Section 6.10.1 of the project REF and are still considered to be relevant to the proposed modification. Water quality impacts were assessed through the following methodology:

- Reviewing existing information from databases, reports and other sources of relevant information
- Consideration of the construction activities and ongoing operational activities associated with the project
- Undertaking one (1) round of water quality monitoring within the study area in December 2017
- Undertaking a Phase 1 contamination investigation for the study area
- Assessing impacts on receiving water quality with reference to trigger values for each indicator relevant to typical NSW water quality objectives for estuaries
- Quantitative assessment of the performance of operational water quality treatment measures.

6.3.2 Existing environment

The existing water quality environment is described in Section 6.10.2 of the project REF. The following summarizes key information from the project REF relevant to the proposed modification.

Surface water

The Shoalhaven River catchment consists of an area of 7,000 square kilometres and comprises a variety of land uses. Transport corridors for road and rail are included in the urban land use areas which accounts for six (6) percent of the total catchment area.

Sensitive environmental features within the study area include seagrass beds, the surface water dependent ecosystem of Bomaderry Creek and Shoalhaven River, mudflats and mangroves. Furthermore, the Shoalhaven River is classified as a Type 1 highly sensitive key fish habitat and Class 1 major fish habitat.

Water quality monitoring undertaken by Shoalhaven City Council between 2000 and 2012 in the study area indicated that the water quality in Shoalhaven River had a good to excellent water quality index rating with faecal coliform counts, and phosphorus and nitrogen levels below the relevant ANZECC (2000) guidelines.

Furthermore, in December 2017 a single round of surface water quality monitoring was undertaken at nine (9) locations within the study area. Monitoring locations in Shoalhaven River are shown in Figure 6-2. The monitoring indicated that identified metals and chemicals and other factors such as chemical oxygen demand and biological oxygen demand were all below the analytical detection limits and the relevant ANZECC (2000) guidelines.

In summary, the water quality of the Shoalhaven River is generally good.

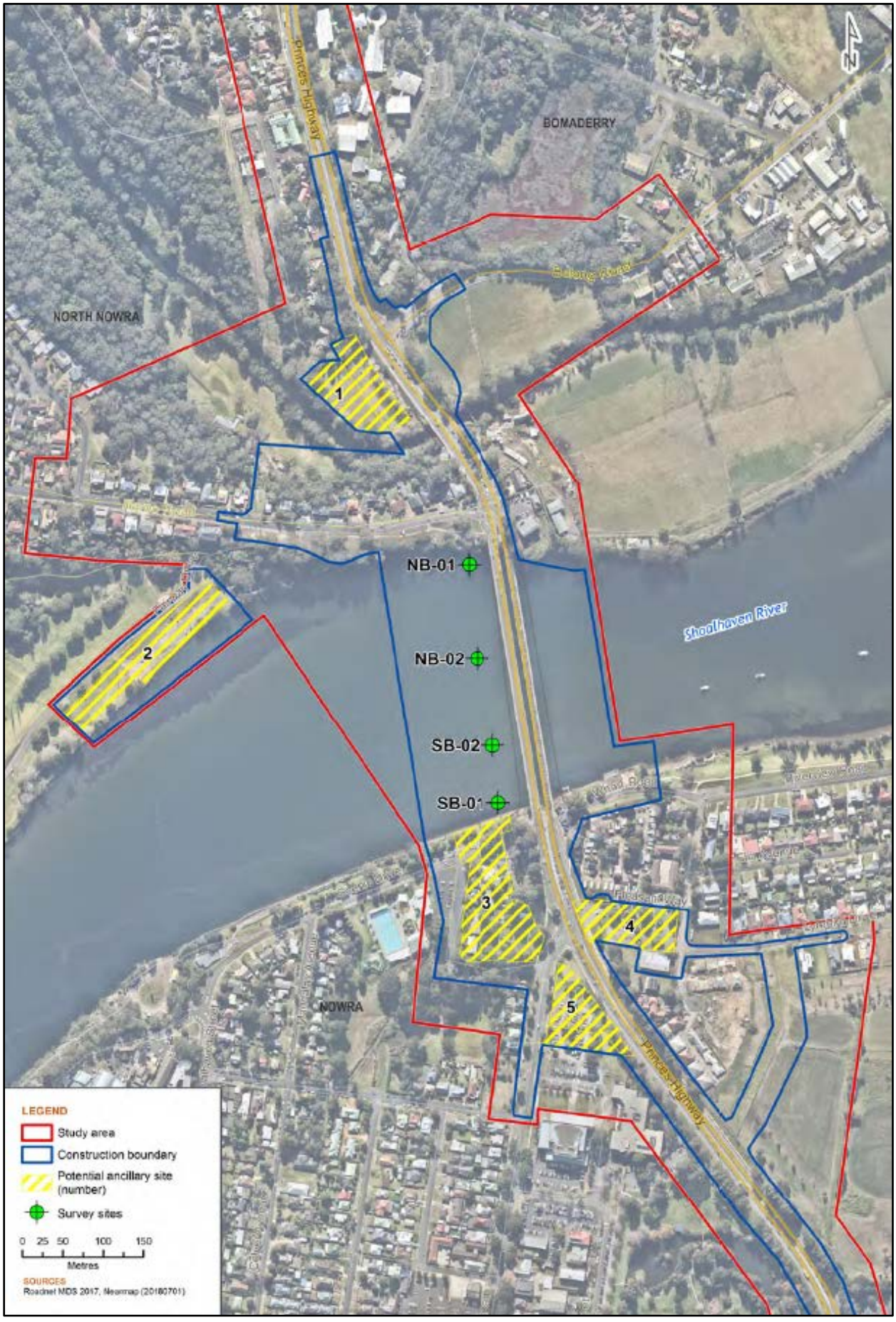

Figure 6-2: Surface water quality monitoring locations in Shoalhaven River (Source: Roads and Maritime, 2018).

Groundwater

The project REF identified no existing documented data relating to groundwater quality within the study area. However, there are six (6) registered groundwater bores in the vicinity of the study area.

6.3.3 Potential impacts

Construction

A summary of water quality impacts during construction are described in Table 6-8.

Table 6-8: Summary of potential water quality impacts during construction.

Main features of the proposed modification	Construction impacts
Fairway Drive roundabout	The works would involve construction activities that pose a risk to water quality, including ground disturbance, vegetation removal and new pavement. These activities may reduce the overall water quality of the nearby Shoalhaven River through increased sedimentation as assessed in the project REF. In addition, the construction of the property and maintenance access north of the Fairway Drive roundabout may increase sedimentation of Bomaderry Creek.
Construction works in Shoalhaven River and Bomaderry Creek	The rock material comprising the platforms would be typically comprised of rock that would not result in fine sediment material entering the waterway. Rock used would be hard, sound, durable rock, free of fine particles and not contaminated with foreign materials. Silt curtains and geotextile wrapped rock filter bunds would also be installed around the platforms to minimise runoff into Shoalhaven River and Bomaderry Creek. In combination with the safeguards and management measures in Section 7, these physical barriers would minimise potential water quality impacts from sedimentation, erosion and scouring. As a result, the additional impact on water quality would be minor.
Changes to ancillary sites	Gateway Park is not in close proximity to the Shoalhaven River. The south-west boundary of Gateway Park is located near an artificial waterbody however, potential impacts to water such as sedimentation and spills are unlikely since the Princes Highway separates these areas. The Fish shop east of Nowra Bridge abutment and Paddock south of Bolong Road ancillary sites are located near Shoalhaven River and Bomaderry Creek, respectively. Potential impacts to water quality would be effectively managed through the Soil and Water Management Plan (SWMP).
Works outside the project study area defined in the project REF	The installation of maritime navigation aids and moorings in Shoalhaven River to support construction barges would not significantly impact water quality.

Main features of the proposed modification	Construction impacts
Works outside the construction boundary defined in the project REF	The demolition of Bomaderry Creek footbridge may result in construction debris, earth from exposed surfaces and/or vegetation waste from minor clearing entering the creek and causing minor sedimentation.
Changes to the construction methodology	Piling and construction activities associated with the installation of the bridge piers were identified in the project REF as a risk to water quality. The potential water quality impacts of the proposed installation of driven steel tubular piles are considered to be generally consistent with the bored piles assessed in the project REF as both construction methodologies would require permanent steel casing driven into the riverbed. The water quality impacts of piling would include minor disturbance of the riverbed leading to increased turbidity levels and reduced water quality. Finally, as identified in the project REF, only minor groundwater ingress would be expected during piling for the bridge piers.

Operation

A summary of potential water quality impacts during operation are described in Table 6-9.

Table 6-9: Summary of potential water quality impacts during operation.

Other main features of the proposed modification	Operational impacts
Fairway Drive roundabout	The works would involve drainage upgrades for the proposed infrastructure. This would effectively capture surface water flows across new pavement and mitigate adverse water quality impacts.
Construction works in Shoalhaven River and Bomaderry Creek	The platforms would be removed upon completion of bridge construction activities, including the removal of all construction plant and equipment. As a result, there would be no adverse impact during operation.
Changes to ancillary sites	Ancillary sites would be restored upon completion of construction, including the removal of all construction plant, equipment, buildings and site vehicles. As a result, there would be no adverse impact during operation.
Works outside the construction boundary defined in the project REF	The concrete footings of Bomaderry Creek footbridge would remain in-situ. This would mitigate adverse water quality impacts from their removal such as localised disturbance of the natural flow regime and increased turbidity levels.

6.3.4 Safeguards and management measures

Water quality safeguards and management measures for the proposed modification are outlined in Table 6-10. These are in addition to those previously described in the project REF and submissions report.

Table 6-10: Additional water quality safeguards and management measures.

Impact	Environmental safeguards	Responsibility	Timing	Reference
Water quality	Split rock used in reclamation works in or adjacent to the waterways must be clean and free of fines. The Contractor must source, thoroughly inspect and then authorise the use of split rock material in or adjacent to the waterways.	Construction Contractor	Construction	Project specific control

Other safeguards and management measures that would address water quality impacts are identified in Section 7.

6.4 Biodiversity

6.4.1 Methodology

A biodiversity assessment report (SMEC, 2018) was prepared for the project REF to determine the potential impacts on terrestrial and aquatic biodiversity and describe implementable management measures to minimise impacts on threatened species, communities and their habitats. The methodology of the biodiversity assessment is described in Section 6.9.1 of the project REF and is still considered to be relevant to the proposed modification.

The submissions report described that the project will require the removal of 4.68 hectares of vegetation that provides potential foraging habitat for this species when suitable feed trees are in flower. As part of the submissions report, an additional assessment of the potential impacts of the project on the Regent Honeyeater *(Anthochaera Phrygia)* was triggered by the sighting of a single individual in September 2018 less than 100 metres from the construction boundary. The additional assessment concluded that the project is not expected to have a significant impact on the Regent Honeyeater during either construction or operation.

6.4.2 Existing environment

The existing terrestrial and aquatic biodiversity is described in Section 6.9.2 of the project REF. The following summarizes key information from the project REF relevant to the proposed modification.

The proposed modification is located within the Sydney Basin Bioregion in the Illawarra IBRA subregion and occurs within the Shoalhaven Alluvial Plain Mitchell Landscape.

Much of the vegetation within the study area has been cleared of native vegetation with current land uses including residential, commercial and public recreation. Although terrestrial habitats have been modified, North Nowra Rotary Park near the proposed Fairway Drive roundabout contains remaining bushland including fauna habitat features such as large sandstone overhangs.

The Shoalhaven River provides a variety of habitats including mud flats, seagrass, mangroves and estuarine, many of which may be used by threatened species. The Shoalhaven River is classified as a Type 1 highly sensitive key fish habitat and Class 1 major fish habitat.

Plant community types

Two native vegetation plant community types (PCTs) are located in the study area (Figure 6-3). They are the Spotted Gum – Blackbutt shrubby open forest on the coastal foothills, southern Sydney Basin Bioregion and northern South East Corner Bioregion (1206) and the Swamp Paperbark – Swamp Oak tall shrubland on estuarine flats, Sydney Basin Bioregion and South East Corner Bioregion (1236).

Threatened ecological communities

One ecological community within the study area is listed as endangered under the TSC Act. This is the Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions which occurs as Swamp Paperbark – Swamp Oak tall shrubland on estuarine flats, Sydney Basin Bioregion and South East Corner Bioregion (1236). The small remnants are in poor condition.

Threatened flora and fauna species and populations

Only one threatened flora species, the Magenta Lilly Pilly (*Syzygium paniculatum*) was found to occur within the study area during field surveys conducted for the project REF. Additionally, five threatened fauna species including one migratory species were recorded in the study area during surveys (Figure 6-4).

Aquatic habitat

The Shoalhaven River is classified as a Type 1 highly sensitive key fish habitat and Class 1 major fish habitat. The aquatic flora recorded in the study area consisted of about 0.3 hectares of seagrass *(Zostera muelleri)* including to the east and west of the southern end of the new and existing bridges, and small stands of the Grey Mangrove (*Avicennia marina*) including to the west of the existing bridges on the southern and northern riverbanks. The Australian Grayling (*Prototroctes maraena*) was recorded within the study area during surveys conducted for the project REF.

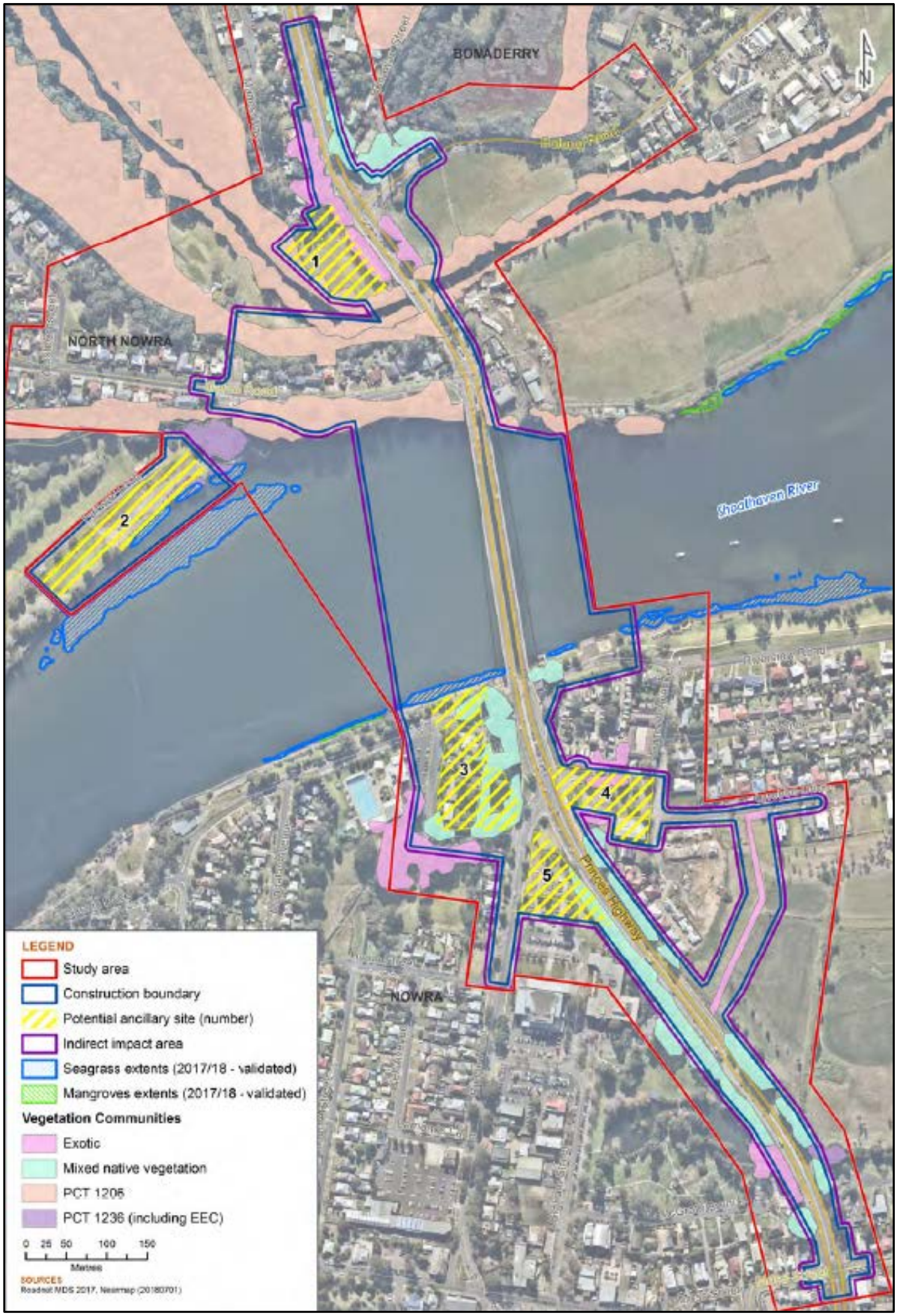

Figure 6-3: Vegetation communities (Source: Roads and Maritime, 2018).

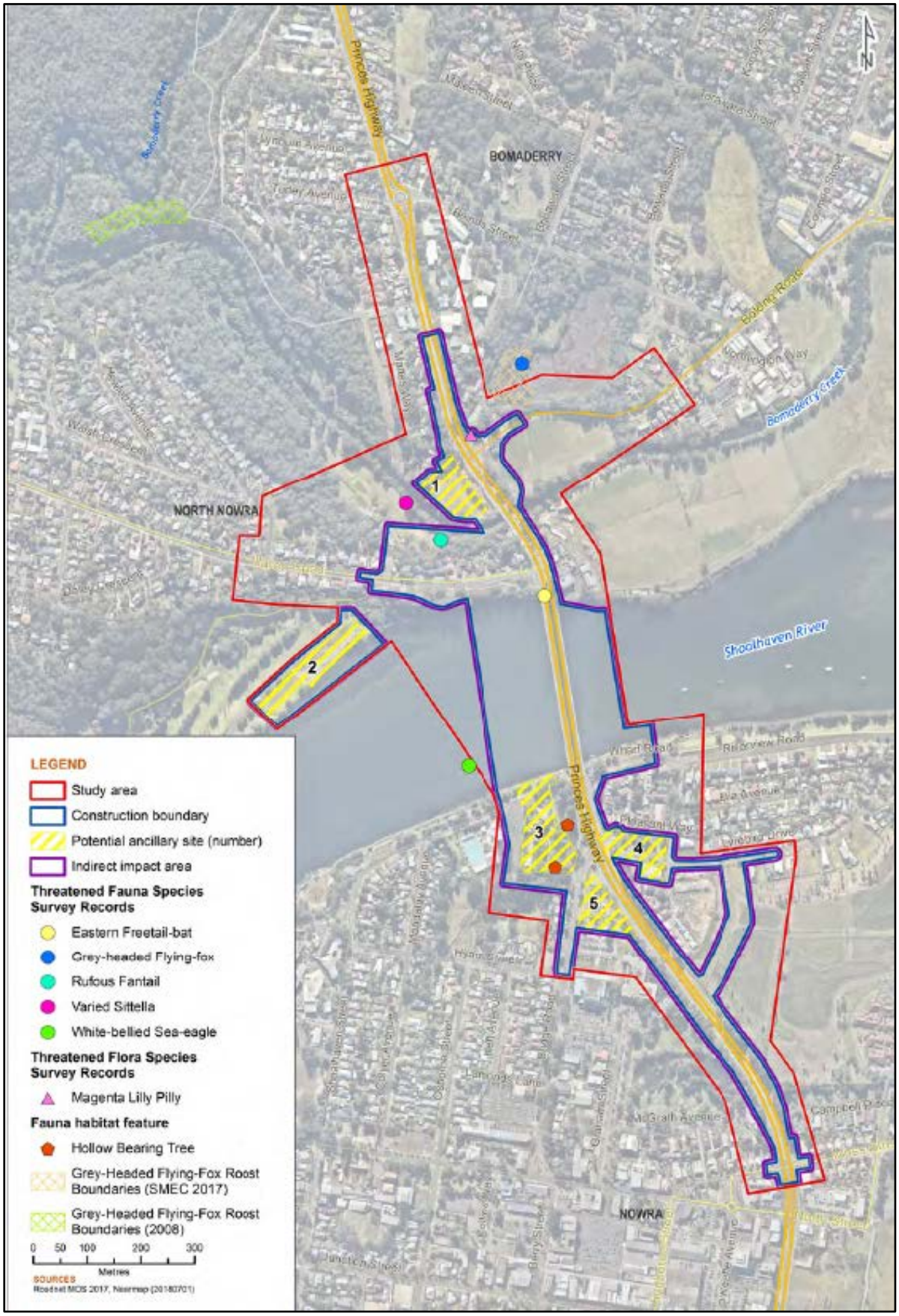

Figure 6-4: Threatened flora and fauna species recorded in the study area (Source: Roads and Maritime, 2018).

6.4.3 Potential impacts

Construction

A summary of potential biodiversity impacts during construction are described in Table 6-11.

Table 6-11: Summary of potential biodiversity impacts during construction.

Main features of the proposed modification	Construction impacts
Fairway Drive roundabout	New pavement and shared path would require the removal of trees on the southern and northern verges of Illaroo Road. Trees on the southern verge bordering North Nowra Rotary Park form PCT1206. The removal of trees is considered to be minor in comparison to the removal area described and assessed in the project REF. The works are unlikely to impact other remaining bushland and habitat features in nearby North Nowra Rotary Park. The PCT has potential groundwater interaction with the subsurface groundwater dependent ecosystem (GDE), Currambene – Batemans Lowlands Forest. As the works would relate to the clearing of vegetation on the surface, it is unlikely that the works would significantly impact the subsurface flows of the GDE.
Construction works in Shoalhaven River and Bomaderry Creek	The project REF identified that the new bridge and temporary barge mooring and loading facilities would impact identified seagrass *(Zostera muelleri)* on the Shoalhaven River southern bank and at Greys Beach. The platform in Shoalhaven River would also impact seagrass beds on the southern bank which constitute a Type 1 key fish habitat under the FM Act. At the time of the Biodiversity Assessment Report undertaken for the project REF, the remainder of the alignment of the new bridge was devoid of benthic habitat. Therefore, there would be no further impact on seagrass beds by the platform as it extends into the river. The construction of the platforms in Bomaderry Creek may require some minor clearing of PCT1206 within the northern and southern banks of the Bomaderry Creek riparian vegetation corridor. Finally, the platform has a potential to obstruct the free passage of fish in Shoalhaven River and Bomaderry Creek for the duration of construction. The potential impact is considered to be greater for the Shoalhaven River as it is a Type 1 highly sensitive key fish habitat and Class 1 major fish habitat. The platforms may also impact fish spawning and recruitment which can result in adverse impacts on fish-stock populations. It is anticipated that the platforms within Shoalhaven River and Bomaderry Creek would only restrict the cross-sectional area of the waterways by approximately less than 24% and 10%, respectively. This would still allow for tidal movements and therefore fish passage, recruitment and spawning would be maintained.

Main features of the proposed modification	Construction impacts
Changes to ancillary sites	The Gateway Park and Paddock south of Bolong Road ancillary sites are located on predominantly cleared land. PCT1206 trees along waterway banks at the Paddock south of Bolong Road and Fish shop east of Nowra Bridge abutment ancillary sites would unlikely be impacted by construction activities. Furthermore, activities at the Fish shop east of Nowra Bridge abutment ancillary site are unlikely to impact the Eastern Freetail-bat *(Mormopterus norfolkensis)* which was recorded at the existing bridge over Shoalhaven River during surveys for the project REF. The Magenta Lilly Pilly *(Syzygium paniculatum)* recorded north of the Paddock south of Bolong Road ancillary site would be removed under the project REF. Finally, there are no PCTs or threatened flora and fauna species at the Gateway Park ancillary site.
Works outside the project study area defined in the project REF	The proposed maritime navigation aids and moorings in Shoalhaven River encompass an area which includes seagrass *(Zostera muelleri)*. Based on this area, the location of proposed maritime navigation aids and moorings would impact on seagrass populations on the southern bank of Shoalhaven River and at Greys Beach.
Works outside the construction boundary defined in the project REF	Minor clearing within the Bomaderry Creek riparian vegetation corridor to facilitate the demolition of the Bomaderry Creek footbridge would have minor impact on PCT1206. The localised nature of demolition would unlikely have a significant impact on aquatic species and their habitat.
Changes to the construction methodology	The potential impact of driven steel tubular piles would generally be consistent with bored piles assessed in the project REF, which includes changes in sedimentation and turbidity levels. Driven piling works would also result in increased underwater noise for aquatic biodiversity. However, the potential impacts would be relatively minor as they would be short-term and occur over a small individual footprint area.

Operation

A summary of potential biodiversity impacts during operation are described in Table 6-12.

Table 6-12: Summary of potential biodiversity impacts during operation.

Other main features of the proposed modification	Operational impacts
Fairway Drive roundabout	Replanting using native vegetation would reinstate terrestrial habitat along Illaroo Road and North Nowra Rotary Park and offset the removal of vegetation during construction.

Other main features of the proposed modification	Operational impacts
Construction works in Shoalhaven River and Bomaderry Creek	The platform would be removed upon completion of construction of the bridge superstructure. As a result, there would be no adverse impact during operation.
Changes to ancillary sites	Ancillary sites would be restored upon completion of construction, including the removal of all construction plant, equipment, buildings and site vehicles. As a result, there would be no adverse impact during operation.
Works outside the construction boundary defined in the project REF	The concrete footings of Bomaderry Creek footbridge would remain in-situ. This would maintain the existing environment for aquatic species.

Conclusion on significance of impacts

The modification 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 and therefore a Species Impact Statement is not required.

The modification is not likely to significantly impact threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act.

6.4.4 Safeguards and management measures

Biodiversity safeguards and management measures for the proposed modification are outlined in Table 6-13. These are in addition to those previously described in the project REF and submissions report.

Table 6-13: Additional biodiversity safeguards and management measures.

Impact	Environmental safeguards	Responsibility	Timing	Reference
Potential roosting habitat	The disused Bomaderry Creek footbridge will be investigated to determine whether there is roosting habitat potential for microchiropteran bat species such as the Little Bentwig-bat *(Miniopterus australis)*, Eastern Bentwing-bat *(Miniopterus schreibersii oceanensis)* and Southern Myotis *(Myotis macropus)*.	Construction Contractor	Pre-construction	Project specific control
Removal of aquatic habitat	Removal of aquatic habitat (seagrass) will be minimised through detailed design. It is recommended that all	Construction Contractor	Pre-construction	Project specific control

Impact	Environmental safeguards	Responsibility	Timing	Reference
	proposed maritime navigation aids and moorings in Shoalhaven River are located in areas absent of seagrass.			
Removal of seagrass	To minimise and monitor impacts to seagrass beds in Shoalhaven River: • Seagrass monitoring must be undertaken prior to construction to confirm the location and extent of the seagrass beds identified in the project REF. • Implement a before-after control-impact (BACI) seagrass monitoring program to detect potential changes in seagrass health and distribution due to construction activities including the construction and use of the temporary rock working platform.	Construction Contractor	Pre-construction and Construction	Project specific control

Other safeguards and management measures that would address biodiversity impacts are identified in Section 7.

6.4.5 Biodiversity offsets

Biodiversity offsets are described in Section 6.9.4 of the project REF.

TfNSW would provide these biodiversity offsets and any other additional offsets required as a result of impacts to seagrass *(Zostera muelleri)* from the temporary rock working platform in Shoalhaven River and maritime navigation aids and moorings.

6.5 Other impacts

6.5.1 Existing environment and potential impacts

Potential impacts of the proposed modification on other environmental factors are described in Table 6-14.

Table 6-14: Potential impacts on other environmental factors.

Environmental factor	Existing environment	Potential impacts
Aboriginal heritage	The existing environment as it relates to Aboriginal heritage is described in Section 6.3.2 of the project REF and is still considered to be relevant to the proposed modification.	Excavation works would generally not involve significant subsurface excavation that may impact Aboriginal sites. The proposed modification would be undertaken in accordance with the Aboriginal Heritage Impact Permit (AHIP) described in the project REF.
Non-Aboriginal heritage	The existing environment as it relates to non-Aboriginal heritage is described in Section 6.4.2 of the project REF and is still considered to be relevant to the proposed modification.	The proposed modification would be located in the vicinity of non-Aboriginal heritage items. There would be no direct impact on the physical fabric of the items nor encroachment of the heritage curtilage. The Fish Shop east of Nowra Bridge abutment ancillary site is located on the historical archaeological item “Wharf for coasting steamers and stores”. The site was assessed in the project REF as being moderately disturbed with low potential for intact, locally significant archaeological deposits associated with the former wharf and stores. Archaeological deposits above the existing sandstone embankment may include pier pilings, post holes, brick or stone footings. The demolition of the Fish Shop including associated structures, and the construction and use of the ancillary site may disturb potential archaeological remains.

Environmental factor	Existing environment	Potential impacts
		Potential impacts would be effectively managed through appropriate safeguards and management measures.
Landscape character and visual amenity	The existing environment as it relates to landscape character and visual amenity is described in Section 6.5.2 of the project REF and is still considered to be relevant to the proposed modification.	The proposed modification would have minor permanent impact on landscape character and significant views including to mature vegetation in North Nowra Rotary Park towards Shoalhaven River. In addition, construction works and ancillary sites would have a short-term impact on the overall character of the place. Potential impacts would be effectively managed through appropriate safeguards and management measures in Section 7.
Flooding and hydrology	The existing environment as it relates to flooding and hydrology is described in Section 6.6.2 of the project REF and is still considered to be relevant to the proposed modification.	The Shoalhaven River and Bomaderry Creek are susceptible to flooding. The temporary rock working platform in Shoalhaven River between Pier 6 and 9 would generally be located in shallower sections of Shoalhaven River. The platform will incorporate scour protection designed for a 5% Annual Exceedance Probability (AEP) event. The platforms have the potential to introduce impediments to flow and change the overland flow paths at specific locations during a flood event for the duration of construction which may result in additional localised flooding. Localised flooding may inundate the platform itself and nearby construction areas resulting in damage or loss of plant and equipment. Local roads, exposed ground areas and surrounding commercial and residential premises, particularly on Scenic Drive may also be impacted. It is considered that the impact of an impending flood event during construction would be effectively managed through additional safeguards and management measures in Section 6.5.2.

Environmental factor	Existing environment	Potential impacts
Coastal processes	The existing environment as it relates to coastal processes is described in Section 6.6.2 of the project REF and is still considered to be relevant to the proposed modification.	The temporary rock working platform in Shoalhaven River would be located about 15 kilometres from the mouth of the Shoalhaven River. In addition, the temporary rock working platforms in Bomaderry Creek would be located on the western side of the existing Bomaderry Creek Bridge. As previously stated, the platforms have the potential to introduce impediments to flow for the duration of construction and result in additional localised flooding. Considering the nature and scale of the platform in Shoalhaven River, it would increase velocity flows and may impact on tides and currents and the natural transportation of sediment down Shoalhaven River to the coast. Furthermore, the sacrificial layer of rock proposed to remain in Shoalhaven River would ultimately be pushed into the riverbed and be covered by sediment under the weight of the platform and plant during construction. Therefore, the sacrificial layer is not considered to create long-term changes to physical estuarine processes. The waterway restriction caused by the extension of the platforms into Bomaderry Creek would increase velocity flows. The platforms would also temporarily impact on the natural transportation of sediment. It is considered that potential impacts would be effectively managed through appropriate safeguards and management measures in Section 7.
Property and land use	The existing environment as it relates to property and land use is described in Section 6.7.1 of the project REF and is still considered to be relevant to the proposed modification.	The proposed modification utilises the existing road corridor to facilitate the proposed modification, where possible. However, additional property acquisition would be required to construct the Fairway Drive roundabout and ancillary sites. The extent of property acquisition by TfNSW to facilitate construction of the proposed modification would be refined and confirmed during

Environmental factor	Existing environment	Potential impacts
		detailed design, and in consultation with the affected property owners (Section 3.6).
Socio-economic	The existing environment as it relates to socio-economics is described in Section 6.8.2 of the project REF and is still considered to be relevant to the proposed modification.	The construction of Fairway Drive roundabout may occasionally restrict access to Fairway Drive which may reduce the amenity of Greys Beach Reserve and the boat ramp for the duration of construction. The installation of maritime navigation aids and moorings may restrict commercial and recreational watercraft movements in Shoalhaven River. Finally, the Perfect Catch Seafoods & Takeaway, 480 Princes Highway, Bomaderry would also be demolished and used as an ancillary site resulting in total loss of the business.
Soils	The existing environment as it relates to soils is described in Section 6.11.2 of the project REF and is still considered to be relevant to the proposed modification.	The platform and ancillary sites are located on land and sediments with a probability of acid sulfate soils (ASS). The treatment and stockpiling of ASS would occur at ancillary sites and would be effectively managed to prevent the mobilisation of ASS and potentially contaminated materials. Potential impacts would be effectively managed through appropriate safeguards and management measures in Section 7.
Waste management	The waste resource management hierarchy principles and waste streams associated with construction are described in Section 6.12 of the project REF and are still considered to be relevant to the proposed modification.	The proposed modification would generally result in greater volumes of green waste, rock material, concrete and asphalt. The project REF identified a Waste Management Plan (WMP) would be prepared and implemented as part of the CEMP.
Air quality	The existing environment as it relates to air quality is described in Section 6.13.2 of the project REF and is still considered to be relevant to the proposed modification.	The proposed modification would have short-term localised impacts on air quality associated with construction including demolition activities, construction vehicle movements, earthworks and vegetation clearing. Potential impacts would be

Environmental factor	Existing environment	Potential impacts
		effectively managed through appropriate safeguards and management measures in Section 7.
Climate change and sustainability	The existing environment as it relates to climate change and sustainability is described in Section 6.14.1 of the project REF and is still considered to be relevant to the proposed modification.	The proposed modification would not generate significant greenhouse gas emissions in addition to those described in the project REF.

6.5.2 Safeguards and management measures

Additional safeguards and management measures to minimise the potential impacts on other environmental factors are described in Table 6-15.

Table 6-15: Safeguards and management measures to minimise potential impacts on other environmental factors.

Impact	Environmental safeguards	Responsibility	Timing	Reference
Construction within the waterway	In addition to the preparation of a Flood Management Plan (FMP), the following management controls will be implemented to minimise potential impact of construction activities in Shoalhaven River and Bomaderry Creek in a flood event. Construction and use of temporary rock working platforms: • Install heavy-duty silt curtains around the platform during construction and removal • Install geotextile wrapped rock filter bund around platform to capture potential concrete or spoil runoff • Rock material selected would not result in fine sediment material entering the waterway, be free of fine particles and not contaminated with foreign materials. • A suitable hard, sound, durable rock material is to be selected to resist weathering and erosion under direct impact from plant and equipment and through exposure to the elements. • Provide marine spill kits on the platform, southern banks of Shoalhaven River and banks of Bomaderry Creek. • Enact site lockdown procedures and move potential floating material to higher ground if a flood event is likely. • During removal of the platforms, the first layer of rock on the bottom of Shoalhaven River and Bomaderry Creek would remain in-situ to avoid damage and/or disturbance of the riverbed leading to increased turbidity levels. • During removal of the platforms, the silt curtains are to remain in-situ to capture any loose debris or accumulated sediment between the rock armour.	Construction Contractor	Construction	Project specific control

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Use of waterway barges: • Ensure hydraulic hoses are sleeved or wrapped in geofabric or plastic or similar to contain hydraulic oil in case of hydraulic hose breakage • In consideration of weather conditions, warnings and tides, rotate barges to have the bow facing upstream and secure with additional anchor lines • Relocate barges to the southern bank of Shoalhaven River in a major flood event and secure with additional anchor lines • Provide marine spill kits on the barges and banks of Shoalhaven River.			
Consultation regarding construction within the waterway	TfNSW would undertake consultation with the local community regarding the flood impact of permanent works if impacts increase from the levels predicated in the project REF. The Construction Contractor would undertake consultation for flooding impacts as a result of temporary works.	TfNSW and Construction Contractor	Pre-construction	Project specific control
Historical archaeology	The existing sandstone embankment to the shoreline associated with the historical archaeological item "Wharf for coasting steamers and stores" is to be fenced-off for the portion of the site adjoining the project boundary to prevent damage during the construction and use of the Fish Shop east of Nowra Bridge abutment ancillary site.	Construction Contractor	Pre-construction	Project specific control

6.6 Cumulative impacts

The proposed modification is considered to be a moderate modification, considering:

- the nature and scale of the proposed works
- the description and assessment of the project in the project REF.

The following factors were considered in terms of cumulative impacts:

- The project REF identified that the new bridge would impact about 0.03 hectares of seagrass *(Zostera muelleri)* on the southern bank of Shoalhaven River. The project REF also identified that 0.06 hectares of seagrass may be impacted by temporary barge mooring and loading facilities on the southern bank and at Greys Beach. The proposed temporary rock working platform in Shoalhaven River would be located on a small area of seagrass on the southern bank. The total area of seagrass that would be impacted is small and therefore it is considered that there would be no further cumulative impacts. In addition, the platform within Shoalhaven River would only restrict the waterway by approximately less than 24%. This would still allow for tidal movements and therefore fish passage would be maintained for the duration of construction.
- The location of maritime navigation aids and moorings in an area extending about 400 metres west and 200 metres east of Nowra Bridge would impact seagrass populations near Greys Beach and the southern bank of Shoalhaven River.
- One (1) local business would be lost as a result of the proposed modification. The demolition of the Perfect Catch Seafoods & Takeaway, 480 Princes Highway, Bomaderry during construction would have full property impact. However, the cumulative impact on the local economy is considered to be relatively minor.
- The removal of some trees and/or vegetation on Illaroo Road and within the Bomaderry Creek riparian vegetation corridor belonging to the plant community type (PCT) Spotted Gum – Blackbutt shrubby open forest on the coastal foothills, southern Sydney Basin Bioregion and northern South East Corner Bioregion (PCT1206) would have relatively minor impact on the local environment considering other construction works assessed in the project REF.

  In consideration of the above, any cumulative impacts are considered to be relatively minor.

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 may potentially arise as a result of the proposed modification. Should the proposed modification proceed, these management measures would be addressed if required during detailed design and incorporated into the Environmental Work Method Statements (EWMS) and Contractors Environmental Management Plan (CEMP) and applied during the construction and operation of the proposed modification.

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures from the submissions report prepared for the Nowra Bridge Project are summarised in Table 7-1. Additional safeguards and management measures identified in this addendum REF are included in bold font and underlined. The safeguards and management measures will be incorporated into the detailed design phase of the proposed modification, EWMSs 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.	Impact	Environmental safeguards	Responsibility	Timing	Reference
GEN1	General – minimise environmental impacts during construction	A CEMP will be prepared and submitted for review and endorsement of the **TfNSW** Environment Manager prior to commencement of the activity. As a minimum, the CEMP will address the following: • Any requirements associated with statutory approvals • Details of how the project will implement the identified safeguards outlined in the REF • Issue-specific environmental management plans • Roles and responsibilities • Communication requirements • Induction and training requirements • Procedures for monitoring and evaluating environmental performance, and for corrective action • Reporting requirements and record-keeping • Procedures for emergency and incident management • Procedures for audit and review. The endorsed CEMP will be implemented during the undertaking of the activity.	**TfNSW**, Construction Contractor	Pre-construction / detailed design	Section 3 of *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
GEN2	General – notification	All businesses, residential properties and other key stakeholders (e.g. schools, local councils) affected by the activity will be notified at least five days prior to commencement of the activity.	**TfNSW**, Construction Contractor	Pre-construction	Project specific control
GEN3	General – environmental awareness	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. Site-specific training will be provided to personnel engaged in activities or areas of higher risk. These include: • Areas of Aboriginal heritage sensitivity • Threatened species habitat • Adjoining residential areas requiring particular noise management measures.	**TfNSW**, Construction Contractor	Detailed design / Pre-construction	Project specific control
GEN4	**General – works outside the project study area defined in the project REF**	**These works will be completed under an Environmental Work Method Statement (EWMS).**	**Contractor**	**Pre-construction**	**Project specific control**
Traffic and transport					
T1	Traffic and transport	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 *Specification G10 Control of Traffic* (Roads and Maritime, 2018). The TMP will include: • Confirmation of haulage routes • Measures to maintain access to local roads and properties • Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access	Construction Contractor	Pre-construction	Section 4.8 of *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Requirements and methods to consult and inform the local community of impacts on the local road network • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads • A response plan for any construction traffic incident • 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 • Monitoring, review and amendment mechanisms.			
T2	Traffic and transport	Undertake consultation with local and regional bus companies prior to and during construction.	Construction contractor	Pre-construction / Construction	Project specific control
T3	Traffic and transport	Undertake consultation with Shoalhaven City Council regarding potential impacts to parking during construction and operation.	**TfNSW**	Pre-construction	Project specific control
T4	Traffic and transport	Undertake consultation with emergency services and Shoalhaven District Memorial Hospital before and during construction to confirm any diversions during construction.	Construction Contractor	Pre-construction / Construction	Project specific control
T5	Traffic and transport	Undertake consultation with property owners regarding changes to access arrangements. Targeted notification to affected residents and businesses will be conducted prior to the completion of altered local road connections, where road closures and detours are proposed.	Construction Contractor	Pre-construction / Construction	Project specific control
T6	Traffic and transport	Notifications will be issued to the local community regarding changes to pedestrian and cycle path access, diversions or alternative routes and any proposed changes to parking.	Construction Contractor	Pre-construction / Construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
T7	Traffic and transport	Schedule partial road closures to avoid peak holiday periods.	Construction Contractor	Construction	Project specific control
T8	Traffic and transport	Provide advance notification to the community where impacts to on-street and off-street parking is unavoidable.	Construction Contractor	Construction	Project specific control
T9	Traffic and transport	Obtain a Road Occupancy Licence where required.	Construction Contractor	Pre-construction / Construction	Project specific control
T10	**Traffic and transport**	**In the event that temporary restrictions on maritime traffic movements are required during construction, the community will be notified in advance and any temporary restrictions will be in accordance with applicable TfNSW requirements.**	**Construction Contractor**	**Construction**	**Project specific control**
Noise and vibration					
NV1	Construction noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will be in accordance with the *Roads and Maritime Construction Noise and Vibration Guideline* (RMS, 2016) and will identify: • All potential significant noise and vibration generating activities associated with the activity • Feasible and reasonable mitigation measures to be implemented, taking into account Beyond the Pavement: urban design policy, process and principles (Roads and Maritime, 2014) • A monitoring program to assess performance against relevant noise and vibration criteria • Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures • Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.	Construction Contractor	Detailed design / pre-construction	Section 4.6 of *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NV2	Construction noise	Where feasible, use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; and consideration of site topography when situating plant.	Construction Contractor	Construction	Project specific control
NV3	Construction noise and vibration	All sensitive receivers likely to be affected will be notified of construction impacts at least seven calendar days prior to the commencement of any works that may generate noise levels above the Noise Management Level or high vibration impacts. The notification will provide details of: • The project • The construction period and construction hours • Contact information for project management staff • Complaint and incident reporting • How to obtain further information.	Construction Contractor	Pre-construction	Project specific control
NV4	Out of hours work	Out of hours works will be carried out in accordance with the *Construction Noise and Vibration Guideline* (Roads and Maritime 2016).	Construction Contractor	Construction	Project specific control
NV5	Works with high noise levels	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise levels should be scheduled during less sensitive time periods, such as after 8.00 am and before 6.00 pm.	Construction Contractor	Construction	Project specific control
NV6	~~Construction respite Periods~~ **High noise generating activities during construction**	~~High noise generating activities near receivers should be carried out in blocks that do not exceed three hours each, with a minimum respite period of one hour between each block. The duration of each block of work and respite should be flexible to accommodate the usage and amenity at nearby receivers.~~ ~~For high noise activities occurring out of hours, unless Duration Respite is negotiated with the community with consultation~~	Construction Contractor	Construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		~~documented and approved by Roads and Maritime project manager or permitted under the licence there should be no more than:~~ ~~• Two consecutive evenings or nights per week~~ ~~• Three evenings or nights per week; and~~ ~~• Six evenings or nights per month.~~ ~~For night work these periods of work should be separated by not less than one week.~~ **As part of the NVMP, works likely to be high noise generating during construction will be managed in accordance with the Construction Noise and Vibration Guideline (RMS, 2016) and should consider:** • **Respite periods** • **Further community consultation** • **Notifications** • **Project specific mitigation measures including the outcomes of community consultation undertaken**			
NV7	Construction noise and vibration	Shield stationary noise sources such as pumps, compressors, fans, etc. Stationary noise sources should be enclosed or shielded where feasible and reasonable while ensuring that the occupational health and safety of workers is maintained. Appendix D of AS 2436:2010 lists materials suitable for shielding.	Construction Contractor	Construction	Project specific control
NV8	Damage to structures	Attended vibration monitoring should be undertaken at sensitive receivers during works with potential for vibration to cause structural damage and human response in order to confirm appropriate site-specific minimum working distances. Site-specific minimum working distances should be determined whenever significant vibration generating plant will be working close	Construction Contractor	Construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		to or within the recommended minimum working distances listed in Appendix D to the REF.			
NV9	Damage to structures	Dilapidation surveys will be conducted at all residential and other vibration sensitive receivers within 50 metres of the construction site.	Construction Contractor	Pre-construction	Project specific control
NV10	Construction vibration	Notification of residences potentially affected by vibration by letterbox drop will be carried out for all occupied buildings within 100 metres of the construction site.	Construction Contractor	Pre-construction / Construction	Project specific control
NV11	Potential damage to heritage listed structures	Attended vibration monitoring will be carried out during periods where construction plant and equipment are operating within the minimum working distance for the heritage listed structures identified in Table 6-24 of the REF.	Construction Contractor	Pre-construction / Construction	Project specific control
NV12	Potential damage to rock shelters	Vibration monitoring will be carried out during periods where high vibration plant and equipment are operating in close proximity to the rock shelters to determine appropriate site-specific vibration levels.	Construction Contractor	Construction	Project specific control
NV13	Operational noise Mitigation	Operational noise mitigation requirements will be reviewed during detailed design. At-property treatments will be agreed upon and implemented in consultation with property owners.	**TfNSW**, Designer	Detailed design	Project specific control
NV14	Operational noise Mitigation	Where practical, operational noise treatments will be implemented at the start of the construction period.	Construction Contractor	Pre-construction	Project specific control
NV15	Operational noise	Post-construction noise monitoring will be undertaken in accordance with *Noise Criteria Guideline* (Roads and Maritime 2016) and *Noise Mitigation Guideline* (Roads and Maritime 2016) within 2-12 months of proposal completion, at selected representative locations along the proposal route.	**TfNSW**	Post-construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
Aboriginal heritage					
AH1	Aboriginal heritage	An Aboriginal Heritage Management Plan (AHMP) will be prepared in accordance with the *Procedure for Aboriginal cultural heritage consultation and investigation* (Roads and Maritime, 2012) and *Standard Management Procedure – Unexpected Heritage Items* (Roads and Maritime, 2015) and implemented as part of the CEMP. It will provide specific guidance on measures and controls to be implemented for managing impacts on Aboriginal heritage. The AHMP will be prepared in consultation with all relevant Aboriginal groups.	Construction Contractor	Pre-construction	Section 4.9 of *G36 Environment Protection*
AH2	Unexpected finds	*The Standard Management Procedure – Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where **TfNSW** 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.	Construction Contractor	Construction	Section 4.9 of *G36 Environment Protection*
AH3	AHIP	An Aboriginal heritage impact permit (AHIP) will be sought for the overall proposal area. Collection of surface artefacts and salvage excavations will be completed in accordance with an AHIP prior to any activities (including pre-construction activities) which may harm Aboriginal objects at these locations.	**TfNSW**, Construction Contractor	Detailed design / Pre-construction	Cultural Heritage Assessment Report (CHAR), Artefact Heritage Services, 2018)
AH4	Aboriginal heritage	Where possible, all subsurface impact to Graham Lodge Aboriginal Artefact Scatter (AHIMS ID 52-5-0879) will be avoided. Where impacts are unavoidable, salvage excavations will be undertaken in accordance with an AHIP and a Section 60 permit.	TfNSW, Construction Contractor	Detailed design / Pre-construction /	Cultural Heritage Assessment Report

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
				Construction	(CHAR), Artefact Heritage Services, 2018)
AH5	Aboriginal heritage	Collection of surface artefacts across Nowra Bridge 1 (AHIMS ID 52-5-0852) and Nowra Bridge 2 (AHIMS ID 52-5-0853) will be conducted prior to construction, in accordance with an AHIP.	TfNSW, Construction Contractor	Detailed design / Pre-construction / Construction	Cultural Heritage Assessment Report (CHAR), Artefact Heritage Services, 2018)
AH6	Aboriginal heritage	Targeted salvage excavation will be conducted within Nowra Bridge 2 (AHIMS ID 52-5-0853), Nowra Bridge 7 (AHIMS ID 52-5-0875), Nowra Bridge 8 (AHIMS ID 52-5-0876), and Nowra Bridge 9 (AHIMS ID 52-5-0874) prior to construction in accordance with an AHIP.	TfNSW, Construction Contractor	Detailed design / Pre-construction / Construction	Cultural Heritage Assessment Report (CHAR), Artefact Heritage Services, 2018)
AH7	Aboriginal heritage	Long term arrangements for the management of excavated artefacts, such as reburial or a keeping place, will be determined in accordance with the recommendations of registered Aboriginal stakeholders and OEH.	TfNSW, Construction Contractor	Pre-construction / Construction / Post construction	Cultural Heritage Assessment Report (CHAR), Artefact Heritage Services, 2018)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
AH8	Aboriginal heritage	Prepare and implement a Heritage Interpretation Strategy that addresses the cultural significance of the proposal location within the Dharawal landscape and archaeological finds from the study area. Develop the strategy in consultation with the Registered Aboriginal Parties.	TfNSW, Construction Contractor	Pre-construction / Construction / Post construction	Cultural Heritage Assessment Report (CHAR), Artefact Heritage Services, 2018)
AH9	Aboriginal heritage	Maintain ongoing consultation with the Registered Aboriginal Parties during detailed design and construction.	TfNSW, Construction Contractor	Pre-construction / Construction	Cultural Heritage Assessment Report (CHAR), Artefact Heritage Services, 2018)
Non-Aboriginal heritage					
NAH1	Non-Aboriginal Heritage	A Non-Aboriginal Heritage Management Plan (NAHMP) will be prepared and implemented as part of the CEMP. It will provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to Non-Aboriginal heritage. The NAHMP will include: • Provisions to appropriately protect and manage significant fabric during the proposed. • Provision of a heritage induction for all workers being carried out prior to commencement of works. • The induction will include values of the sites, avoidance procedure, and contacts (site manager, Road and Maritime environment officer) for reporting unexpected archaeological finds, or inadvertent impact to heritage items.	Construction Contractor	Detailed design / Pre-construction	Section 4.10 of *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NAH2	Non-Aboriginal Heritage	*The Standard Management Procedure – Unexpected Heritage Items* (Roads and Maritime, 2015) 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.	Construction Contractor	Detailed design / Pre-construction	Section 4.10 of *G36 Environment Protection*
NAH3	Non-Aboriginal heritage	Where practicable, impacts to Graham Lodge and curtilage will be avoided. Where subsurface works which may impact significant archaeological remains within Graham Lodge are unavoidable and justifiable, an Archaeological Research Design will be prepared to support a Section 60 application.	**TfNSW**, Construction Contractor	Detailed design / Pre-construction	Statement of Heritage Impact (SoHI), Artefact Heritage Services, 2018
NAH4	Non-Aboriginal Heritage	**TfNSW** will investigate the technical feasibility and suitable location for relocation of the pavilion structure associated with the Captain Cook Bicentennial Memorial, in consultation with Shoalhaven City Council. Subject to the feasibility and suitable location being determined for relocation, **TfNSW** will meet all reasonable costs associated with its relocation.	**TfNSW**, Construction Contractor	Detailed design / Pre-construction	Statement of Heritage Impact (SoHI), Artefact Heritage Services, 2018
NAH5	Non-Aboriginal Heritage	Where practicable, investigate opportunities to minimise impacts to the curtilage of 'Lynburn' (LEP No.130) and 'Illowra' (LEP No. 136). Wherever possible, natural screening adjacent to heritage items along the Princes Highway will be retained. Where impact to vegetation cannot be avoided new plantings will be considered.	**TfNSW**, Construction Contractor	Detailed design / Pre-construction / Post construction	Statement of Heritage Impact (SoHI), Artefact Heritage Services, 2018
NAH6	Non-Aboriginal Heritage	Consideration should be given to the preparation of a heritage interpretation strategy as part of the proposal. An interpretation strategy would consider interpretation opportunities for heritage items located within the study area. A heritage interpretation strategy for	**TfNSW**	Detailed design	Statement of Heritage Impact (SoHI), Artefact

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		the existing southbound bridge will be addressed through the separate adaptive reuse assessment process.			Heritage Services, 2018
NAH7	Non-Aboriginal Heritage	An archival recording will be prepared for the Captain Cook Bicentennial Memorial, the Nowra Bridge over the Shoalhaven River, 'Illowra', 'Lynburn' and the potential unlisted heritage item 'M&M Guesthouse' prior to impacts occurring. The archival recording will be prepared in accordance with *Photographic Recording of Heritage Items Using Film or Digital Capture* (Heritage Council 2006).	**TfNSW**	Detailed design / Pre-construction	Statement of Heritage Impact (SoHI), Artefact Heritage Services, 2018
NAH9	Non-Aboriginal Heritage	Consider options for relocation of the unlisted potential heritage item 'M&M Guesthouse' in consultation with Shoalhaven Council	**TfNSW**	Prior to detailed design	Statement of Heritage Impact (SoHI), Artefact Heritage Services, 2018
NAH10	Non-Aboriginal Heritage	Potential impacts of the proposed noise barrier on State heritage listed Graham Lodge (SHR No. 01699) would be assessed during detailed design	Construction Contractor	Detailed design	Project specific control
NAH11	Maritime archaeology	A remote sensing survey using side-scan sonar of the project impact area will be conducted to confirm the presence or absence of submerged archaeological resources within the impact area. In the event that underwater archaeological resources are identified as a result of underwater surveys a diving inspection will be carried out by qualified commercial divers, supervised by a qualified maritime archaeologist, to confirm the nature and significance of the archaeological resource. If archaeological resources of State significance are identified, the Heritage Division, as Delegate of the NSW Heritage Council will be notified in accordance with Section 144 of the NSW Heritage Act 1977.	**TfNSW**	Pre-construction	Maritime archaeological due diligence assessment, RPS, 2018

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NAH12	Maritime archaeology	If the potential for additional impact of Nowra Wharf is identified, photographic recording will be carried out for the wharf and slip prior to impact in accordance with the *Photographic Recording of Heritage Items using Film or Digital Capture* (Heritage Council, 2006).	**TfNSW**	Pre-construction / Construction	Maritime archaeological due diligence assessment, RPS, 2018
NAH13	**Historical archaeology**	**The existing sandstone embankment to the shoreline associated with the historical archaeological item "Wharf for coasting steamers and stores" is to be fenced-off for the portion of the site adjoining the project boundary to prevent damage during the construction and use of the Fish Shop east of Nowra Bridge abutment ancillary site.**	**Construction Contractor**	**Pre-construction**	**Project specific control**
Landscape character and visual impact					
LV1	Landscape character and visual impact	An Urban Design and Landscape Plan (UDLP) will be prepared to inform detailed design and will form part of the CEMP. Development of the UDLP will draw on the Urban Design Report and Landscape and Visual Assessment prepared for the REF. 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 UDLP will include design treatments for: • Location and identification of existing vegetation and proposed landscaped areas, including species to be used • Built elements including retaining walls, bridges, noise walls, and foreshore structures • Pedestrian and cyclist elements including footpath location, paving types and pedestrian crossings • Fixtures such as seating, lighting, fencing and signs • Details of the staging of landscape works taking account of related environmental controls such as erosion and sedimentation controls and drainage • Procedures for monitoring and maintaining landscaped or rehabilitated areas.	Designer	Detailed design	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		The UDLP will be prepared in accordance with relevant guidelines, including: • Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014) • Landscape Guideline (RTA, 2008) • Environmentally Friendly Seawalls' (OEH, 2009) • Bridge Aesthetics (Roads and Maritime, 2012) • Noise Wall Design Guidelines (RTA, 2006) • Shotcrete Design Guideline (RTA, 2005). Landscape Guideline (RTA, 2008) • Bridge Aesthetics (Roads and Maritime, 2012) • Noise Wall Design Guidelines (RTA, 2006) • Shotcrete Design Guideline (RTA, 2005).			
LV2	Retention of existing vegetation	The proposal will be designed to avoid impact to prominent trees and vegetation communities as far as practicable possible. Water quality structures and drainage lines will be designed to avoid existing vegetation where practicable.	Designer	Detailed design	Project specific control
LV3	Bridge form	The proposed bridge design will aim to achieve a slender and less visually intrusive form and be visually harmonious with the existing bridges.	Designer	Detailed design	Project specific control
LV4	Impacts on existing Vegetation	Investigate introducing retaining walls in the following locations to provide the opportunity to retain existing tree plantings, improve the visual and pedestrian amenity, and reduce the scale of the highway: • Either side of the Princes Highway between Bolong Road and Bomaderry Creek bridge. • The new northbound bridge approach road • Either side of the Princes Highway south of the Bridge Road intersection	Designer	Detailed design	Landscape Character and Visual Impact Assessment
LV5	Impacts on vegetation	Consider the proposed drainage swale design and location to minimise cutting as well as provide additional space for planting near the corner of the Princes Highway and Illaroo Road	Designer	Detailed design	Landscape Character and Visual Impact

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
					Assessment
LV6	Impact on Rotary Park	Consider the proposed footpath alignment and stair design of the path beneath the bridge structures and in Rotary Park to better reflect its parkland setting	Designer	Detailed design	Landscape Character and Visual Impact Assessment
LV7	Impacts on existing vegetation	Consider the alignment of the footpath on the north eastern corner of the existing southbound bridge, in consultation with adjacent land owners, to avoid impact to existing trees.	Designer	Detailed design	Landscape Character and Visual Impact Assessment
LV8	Active transport	Investigate the design of the entrance to properties on the north eastern corner of the existing southbound bridge to prioritise pedestrians and cyclists over vehicles and facilitate ease of travel.	Designer	Detailed design	Landscape Character and Visual Impact Assessment
LV9	Visual impact of piers	Consider the proposed pier designs to strengthen the complementary relationship between the proposed bridge piers and the piers of the existing northbound and southbound bridges. In particular, it will consider tapering the piers at their long elevation	Designer	Detailed design	Landscape Character and Visual Impact Assessment
LV10	Site restoration	Construction work sites and ancillary sites will be returned to at least their pre-construction state, unless otherwise detailed in the project design, once construction activities are complete or will be progressively remediated throughout the construction program where possible	Designer	Detailed design	Landscape Character and Visual Impact Assessment
LV11	Retention of existing vegetation	Existing trees to be retained within construction facilities areas will be identified, protected and maintained for the duration of the construction works	Designer	Detailed design	Landscape Character and Visual Impact Assessment
LV12	Light spill	Temporary lighting will be screened, diverted or minimised to avoid unnecessary light spill	Designer	Detailed design	Landscape Character and Visual Impact

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
					Assessment
LV13	Site restoration	Material used for temporary land reclamation will be removed once construction activities are complete.	Designer	Detailed design	Landscape Character and Visual Impact Assessment
Flooding and hydrology					
HY1	Hydrology	Temporary drainage structures will be designed and constructed in accordance with the *Technical Guideline – Temporary Stormwater Drainage for Road Construction* (Roads and Maritime 2011c).	Construction Contractor	Construction	Project specific control
HY2	Flooding	As part of the CEMP, a flood management plan will be prepared and will include appropriate management measures to manage the risk and impacts of flooding including, but not limited to: • Steps to be taken in the event of a flood warning • Removal or securing of loose material • Storage or removal of plant and equipment • Storage of fuels and chemicals.	Construction Contractor	Pre-construction / construction	Project specific control
HY3	Property impacts	The flooding analysis will be reviewed as part of detailed design, particularly with regard to any changes to the design that could affect flooding behaviour and changes in flood levels from that presently existing. This will consider the incremental impact on residential properties and on other affected development. The review will include consultation with relevant stakeholders including Shoalhaven City Council and OEH.	Designer	Detailed design	Project specific control
HY4	Property impacts	**TfNSW** will carry out a damage assessment during detailed design for affected properties related to the incremental impact of the proposal, and this will be used to inform consultation with affected residents.	Designer	Detailed design	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
HY5	Construction within the waterway	In addition to the preparation of a Flood Management Plan (FMP), the following management controls will be implemented to minimise potential impacts of construction activities in Shoalhaven River and Bomaderry Creek in a flood event. Construction and use of temporary rock working platform: • Install heavy-duty silt curtains around the platform during construction and removal • Install geotextile wrapped rock filter bund around platform to capture potential concrete or spoil runoff • Rock material selected would not result in fine sediment material entering the waterway, be free of fine particles and not contaminated with foreign materials. • A suitable hard, sound, durable rock material is to be selected to resist weathering and erosion under direct impact from plant and equipment and through exposure to the elements. • Provide marine spill kits on the platform, southern banks of Shoalhaven River and banks of Bomaderry Creek. • Enact site lockdown procedures and move potential floating material to higher ground if a flood event is likely. • During removal of the platforms, the first layer of rock on the bottom of Shoalhaven River and Bomaderry Creek would remain in-situ to avoid damage and/or disturbance of the riverbed leading to increased turbidity levels. • During removal of the platform, the silt curtains are to remain in-situ to capture any loose debris or accumulated sediment between the rock armour. Use of waterway barges:	Construction Contractor	Construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• **Ensure hydraulic hoses are sleeved or wrapped in geofabric or plastic or similar to contain hydraulic oil in case of hydraulic hose breakage** • **Consider relocating barges to the southern bank of Shoalhaven River in a major flood event and secure with additional anchor lines** • **Provide marine spill kits on the barges and banks of Shoalhaven River.**			
HY6	**Consultation regarding construction within the waterway**	**TfNSW would undertake consultation with the local community regarding the flood impact of permanent works if impacts increase from the levels predicated in the project REF. The Construction Contractor would undertake consultation for flooding impacts as a result of temporary works.**	**TfNSW and Construction Contractor**	**Pre-construction**	**Project specific control**
Property and land use					
PA1	Property acquisition and relocation issues	**TfNSW** will continue to consult with directly affected property owners throughout the detail design phase.	**TfNSW**	Detailed design	Project specific control
PA2	Property acquisition	All property acquisition will be carried out in accordance with the *Land Acquisition Information Guide* (Roads and Maritime, 2014b), the *Land Acquisition (Just Terms Compensation) Act 1991* and the NSW Government Land Acquisition Reform 2016.	**TfNSW**	Detailed design, Pre-construction	Core standard safeguard PL1
PA3	Property acquisition	Acquisition of Crown land will be carried out in accordance with the *Crown Lands Management Act 2016*.	**TfNSW**	Detailed design, Pre-construction	Project specific control
Socio-economic					

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SE1	Project communications	A Community and Stakeholder Engagement Plan will be prepared and will include: • Procedures and mechanisms that will be implemented in response to the key social impacts identified for the proposal. • Procedures and mechanisms that will be used to engage with affected landowners, business owners, and the wider community to identify potential access, parking, business visibility, and other impacts and develop appropriate management measures. • Procedures to keep the community informed about construction and any associated changes to conditions (e.g. detours or lane closures) such as through advertisements in local media and advisory notices or variable message signs • Procedure for the management of complaints and enquiries, including a contact name and number for complaints. The plan will be prepared in accordance with the *Community Involvement and Communications Resource Manual* (RTA, 2008).	**TfNSW**	Detailed design / pre-construction	Project specific control
SE2	Impacts on council infrastructure	**TfNSW** will continue to consult with Council regarding impacts to council infrastructure.	**TfNSW**	Detailed design	Project specific control
SE3	Impacts on social infrastructure – maritime activities	At least one of the two boat ramps within the proposal area will be available to the public at all times. The public would be notified in advance of any access restrictions during construction.	**TfNSW**, Construction Contractor	Detailed design, Construction	Project specific control
SE4	Impact on Greys Beach Reserve	Use of the Greys Beach Reserve site for temporary construction activities will be planned to consider peak usage periods of the river for recreational users. Access to the boat ramp at Greys Beach will be maintained at all times. Access to parking would be largely maintained between the September/October school holidays to the Monday after Anzac Day. Outside of these times about half of the existing parking area (about 50 spaces) will be available.	**TfNSW**, Construction Contractor	Detailed design, Construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SE5	Impacts on social infrastructure – time capsule	**TfNSW** will endeavour to identify the location of the time capsule in Moorhouse Park and establish an appropriate salvage and/or relocation of this object, in consultation with Council and relevant community members.	**TfNSW**	Detailed design	Project specific control
SE6	Impact on parking	Consultation will be carried out with Council to identify alternative parking arrangements to replace car parking lost during construction.	**TfNSW**	Detailed design, Pre-construction	Project specific control
SE7	Impact on access to Shoalhaven River Foreshore	The CEMP will include measures to ensure public access to the Shoalhaven River foreshore and pathways is maintained during construction, where possible given safety considerations.	**TfNSW**, Construction Contractor	Detailed design, Construction	Project specific control
SE8	Construction staff Parking	The construction contractor will provide suitable off-street parking to accommodate workers during construction. Construction vehicles would not occupy private parking including Nowra Aquatic Centre and Shoalhaven Entertainment Centre and Visitor Centre. The Construction TMP will include appropriate measures to prevent construction staff from utilising these public parking areas.	Construction Contractor	Pre-construction, Construction	Project specific control
SE9	Business and tourism impacts – operation	Existing businesses with authorised Tourist Attraction Signposting Assessment Committee (TASAC) approved signage will be consulted to develop revised signage if impacted by the proposal.	**TfNSW**	Detailed design	Project specific control
SE10	Impact on visual amenity	**TfNSW** will consult with affected residents with regard to the proposed noise barrier on the eastern side of the Princes Highway south of the Shoalhaven River. This will include investigation and consideration of alternative options for noise mitigation.	**TfNSW**	Detailed design	Project specific control
SE11	Parking during construction	Consultation with Council and the other property owners will be carried out to confirm the suitability of the identified areas proposed for temporary car parking and specific matters relating to their use.	Designer	Detailed design	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SE12	Impact on Greys Beach Reserve	Consultation with boat ramp users, Council, and other relevant community groups would be undertaken regarding any changes to the availability of parking at Greys Beach.	Designer, Construction Contractor	Detailed design	Project specific control
Biodiversity					
B1	General biodiversity	A Flora and Fauna Management Plan (FFMP) will be prepared as part of the Construction Environmental Management Plan (CEMP). The FFMP will be prepared in accordance with the *Roads and Maritime Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011) (Biodiversity Guidelines) and Section 4.8 of Roads and Maritime Specification *G36 Environment Protection* and *G40 Clearing and Grubbing*. The FFMP will include, but not be limited to: • Pre-clearing process • Management of unexpected species finds • Delineation of exclusion zones • Process for weed management • Process for pathogen management • Requirements set out in the Landscape Guideline (RTA 2008).	Construction Contractor	Prior to construction	Project specific control
B2	Removal of native vegetation	Native vegetation removal would be minimised through detailed design.	Designer	Detailed design	Project specific control
B3	Impacts on fauna	Pre-clearing surveys will be undertaken in accordance with *Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	Construction Contractor	Pre-construction	Project specific control
B4	Removal of vegetation	Vegetation removal will be undertaken in accordance with *Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	Construction Contractor	Construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
B5	Removal of vegetation	Native vegetation will be re-established in accordance with *Guide 3: Re-establishment of native vegetation of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	Construction Contractor	Construction / Post construction	Project specific control
B6	Threatened flora and fauna	The unexpected species find procedure is to be followed under *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011) if threatened ecological communities, not assessed in the biodiversity assessment, are identified in the proposal site.	Construction Contractor	Construction	Project specific control
B7	Removal of vegetation	A mulch management plan will be prepared in accordance with the mulch order 2016 under the *Protection of the Environment Operations Act 1997* (POEO Act)	Construction Contractor	Pre-construction	Project specific control
B8	Removal of EEC	Exclusion zones will be placed around retained EECs in accordance with *Guide 2: Exclusion Zones*	Construction Contractor	Pre-construction	Project specific control
B9	Removal of aquatic habitat	Removal of aquatic habitat (seagrass) will be minimised through detailed design. **It is recommended that all proposed maritime navigation aids and moorings in Shoalhaven River are located in areas absent of seagrass.**	Construction Contractor	Pre-construction	Project specific control
B10	Removal of threatened species habitat and habitat features	Habitat will be replaced or re-instated in accordance with *Guide 5: Re-use of woody debris and bushrock* and *Guide 8: Nest boxes of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	Construction Contractor	Construction	Project specific control
B11	Aquatic habitat impacts	Aquatic habitat will be protected in accordance with *Guide 10: Aquatic habitats and riparian zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011) and Section 3.3.2 *Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013* (DPI (Fisheries NSW) 2013).	Construction Contractor	Construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
B12	Aquatic habitat impacts	DPI (Fisheries) will be consulted with regard to the need for a permit to harm marine vegetation.	Construction Contractor	Construction	Project specific control
B13	Changes to hydrology	Changes to existing surface water flows will be minimised through detailed design.	Designer	Detailed design	Project specific control
B14	Injury and mortality of fauna	Fauna will be managed in accordance with *Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	Construction Contractor	Construction	Project specific control
B15	Invasion and spread of weeds	Weed species will be managed in accordance with *Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	Construction Contractor	Construction	Project specific control
B16	Invasion and spread of pathogens and disease	Pathogens will be managed in accordance with *Guide 7: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	Construction Contractor	Construction	Project specific control
B17	Noise, light and vibration	Shading and artificial light impacts will be minimised through detailed design.	Designer	Detailed design	Project specific control
B18	Aquatic habitats	**TfNSW** will determine and implement a suitable offset for impacts to affected key fish habitat in accordance with the *Guideline for Biodiversity Offsets* (Roads and Maritime 2016) and the DPI's *Policy and guidelines for fish habitat conservation and management* (DPI 2013), in consultation with DPI (Fisheries).	**TfNSW**	Pre-construction	Project specific control
B19	Aquatic pests and Diseases	All machinery and vessels used within the waterway are to be verified as clean and free of potential weeds, pests and pathogens prior to arrival to site. Procedures to prevent the introduction or spread of aquatic pests, diseases and saltwater weeds will be developed in	Construction Contractor	Pre-construction / Construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		consultation with DPI Aquatic Biosecurity and implemented during construction.			
B20	Fish kills	**TfNSW** will immediately notify DPI Fisheries of any fish kills in the vicinity of the works.	Construction Contractor	Construction	Project specific control
B21	**Potential roosting habitat**	**The disused Bomaderry Creek footbridge will be investigated to determine whether there is roosting habitat potential for microchiropteran bat species such as the Little Bentwig-bat (Miniopterus australis), Eastern Bentwing-bat (Miniopterus schreibersii oceanensis) and Southern Myotis (Myotis macropus).**	**Construction Contractor**	**Pre-construction**	**Project specific control**
B22	**Removal of seagrass**	**To minimise and monitor impacts to seagrass beds in Shoalhaven River:** • **Seagrass monitoring must be undertaken prior to construction to confirm the location and extent of the seagrass beds identified in the project REF.** • **Implement a before-after control-impact (BACI) seagrass monitoring program to detect potential changes in seagrass health and distribution due to construction activities including the construction and use of the temporary rock working platform.**	**Construction Contractor**	**Pre-construction and Construction**	**Project specific control**
Water quality					
WQ1	Water quality	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. The SWMP will contain as a minimum the following elements:	Construction Contractor	Pre-construction	Section 2.1 of *G38 Soil and Water Management*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Site specific Erosion and Sedimentation Control Plans (ESCPs), including detailed consideration of staging and management at ancillary sites, in accordance with the Blue Book • Identification of site conditions or construction activities that could potentially result in erosion and associated sediment runoff • Methods to minimise potential adverse impacts of construction activities on the water quality within surrounding waterways • Details of measures to minimise any adverse impacts of sedimentation on the surrounding environment • Details of measures to minimise soil erosion caused by all construction works including clearing, grubbing and earthworks • Details of measures to make site personnel aware of the requirements of the SWMP by providing information within induction, toolbox and training sessions • Details of the roles and responsibilities of personnel responsible for implementing the SWMP • Details of measures for the inspection and maintenance of construction phase water treatment devices and structures • Details of water quality monitoring • Detailed construction methodology and environmental work method statement for the proposed bridge works and creek realignment within Shoalhaven River and Bomaderry Creek to minimise the potential for bank instability, scour, flooding, working over water and other adverse impacts of construction activities on the water quality. The SWMP will be reviewed by a soil conservationist on the **TfNSW** list of Registered Contractors for Erosion, Sedimentation and Soil Conservation Consultancy Services. The SWMP will be revised as required to address the outcomes of the review.			
WQ2	Water quality	A site ESCP will be prepared and implemented as part of the SWMP. The ESCP will include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in	Construction Contractor	Pre-construction	Section 2.2 of *G38 Soil and Water Management*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		the event of wet weather. Development of the ESCP will take into consideration: • Provision of sediment basins • Temporary surface drainage line controls • Bridge deck and bridge piles working with over water and alkaline waste water management • Over water sediment controls including: o Silt fences along areas of the foreshore that have been cleared o Silt curtains encompassing construction areas disturbing or releasing river bottom sediments (e.g. piling) o Silt booms surrounding barges to ensure leaks /spills are contained.			
WQ3	Water quality	The SWMP will identify the position of an on-site environmental representative to complete self-audits and monitor implementation of the SWMP.	Construction Contractor	Pre-construction / Construction	Project specific control
WQ4	Water quality	In the event of significant groundwater inflows, undertake further assessment and consultation with DPI (Water) in relation to any licencing requirements.	Construction Contractor	Construction	Project specific control
WQ5	Water quality	During detailed design implement best practice water sensitive urban design (WSUD) measures to provide dissipation of flows and prevent gross pollutants and contaminants entering the study area's waterways. WSUD measures are designed to provide treatment of nutrients and suspended solids prior to discharge to the existing receiving environment.	Designer	Detailed design	Project specific control
WQ6	Water quality	During detailed design, review the drainage design to identify and evaluate opportunities to meet the WSUD water quality objectives, including consideration of: • Improvements to the design of the southern basin to achieve better performance	Designer	Detailed design	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Inclusion of grass swales on both sides of the highway in the vicinity of Bolong Road (subject to the acquisition area) • Provision of a grassed swale as part of rehabilitation of the ancillary site adjacent to Bridge Road / Scenic Drive.			
WQ7	Water quality	Surface water quality monitoring will be undertaken prior to construction to establish baseline water quality and regularly during construction so that any impacts from the proposal construction phase can be identified and addressed. Sampling locations and monitoring methodology will be determined as part of the CEMP, but as a minimum will be undertaken upstream and downstream of creek crossings and in accordance with the *Guideline for Construction Water Quality Monitoring* (Roads and Maritime, 2003).	**TfNSW**, Construction Contractor	Pre-construction / Construction	Project specific control
WQ8	Water quality	Bulk storage of fuels or chemicals should be located greater than 100 metres from any watercourse or mapped EEC. In constrained areas where criteria cannot be achieved, additional risk assessment and additional mitigation measures may need to be considered and implemented to manage risk to sensitive receivers to an acceptable level.	Construction Contractor	Construction	Project specific control
WQ9	Water quality	Vehicles and machinery will be properly maintained to minimise the risk of fuel/oil leaks.	Construction Contractor	Construction	Project specific control
WQ10	Water quality	An Emergency Spill Plan will be developed and incorporated in the CEMP. This will include measures to avoid spillages of fuels, chemicals, and concrete wash or fluids into any waterways.	Construction Contractor	Construction	Project specific control
WQ11	Water quality	The storage, handling and use of fuels or chemicals will be undertaken in accordance with the *Occupational Health and Safety Act 2000* and WorkCover's *Storage and Handling of Dangerous Goods Code of Practice* (WorkCover, 2005).	Construction Contractor	Construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
WQ12	Water quality	If any dewatering or other activities which will impact the local groundwater system are proposed, consultation with the DPI (Water) will be undertaken to determine the requirements for water extraction licenses and approvals.	Construction Contractor	Construction	Project specific control
WQ12	Water quality	Minimise direct and indirect impact to riparian vegetation	Designer, Construction Contractor	Detailed design / Construction	Project specific control
WQ13	Water quality	Split rock used in reclamation works in or adjacent to the waterway**s** must be clean and free of fines. **The Contractor must source, thoroughly inspect and then authorise the use of split rock material in or adjacent to the waterways.**	Construction Contractor	Construction	Project specific control
WQ14	Water quality	The final detailed design plans for the new bridges at Shoalhaven River and Bomaderry Creek, and for water quality treatment devices will be provided to DPI Fisheries for review and comment. **TfNSW** will consider all comments provided with regard to any further revisions to the final design.	**TfNSW**, Construction Contractor	Detailed design	Project specific control
WQ15	Water quality	Operational spill containment of a minimum of 20,000 litres will be provided to ensure that spills on the new bridge and approaches can be captured before reaching sensitive environments.	**TfNSW**, Designer	Detailed design	Project specific control
WQ16	Water quality	Management of water quality during construction will incorporate the following measures: • Where practicable, water from construction sediment basins will be reused in preference to discharge • Construction sediment basin outlets will be rock armoured to meet *Blue Book* design requirements. • Basin dewatering activities will be carried out in accordance with Roads and Maritime's *Environmental Management of Construction Site Dewatering*.	Construction Contractor	Construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Floating siphon devices will be used where practicable to minimise resuspension of sediment during dewatering operations.			
WQ17	Water quality	DPI Fisheries will be consulted with regard to the design and construction of any instream temporary working structures.	Construction Contractor	Construction	Project specific control
Soils					
SO1	Contaminated land	A Contaminated Land Management Plan will be prepared in accordance with the *Guideline for the Management of Contamination* (Roads and Maritime, 2013) and implemented as part of the CEMP. The plan will include, but not be limited to: • Capture and management of any surface runoff contaminated by exposure to the contaminated land • Further investigations required to determine the extent, concentration and type of contamination, as identified in the detailed site investigation (Phase 2) • Management of the remediation and subsequent validation of the contaminated land, including any certification required • Measures to ensure the safety of site personnel and local communities during construction.	Construction Contractor	Pre-construction	Section 4.2 of *G36 Environment Protection*
SO2	Contaminated land	If contaminated areas were encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the **TfNSW** Environment Manager and/or EPA.	Construction Contractor	Construction	Section 4.2 of *G36 Environment Protection*
SO3	Accidental spills	A site-specific emergency spill plan will be developed and will 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	Construction Contractor	Detailed design / Pre-construction	Section 4.3 of *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		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).			
SO4	Acid sulfate soils	During geotechnical investigations, soil sampling and testing for ASS parameters will be carried out in areas of proposed ground disturbance where there is a low to high probability of encountering PASS/ASS. Assessment of the presence/absence of ASS will be made with reference to NSW *Acid Sulfate Soils Assessment Guidelines* (ASSMAC,1998).	Designer	Detailed design	Project specific control
SO5	Acid sulfate soils	During detailed design, the preferred management strategy for PASS/ASS is to avoid its disturbance wherever possible. Where disturbance of PASS/ASS is unavoidable, preferred design strategies are: • Minimisation of disturbance which may include avoiding/ minimising impact on areas with high levels of sulphides, limiting disturbances so that only shallow disturbances occur and minimising groundwater fluctuations. • Neutralisation with lime • Hydraulic separation of sulphides from the sediment either on its own or in conjunction with dredging • Strategic reburial (re-interment) where material can be permanently placed in anaerobic conditions, for example covered by water and compacted soil to keep it wet and free of oxygen. Other management measures may be considered during construction stage but must not pose unacceptably high risks.	Designer	Detailed design	Project specific control
SO6	Acid sulfate soils	An ASS Management Plan (ASSMP) will be prepared to identify procedures for mitigation and management of known PASS/ASS areas during construction stage. The ASSMP will include details on: • Identification of specific areas where PASS/ASS are required to be managed • Determine liming rates for neutralisation of PASS/ASS within each area	Construction Contractor	Pre-construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Details on appropriate construction staging and methods used in relation to PASS/ASS on site • Specific mitigation measures to prevent disturbance of and/or acid generation from PASS/ASS to manage and control environmental issues • Procedures for handling, treatment (including acid neutralisation), containment and disposal of PASS/ASS associated with proposed excavation activities at the site. Additional testing will be required during construction to determine liming rates relevant to each area of ASS that will be disturbed. The plan will be prepared in general accordance with NSW *Acid Sulfate Soils Assessment Guidelines* (ASSMAC,1998).			
SO8	Hazardous materials	A Hazardous Materials (HAZMAT) survey will be carried out to assess the potential for lead-based paints and/or asbestos containing materials including: • Structures identified for demolition • Known buried utilities and service pits A Hazmat Register will identify the location of all known or suspected hazardous materials. Risk assessments will be carried out to quantify and control potential exposure to human and ecological receptors during construction.	Designer	Detailed design	Project specific control
SO10	Hazardous materials	Any works requiring asbestos removal should be carried out in accordance with an Asbestos Removal Control Plan prepared in accordance with the relevant published guidelines and codes of practice: • Code of Practice. How to safely remove asbestos in the workplace (SafeWork NSW, 2016a) • Code of Practice. How to manage and control asbestos in the workplace (SafeWork NSW, 2016b) • Roads and Maritime Procedure Asbestos Related Work No. 066P25 (Roads and Maritime, 2013).	Construction Contractor	Construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		Prior to works, notifications to SafeWork NSW will be carried out by the appropriate licensed asbestos removal contractor. At the completion of the asbestos removal, clearance certificates will be issued to the contractor confirming the effectiveness of asbestos removal.			
SO11	Hazardous materials	An unexpected finds protocol will be employed if previously unidentified asbestos contamination is discovered during construction. Work in the affected area will cease immediately, and an investigation must be undertaken, and a report prepared to determine the nature, extent and degree of the asbestos contamination. The level of reporting must be appropriate for the identified contamination in accordance with *Guidelines for Consultants Reporting on Contaminated Sites* (OEH, 2011), any relevant SafeWork NSW codes of practice and include the proposed methodology for the remediation of the asbestos contamination. Works may only recommence upon receipt of a validation report from a suitably qualified contamination specialist that the remediation activities have been undertaken in accordance with the investigation report and remediation methodology.	Construction Contractor	Construction	Project specific control
SO12	Sedimentation and erosion	During detailed design, the potential impacts associated with bridge construction and operation will be further considered to minimise the likelihood of bank instability and scouring, flow alteration and potential increased risk of flooding. The design and construction methodologies should, wherever possible, minimise direct and indirect impacts to riparian vegetation, and implement best practice water sensitive urban design (WSUD) measures to provide dissipation of flows and prevent gross pollutants and contaminants entering the study area's waterways. WSUD measures are designed to provide treatment of nutrients and suspended solids prior to discharge to the existing receiving environment.	Designer	Detailed design	Project specific control
Waste management					

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
WA1	Waste management – general	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: • Measures to avoid and minimise waste associated with the project • Classification of wastes and management options (re-use, recycle, stockpile, disposal) • Statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions • Procedures for storage, transport and disposal • Monitoring, record keeping and reporting. The WMP will be prepared taking into account the *Environmental Procedure – Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime, 2014) and relevant Roads and Maritime Waste Fact Sheets.	Construction Contractor	Pre-construction	Project specific control
WA2	Waste management – general	All wastes will be managed and disposed of in accordance with the POEO Act. All liquid and/or non-liquid waste generated on the site will be assessed and classified in accordance with *Waste Classification Guidelines* (Environment Protection Authority 2014), or any superseding document.	Construction Contractor	Construction	Project specific control
WA3	Waste management – general	Noxious weeds removed during construction will be managed in accordance with Department of Primary Industries requirements and relevant legislation.	Construction Contractor	Construction	Project specific control
WA4	Waste management – general	Site inductions will include waste management and disposal requirements and facilities.	Construction Contractor	Construction	Project specific control
WA5	Waste management – general	Appropriate portable toilets with either pump out facilities or sewer connections will be provided for site personnel and sewage will disposed of appropriately and in accordance with relevant legislation.	Construction Contractor	Construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
WA6	Fill material	Excavated material will be reused on site where feasible and suitable for the intended reuse to reduce demand on resources. Where excavated material cannot be used on site, opportunities for reuse on nearby projects will be investigated.	Construction Contractor	Construction	Project specific control
WA7	Fill material	Any required additional fill material will be sourced from appropriately licensed facilities and/or other construction projects wherever possible. Additional fill material will be sourced and verified as suitable for use in accordance with relevant EPA and **TfNSW** guidelines.	Construction Contractor	Construction	Project specific control
WA8	Green waste	Where practicable and suitable for use, cleared vegetation will be mulched for use on site.	Construction Contractor	Construction	Project specific control
WA9	Disposal of waste	Excavated material will be reused on-site where feasible and suitable for the intended reuse to reduce demand on resources. Where excavated material cannot be used on site, opportunities for reuse on nearby projects will be investigated.	Construction Contractor	Construction	Project specific control
WA10	Disposal of waste	All waste will be disposed of to an appropriate licensed facility. All waste materials removed from the site will only be directed to a waste management facility or premises lawfully permitted to accept the materials.	Construction Contractor	Construction	Project specific control
WA11	Management of tannins	A tannin leachate management protocol will be developed in accordance with Roads and Maritime' *Environmental Direction – Management of Tannins from Vegetation Mulch* (Roads and Maritime, 2012) to manage the stockpiling of mulch and use of cleared vegetation and mulch filters for erosion and sediment control	Construction Contractor	Construction	Project specific control
WA12	Waste generation	Waste generated outside the site will not be received at the site for storage, treatment, processing, reprocessing, or disposal on the site, except as expressly permitted by a licence under the *Protection of the Environment Operations Act 1997*, if such a licence is required in relation to that waste.	Construction Contractor	Construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
Air quality					
AQ1	Air quality	An Air Quality Management Plan (AQMP) will be prepared by a suitably qualified and experienced person(s) in consultation with the EPA and implemented as part of the CEMP. The AQMP will include, but not be limited to: • Potential sources of air pollution • Air quality management objectives consistent with any relevant published EPA and/or OEH guidelines • Mitigation and suppression measures to be implemented • Methods to manage work during strong winds or other adverse weather conditions • A progressive rehabilitation strategy for exposed surfaces.	Construction Contractor	Detailed design / pre-construction	Section 4.4 of G36 *Environment Protection*
AQ2	Dust emissions	Work will cease when levels of visible airborne dust become excessive.	Construction Contractor	Construction	Project specific control
AQ3	Dust emissions	Works that disturb vegetation, soil or stockpiles will not be carried out during winds over 40 km/h when this may affect receivers.	Construction Contractor	Construction	Project specific control
AQ4	Dust emissions	Stockpiled materials will be covered, stabilised or stored in areas not exposed to high winds.	Construction Contractor	Construction	Project specific control
AQ5	Dust emissions	All trucks will be covered when transporting materials to and from the site.	Construction Contractor	Construction	Project specific control
Climate change and greenhouse gas emissions					
CC1	Greenhouse gas emissions	The use of alternative fuels and power sources for construction plant equipment will be investigated and implemented, where appropriate	Construction Contractor	Pre-construction	Project specific control

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
CC2	Greenhouse gas emissions	The energy efficiency and related carbon emissions will be considered in the selection of vehicle and plant equipment	Construction Contractor	Pre-construction	Project specific control
CC3	Greenhouse gas emissions	Construction equipment, plant, and vehicles will be appropriately sized for the task	Construction Contractor	Construction	Project specific control
CC4	Greenhouse gas emissions	Equipment will be serviced frequently to ensure they are operating efficiently	Construction Contractor	Construction	Project specific control
CC5	Greenhouse gas emissions	Where possible, materials will be delivered as full loads and local suppliers would be used	Construction Contractor	Construction	Project specific control
Cumulative impacts					
CU1	Cumulative construction impacts	Ongoing coordination and consultation will be undertaken between the project teams on Albion Park Rail Bypass, Berry to Bomaderry upgrade, and The Consultation Plan will include consultation with Project Managers of the Batemans Bay Bridge replacement, Berry to Bomaderry upgrade and the Far North Collector Road projects to ensure cumulative traffic impacts are appropriately assessed and managed, particularly during peak holiday periods	Roads and Maritime, Construction Contractor	Pre-construction	Project specific control
CU2	Cumulative construction impacts	Consultation with Shoalhaven City Council will be undertaken regarding the Far North Collector Road to ensure cumulative traffic impacts are appropriately assessed and managed, particularly during peak holiday periods	TfNSW, Construction Contractor	Pre-construction / Construction	Project specific control
CU3	Cumulative impacts	The CEMP will be reviewed regularly and revised as required to reflect surrounding development works as it becomes known.	Construction Contractor	Construction	Project specific control

7.3 Licensing and approvals

All relevant licenses, permits, notifications and approvals needed for the Nowra Bridge Project and when they need to be obtained are listed in Table 7-2. Additional or changed licenses and approval requirements identified in this addendum REF are indicated by underlined and/or struck out font.

Table 7-2: Summary of licensing and approvals required.

Instrument	Requirement	Timing
Protection of the Environment Operations Act 1997 (s120)	Environment protection licence (EPL) for scheduled activities – extractive activity.	Prior to start of Construction
Fisheries Management Act 1994 (s199)	Notification to the Minister for Primary Industries prior to any dredging or reclamation works.	Minimum of 28 days prior to the start of any dredging or reclamation works.
Fisheries Management Act 1994 (s205)	Permit to harm marine vegetation from the Minister for Primary Industries.	Prior to any works that could harm marine vegetation
Heritage Act 1977 (s60)	Should subsurface works which may impact significant archaeological remains with Graham Lodge are unavoidable and justifiable, an Archaeological Research Design will be prepared to support a Section 60 application.	Prior to start of any construction activities affecting Graham Lodge
National Parks and Wildlife Act 1974 (s90)	Aboriginal heritage impact permit from the Chief Executive of OEH.	Prior to start of Construction
Crown Land Management Act 2016 (s1.15)	Authorisation to occupy areas of Crown land.	Prior to start of Construction

8. Conclusion

8.1 Justification

The proposed modification would facilitate the objectives stated in Section 2.3 of the project REF and Section 2.2 of this addendum REF.

As stated in Section 2.1, the proposed modification would:

- Provide a new roundabout at the existing intersection of Fairway Drive / Illaroo Road to allow site vehicles and trucks to perform a U-turn during construction of the project and improve traffic flow on Fairway Drive
- Provide temporary rock working platforms in Shoalhaven River and Bomaderry Creek to improve construction access for water-based bridge and pier construction activities. It would also support the installation of driven steel tubular piles for bridge piers in Shoalhaven River
- Establish out of hours construction works to reduce the project completion time and provide further opportunities to set up more established worksites with more effective temporary noise mitigation
- Involve pre-construction activities completed under an Environmental Work Method Statement (EWMS) prior to approval of the Construction Environmental Management Plan (CEMP) for the project
- Provide additional ancillary sites for potential uses including offices and amenities, parking and storage / laydown of plant and materials
- Involve construction works outside the construction boundary defined in the project REF, including the demolition of existing structures at ancillary sites. Property works would also involve demolition of the Bomaderry Creek footbridge to facilitate construction of the project.
- Involve construction works outside the project study area defined in the project REF, including utility works, and temporary and permanent signage and line-marking. Maritime navigation aids and moorings in Shoalhaven River would also be required to support construction barges in the delivery of the project. These works would be completed under an EWMS.

It is considered that the impacts of the proposed modification are relatively minor.

The safeguards and management measures described in Section 7 would avoid, minimise or mitigate potential impacts to the extent that the proposed modification would outweigh potential impacts. Therefore, the proposed modification is considered to be justified.

8.2 Objects of the EP&A Act

Table 8-1 has been adapted from Section 8.2 of the project REF. It has been reviewed and updated where required to reflect changes in impacts due to the proposed modification.

Table 8-1: 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 proposed modification would facilitate the delivery of the project through additional construction activities and ancillary sites. The project would improve the efficiency of traffic movements along a key section of the Princes Highway, promoting the social and economic welfare of the NSW South Coast community.

Object	Comment
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development is considered in Sections 8.2.1 to 8.2.4. 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.	Additional ancillary sites would be effectively used to facilitate delivery of the project.
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 native animals and plants, ecological communities and their habitats.	Potential impacts on biodiversity are discussed in Section 6.4. Potential impacts would be minimised through safeguards and management measures in Section 7.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposed modification would not impact any listed heritage items nor likely impact Aboriginal sites. The proposed modification would be undertaken in accordance with the AHIP. The proposed modification may disturb any archaeological remains of the “Wharf for coasting steamers and stores”.
1.3(g) To promote good design and amenity of the built environment.	Potential landscape character and visual amenity impacts are described in Section 6.5.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Offices and amenities on ancillary sites would be erected in accordance with construction industry guidelines and best practice.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the project.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	The proposed modification has involved consultation with the local community, Shoalhaven City Council and government agencies.

8.2.1 The precautionary principle

A summary of the assessment based on the precautionary principle is provided in Section 8.2.1 of the project REF. The proposed modification is consistent with this principle.

The detailed assessment of the proposed modification is provided in Section 6 of this addendum REF. The updated safeguards and management measures for the project and proposed modification are provided in Section 7.

8.2.2 Intergenerational equity

A summary of the assessment based on intergenerational equity is included in Section 8.2.2 of the project REF. The proposed modification is consistent with this principle.

8.2.3 Conservation of biological diversity and ecological integrity

A summary of the assessment based on conservation of biological diversity and ecological integrity is provided in Section 8.2.3 of the project REF. The proposed modification is consistent with this assessment. The proposed modification would not have a significant impact on biological diversity and ecological integrity.

8.2.4 Improved valuation, pricing and incentive mechanisms

A summary of the assessment based on improved valuation, pricing and incentive mechanisms is provided in Section 8.2.4 of the project REF. The proposed modification is consistent with this assessment.

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, but would still result in some impacts on biodiversity, traffic and transport, noise and vibration, water quality and flooding. Safeguards and management measures as detailed in this addendum REF would ameliorate or minimise these expected impacts. The proposed modification would involve construction activities to facilitate the delivery of the project and ultimately improve the efficiency of traffic movements along a key section of the Princes Highway. 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 significant 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 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 REF 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.

Alex Pappas

Consultant

Advisian

Date: 16/04/2020

I have examined this addendum review of environmental factors and accept it on behalf of TfNSW.

Craig Bear

Project Manager/Engineer

Southern and Western Project Office, Transport for NSW

Date: 17/04/2020

10. References

Department of Environment and Climate Change (2009) Interim Construction Noise Guideline.

Department of Urban Affairs and Planning (1996) Roads and Related Facilities EIS Guideline.

Department of Urban Affairs and Planning (1999) Is an EIS Required?

Department of Environment & Climate Change (2009) Interim Construction Noise Guideline.

SMEC Australia Pty Ltd and Roads and Maritime Services (2018) Nowra Bridge Project Review of Environmental Factors.

Renzo Tonin & Associates (2018) Nowra Bridge Project – Princes Highway Upgrade Noise and Vibration Assessment.

Roads and Maritime Services (2019) Nowra Bridge Project Submissions Report.

Roads and Maritime Services (2016) Construction Noise and Vibration Guideline.

Roads and Maritime Services (2018) Batemans Bay Bridge Replacement Review of Environmental Factors Submissions Report.

Terms and acronyms used in this addendum REF

Term / Acronym	Description
AHIP	Aboriginal Heritage Impact Permit
ASS	Acid Sulfate Soils
AusLink	Mechanism to facilitate cooperative transport planning and funding by Commonwealth and state and territory jurisdictions
BC Act	*Biodiversity Conservation Act 2016* (NSW).
CEMP	Construction / Contractor's environmental management plan
CM Act	*Coastal Management Act 2016*
DPI&E	NSW Department of Planning, Industry & Environment
DPI	NSW Department of Primary Industries
EEC	Endangered Ecological Community
EIA	Environmental impact assessment
EWMS	Environmental Work Method Statement
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
EPL	*Environment Protection Licence*
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
FM Act	*Fisheries Management Act 1994* (NSW)
Heritage Act	*Heritage Act 1977* (NSW)
ICNG	Interim Construction Noise Guideline
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LALC	Local Aboriginal Land Council
LGA	Local Government Area
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.

Term / Acronym	Description
AHIP	Aboriginal Heritage Impact Permit
ASS	Acid Sulfate Soils
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.
NES	Matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
Roads and Maritime	NSW Roads and Maritime Services
PASS	Potential Acid Sulfate Soils
PCT	Plant Community Type
POEO Act	*Protection of the Environment Operations Act 1997*
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
SEPP 2 6	State Environmental Planning Policy No.26 – Littoral Rainforests
SEPP 71	State Environmental Planning Policy No. 71 – Coastal Protection
TfNSW	Transport for NSW
TSC Act	*Threatened Species Conservation Act 1995* (NSW)
QA Specifications	Specifications developed by Roads and Maritime Services for use with road work and bridge work contracts let by Roads and Maritime Services.

Appendix A

Consideration of clause 228(2) factors and matters of National Environmental Significance and Commonwealth land

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
a. Any environmental impact on a community? Construction activities would have potential environmental impacts on the local community in terms of biodiversity, traffic and transport noise and vibration, water quality and flooding. Potential impacts would be managed through the implementation of safeguards and management measures in Section 7.	Short-term negative
b. Any transformation of a locality? Construction works would introduce short-term changes to the locality for the duration of construction. Potential impacts would be managed through the implementation of safeguards and management measures in Section 7. Finally, it is noted that one (1) local business would be lost as a result of the proposed modification.	Short-term negative
c. Any environmental impact on the ecosystems of the locality? The temporary rock working platform in Shoalhaven River and maritime navigation aids and moorings would impact seagrass *(Zostera muelleri)* which constitute a Type 1 key fish habitat under the FM Act. In addition, the platforms within the Shoalhaven River and Bomaderry Creek would only restrict the cross-sectional area of the waterways by approximately less than 24% and 10%, respectively. This would still allow for tidal movements and therefore fish passage would be maintained for the duration of construction. The removal of some trees and/or vegetation would be required on Illaroo Road and within the Bomaderry Creek riparian vegetation corridor belonging to the plant community type (PCT) Spotted Gum – Blackbutt shrubby open forest on the coastal foothills, southern Sydney Basin Bioregion and northern South East Corner Bioregion (PCT1206). Potential impacts would be managed through the implementation of safeguards and management measures in Section 7.	Short-term negative
d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? The removal of trees in the road verge on Illaroo Road / North Nowra Rotary Park would impact on views of mature vegetation. This would be mitigated through landscape replanting. Construction works in Shoalhaven River may restrict commercial and recreational watercraft movements for the duration of construction. Potential impacts would be managed through the implementation of safeguards and management measures in Section 7.	Medium-term negative Short-term negative

Factor	Impact
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? The proposed modification would not impact listed heritage items. However, it may disturb potential archaeological remains of the historical archaeological item "Wharf for coasting steamers and stores".	Minor
f. Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974)? Refer to the response in c). Potential impacts would be managed through the implementation of safeguards and management measures in Section 7.	Short-term negative
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 would impact seagrass beds and require the removal of native trees and/or vegetation. Significant impacts to flora and fauna are unlikely and the proposed modification would not result in the endangering of species. Potential impacts would be managed through the implementation of safeguards and management measures in Section 7 and the biodiversity offsets in Section 6.4.5.	Nil
h. Any long-term effects on the environment? The proposed modification would unlikely have long-term effects on the environment.	Nil
i. Any degradation of the quality of the environment? The proposed modification would have the potential to degrade the quality of the environment through leaks, spills, inadequate erosion and sediment control measures, and scouring. The temporary rock working platforms in Shoalhaven River and Bomaderry Creek have the potential to reduce water quality during a flood event. Potential impacts would be managed through the implementation of safeguards and management measures in Section 7.	Short-term negative
j. Any risk to the safety of the environment? During operation, the proposed modification would ultimately improve local traffic flow along a key section of the Princes Highway.	Long-term positive
k. Any reduction in the range of beneficial uses of the environment? The proposed modification would reduce the range of beneficial uses of the environment during construction in relation to commercial and recreational watercraft movements.	Short-term negative
l. Any pollution of the environment? During construction, the proposed modification would have the potential for leaks and spills from plant and equipment located on and/or near Shoalhaven River	Short-term negative

Factor	Impact
and Bomaderry Creek. Excavation works may encounter potentially contaminated materials and acid sulfate soils. Potential impacts would be managed through the implementation of safeguards and management measures in Section 7.	
m. Any environmental problems associated with the disposal of waste? The proposed modification would unlikely have significant environmental issues associated with the disposal of waste. Safeguards and management measures for the reuse and recycling of waste including demolition materials, where possible, are described in Section 7. Furthermore, acid sulfate soils would be appropriately treated and stockpiled at ancillary sites.	Nil
n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? Resources required for the proposed modification would not be in short supply and would be readily available.	Nil
o. Any cumulative environmental effect with other existing or likely future activities? The proposed modification would have relatively minor cumulative impacts in consideration of the project described and assessed in the project REF. Cumulative impacts would be expected on biodiversity and sensitive receivers in the vicinity of proposed construction works.	Short-term negative
p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? Considering the nature and scale of the temporary rock working platform in Shoalhaven River, it would increase velocity flows and may impact on tides and currents and the natural transportation of sediment down Shoalhaven River to the coast. In addition, the waterway restriction caused by the platforms in Bomaderry Creek would increase velocity flows and would temporarily impact on the natural transportation of sediment.	Short-term negative

Matters of National Environmental Significance and Commonwealth land

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? There are no World Heritage properties within or near the proposed modification.	Nil
b. Any impact on a National Heritage place? There are no National heritage places within or near the proposed modification.	Nil
c. Any impact on a wetland of international importance? There are no wetlands of international importance on the proposed modification.	Nil
d. Any impact on a listed threatened species or communities? • The removal of some trees and/or vegetation would be required on Illaroo Road and within the Bomaderry Creek riparian vegetation corridor belonging to PCT1206 (Spotted Gum – Blackbutt shrubby open forest on the coastal foothills, southern Sydney Basin Bioregion and northern South East Corner Bioregion). There will be no additional impact to PCT1236 (including EEC). • Construction activities are unlikely to impact the Eastern Freetail-bat *(Mormopterus norfolkensis)* which was recorded in the project REF near a proposed additional ancillary site. Construction activities are unlikely to impact the Magenta Lilly Pilly *(Syzygium paniculatum)* which was recorded in the project REF near a proposed additional ancillary site. The species will be removed under the project REF.	Minor
e. Any impacts on listed migratory species? The proposed modification would unlikely have an impact on listed migratory species.	Nil
f. Any impact on a Commonwealth marine area? There are no Commonwealth marine areas within or near the proposed modification.	Nil
g. Does the proposed modification involve a nuclear action (including uranium mining)? The proposed modification does not involve a nuclear action.	Nil

Factor	Impact
Additionally, any impact (direct or indirect) on Commonwealth land? There is no Commonwealth land within or near the proposed modification.	Nil

Appendix B

Statutory consultation checklists

Infrastructure SEPP

Certain development types

Development type	Description	Yes / No	If 'yes' consult with	ISEPP clause
Car Park	Does the project include a car park intended for the use by commuters using regular bus services?	No	Shoalhaven City Council	ISEPP cl. 95A
Bus Depots	Does the project propose a bus depot?	No	Shoalhaven City Council	ISEPP cl. 95A
Permanent road maintenance depot and associated infrastructure	Does the project propose a permanent road maintenance depot or associated infrastructure such as garages, sheds, tool houses, storage yards, training facilities and workers' amenities?	No	Shoalhaven City Council	ISEPP cl. 95A

Development within the Coastal Zone

Issue	Description	Yes / No / NA	If 'yes' consult with	ISEPP clause
Development with impacts on certain land within the coastal zone	Is the proposal within a coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?	No	Shoalhaven City Council	ISEPP cl. 15A

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 *substantial* impact on the stormwater management services which are provided by council?	No	Shoalhaven City Council	ISEPP cl.13(1)(a)
Traffic	Are the works likely to generate traffic to an extent that will *strain* the capacity of the existing road system in a local government area?	No	Shoalhaven City 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 *substantial*	No	Shoalhaven City Council	ISEPP cl.13(1)(c)

Issue	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	ISEPP clause
	impact on the capacity of any part of the system?			
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a *substantial* volume of water?	No	Shoalhaven City 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 *minor* or *inconsequential* disruption to pedestrian or vehicular flow?	Yes	Shoalhaven City Council	ISEPP cl.13(1)(e)
Road & footpath excavation	Will the works involve more than *minor* or *inconsequential* excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	Yes	Shoalhaven City 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 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 *minor* or *inconsequential*?	No	Shoalhaven City Council	ISEPP cl.14

Flood liable land

Issue	Potential impact	Yes / No	If 'yes' consult with	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 *minor* extent?	Yes	Shoalhaven City Council	ISEPP cl.15
Flood liable land	Are the works located on flood liable land? (to any extent). If so, do the works comprise more than minor alterations or	Yes	State Emergency Services	ISEPP cl.15AA

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
	additions to, or the demolition of, a building, emergency works or routine maintenance		Email: erm@ses.nsw.gov.au	

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 *National Parks and Wildlife Act 1974*, or on land acquired under that Act?	No	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 *Marine Estate Management Act 2014*?	No	Department of Industry	ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998*?	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 [Refer to the NSW Rural Fire Service publication Planning for Bush Fire Protection (2006)]	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)

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
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 *Mine Subsidence Compensation Act 1961*?	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 *Local Land Services Act 2013)* on land that is not ***subject land*** (as defined in cl 17 of schedule 7 of the *Threatened Species Conservation Act 1995*)?	No	Department of Planning and Environment	SEPP 18A

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