

Batemans Bay Bridge replacement – New floating pontoon

Addendum review of environmental factors 3

Transport for New South Wales | May 2020

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Prepared by Qubist Pty Ltd and Transport for New South Wales

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Executive summary

The proposed modification

In 2018, Transport for New South Wales (TfNSW, formerly Roads and Maritime Services) determined a review of environmental factors (REF) for the Batemans Bay Bridge replacement project (the project REF). TfNSW proposes to modify the project REF to retain the existing T-Wharf on the southern foreshore and adjust the downstream project boundary to accommodate the new permanent floating pontoon on the Clyde River (proposed modification).

The proposed modification would include:

- Retention of the existing T-Wharf main structure. The remnant low level access structure immediately downstream of the main T-Wharf structure would be removed
- Boundary adjustment to accommodate the new floating pontoon on the southern foreshore of the Clyde River
- Construction and removal of a temporary working platform to facilitate construction of the pontoon.

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

Background

A REF was prepared for the project in November 2017. The project REF was placed on public display between 8 November and 8 December 2017 for community and stakeholder comment. A submissions report was published in May 2018 to respond to issues raised during public display of the project REF.

An environmental impact statement (EIS) was also prepared for the project in November 2017, as a small part of the project is located in an area to which State Environmental Planning Policy No. 14 – Coastal Wetlands (SEPP 14) (now repealed) applied. Development consent for this part of the project was issued by Eurobodalla Shire Council in May 2018 (251/18).

Section 3.2.3 of the project REF describes the foreshore works proposed for the Batemans Bay Bridge replacement project.

The project REF proposed that the T-Wharf on the southern foreshore be replaced downstream of the existing bridge to compensate for the loss of access for larger marine vessels such as large yachts which would be unable to pass under the New Batemans Bay Bridge. The submissions report considered that the proposed replacement of the T-Wharf would provide a floating structure to allow for a range of marine vessel sizes to berth and access the Central Business District (CBD).

Following further development of the detailed design of the project, additional modelling and assessment and community and stakeholder consultation, TfNSW identified the opportunity to retain the T-Wharf in its existing location, while providing improved facilities through construction of a new floating pontoon downstream of the T-Wharf.

Need for the proposed modification

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

The proposed modification is required to meet the needs of the local community and users of the Clyde River in terms of amenity, capacity, accessibility and long-term usability of recreational facilities and the foreshore area more broadly. The proposed modification is required to meet the project REF's commitment to provide berthing space for marine vessels that would be too large to travel under the New Batemans Bay

Bridge due to its fixed height. Berthing space for vessels would be increased as a result of the proposed modification which would encourage increased use of the waterway and foreshore spaces. These improvements would have the potential to deliver socio-economic benefits for the community through increased foot traffic and improved access to the Batemans Bay town centre via the Clyde River.

The proposed modification was developed following extensive consultation with Crown Lands, Maritime Infrastructure Delivery Office, Department of Planning, Industry and Environment (DPIE) (Regions, Industry, Agriculture & Resources) (formerly Department of Primary Industries), Eurobodalla Shire Council, stakeholders and the community and the Foreshore Advisory Committee established for the project.

Proposal objectives

Section 2.3 of the project REF identifies the project objectives.

The proposed modification supports the overall project objectives through delivering benefits to the community in terms of improved access and connectivity to the Clyde River and Batemans Bay town centre. The proposed modification would also improve the amenity of the southern foreshore, encouraging greater appreciation and use of the area, with associated benefits for visitor experiences and local businesses. The proposed modification balances minimal environmental impacts and maximum socio-economic benefits.

Options considered

The various options considered for the proposed modification are summarised below.

Option 1 was the 'do nothing' option. This would involve retaining the existing T-Wharf in its current configuration, without the addition of a new floating pontoon. This would mean that there would be no improvement to accessibility for a variety of vessel sizes to the Batemans Bay CBD.

Option 2 would involve complete replacement of the existing T-Wharf and construction of a new floating pontoon in the location of the existing T-Wharf, as assessed in the project REF. While this option would improve access for a variety of vessel sizes to easily access the Batemans Bay CBD and a new pontoon would provide flexibility for additional extensions if proposed in the future, existing vehicle access amenity to berthed vessels via the T-wharf would be affected, and consultation with stakeholders and the community identified a preference to retain the existing T-Wharf.

Option 3 would involve retaining the existing T-Wharf main structure, excluding the remnant low level access structure, and building new floating pontoons extending from the existing T-Wharf oriented parallel to the foreshore to increase berthing capacity. This option would provide improved access for vessels and meet stakeholder and community desire to retain the T-Wharf. However, the T-Wharf is in poor condition and has a limited remaining useful life unless there is substantial intervention or rehabilitation, resulting in this option delivering less value for money compared to other options considered.

Option 4 would involve retaining the existing T-Wharf main structure, excluding the remnant low level access structure, and boundary adjustment to accommodate the new floating pontoon with access to the foreshore as a separate structure located downstream of the existing T-Wharf. This option was preferable as the new floating pontoon would be a significant increase to existing berthing capacity, it would provide greater flexibility for berthing by a wide variety of vessels types, vehicle access amenity to the T-Wharf would not be affected and there would be improved access to the Batemans Bay CBD. This option best incorporates consultation feedback and would also deliver greater value for money compared to the other proposed options.

Statutory and planning framework

The Batemans Bay Bridge replacement project was approved under former Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in April 2018. The EP&A Act provides the framework for environmental planning and development approvals in NSW and includes provisions to ensure that the

potential environmental impacts of a development are assessed and considered in the decision-making process. This addendum REF is subject to assessment under Part 5 of the EP&A Act.

TfNSW is the proponent and determining authority for the proposed works outlined in this addendum REF. 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. Due to the modification proposed being for a road development and to be carried out on behalf of TfNSW, it can be assessed under Division 5.1 of the EP&A Act. Development consent from Eurobodalla Shire Council is not required.

Community and stakeholder consultation

Due to strong interest from the community and stakeholders in informing the design of the foreshore areas for the project, in 2018 a Foreshore Advisory Committee (FAC) consisting of representatives from a range of agencies and community groups was formed. The FAC was provided with opportunities between October 2018 and May 2019 to present their views and opinions in regard to the foreshore design for consideration.

A report on feedback received from the FAC was published in June 2019. Feedback from the FAC and other stakeholders included the need to provide additional berthing capacity in the Batemans Bay CBD using floating pontoons. Feedback also indicated that there was a desire to retain the existing T-Wharf.

The community was also invited in June 2019 to provide comments on the Urban Design and Landscaping Plan, including the design for the foreshore areas. Consultation activities included drop in sessions, an interactive map and survey and a project information newsletter. A number of responses about design, access and safety features of the proposed new pontoon were received.

As the proposed modification works are adjacent to a marine park declared under the *Marine Estate Management Act 2014* (Batemans Marine Park), consultation was also carried out with DPIE (Regions, Industry, Agriculture & Resources) and DPIE (Batemans Marine Park) to inform the addendum REF. Eurobodalla Shire Council and the asset owner (Crown Lands) were also consulted to inform the addendum REF.

Feedback from these consultation activities has provided input into the development of the preferred option for the proposed modification.

Consultation with the FAC, Eurobodalla Shire Council, government agencies and the wider community on the Urban Design and Landscaping Plan, including the design of the southern foreshore area, will continue during construction of the project.

Environmental impacts

The main environmental impacts for the proposed modification are:

Noise and vibration

A noise assessment has been undertaken as part of the addendum REF to assess potential noise impacts from the proposed modification. The Roads and Maritime Services Construction and Maintenance Noise Estimator tool was used and conservative assumptions were made. The results showed that the proposed modification would result in some exceedances of Noise Management Levels (NMLs) at 13 nearby sensitive receivers. These comprise 11 commercial receivers and two passive recreation receivers. Of these, a total of seven commercial and retail premises on Clyde Street adjacent to the southern foreshore would have the potential to exceed the highly noise affected level of 75 dB(A) during standard construction hours due to the proposed modification. There are no residential receivers located within the Affected Distance of the proposed modification.

The Batemans Bay War Memorial is situated near the proposed location for construction of the new floating pontoon. Where vibration intensive works are to be conducted within 25 metres of this structure, there is potential for vibration impacts. Vibration impacts in relation to human comfort (response) due to the proposed modification may occur during highly vibration intensive activities such as piling. However, vibration emissions would generally be short and intermittent in nature for the proposed modification.

Potential noise and vibration impacts would be managed through implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF, including measures in the *Construction Noise and Vibration Guideline* (Roads and Maritime Services, 2016).

Soil and water quality

Potential soil and water quality impacts from the proposed modification during construction include erosion and sedimentation, disturbance of the river bed and bank, spills and leaks of fuel, oils and other chemicals, acid sulfate soils and stockpiling of materials. Soil disturbance associated with excavation and earthworks, concrete work, vehicle movements, and minor stockpiling of construction materials, may result in impacts to soil and water quality if not adequately managed. In-stream works such as piling, installation of the new floating pontoon and removal of the remnant low level access structure downstream of the T-Wharf would have the potential to disturb sediments, increasing turbidity in the Clyde River. A temporary working platform and cofferdams extending into the river from the southern foreshore may be used during construction. Installation and removal of these structures may disturb river sediments, while significant wet weather, storm or flood events may result in runoff and loss of equipment.

Potential soil and water quality impacts would be minimised through implementation of the safeguards and management measures described in Table 7-1 of this addendum REF.

Landscape character and visual impact

Visual impacts would be associated with construction of the new floating pontoon, including potential impacts associated with construction of a temporary working platform and containment measures such as cofferdams off the southern foreshore. The in-stream construction area for the new floating pontoon would be visible from the southern foreshore and would extend into the Clyde River beyond the approved project boundary.

While there would be some changes to vistas along the southern foreshore due to the retention of the existing T-Wharf with the addition of the new floating pontoon into the landscape, once completed, the addition of the new floating pontoon would be expected to improve the experience for boat users on the Clyde River. This would enhance the recreational value of the waterway, having a positive impact on the river landscape character while also improving the functioning of the foreshore area for local users and visitors.

Potential landscape character and visual impacts would be minimised through implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.

Hydrology and coastal processes

Flood and coastal process modelling carried out for the proposed modification indicates that the proposed modification would be unlikely to have a substantial impact on hydrology and coastal processes, and would not be expected to exacerbate flood levels compared to existing conditions.

A temporary working platform extending into the Clyde River may be used to facilitate construction of the new floating pontoon downstream of the existing T-Wharf. During an intense flood event, there would be the potential for river sediments to accumulate around the temporary working platform. The impact of a significant flood event on the new floating pontoon once completed could result in localised erosion or scouring of the riverbed in the immediate vicinity of the pontoon piles. Impacts on the morphology of the shoreline near the proposed modification due to flooding would be minimised by the revetment which

provides shoreline protection from processes such as erosion. Overall, any changes in river hydrology such as water flows or levels due to the proposed modification would be negligible when compared to natural variation in river hydrology due to wind, waves, and tides. Modelled changes in water levels and flows in the Clyde River due to the proposed modification would not be expected to result in any adverse social and environmental impacts in the surrounding area.

Potential hydrology and coastal processes impacts would be minimised through implementation of the safeguards and management measures identified in Table 7-1 of 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 examined and considered to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

Mitigation measures as detailed in this addendum REF would ameliorate or minimise the expected impacts of the proposed modification. Consistent with the project REF and submissions report, the proposed modification would meet the needs of the local community in terms of accessibility and amenity along the Clyde River foreshore areas and more broadly the Batemans Bay CBD, enhance the recreational value of the area and provide positive socio-economic benefits, while having minimal environmental impact. On balance, the proposed modification is considered justified.

The environmental impacts of the proposed modification are not likely to be significant and therefore it is not necessary for an environmental impact statement to be prepared and approval for the proposed modification to be sought from the Minister for Planning under Division 5.2 of the EP&A Act. The proposed modification is unlikely to affect threatened species, populations or ecological communities or their habitats, within the meaning of the *Biodiversity Conservation Act 2016* or the *Fisheries Management Act 1994* and therefore Species Impact Statement is not required. The proposed modification is also unlikely to affect Commonwealth land or have a significant impact on any matters of national environmental significance.

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1. Introduction

1.1 Proposed modification overview

Transport for New South Wales (TfNSW, formerly Roads and Maritime Services) proposes to modify the Batemans Bay Bridge replacement project (the project) to retain the existing T-Wharf and adjust the project boundary to accommodate the new floating pontoon on the southern foreshore (proposed modification).

As of 1 December 2019, legislation came into effect (*Transport Administration Amendment (RMS Dissolution Bill) 2019*) such that all functions of Roads and Maritime Services are now performed by the integrated TfNSW organisation.

Key features of the proposed modification would include:

- Retention of the existing T-Wharf main structure. The remnant low level access structure immediately downstream of the main T-Wharf structure would be removed
- Boundary adjustment to accommodate the new floating pontoon on the southern foreshore of the Clyde River
- Construction and removal of a temporary working platform to facilitate construction of the pontoon.

The location of the proposed modification is shown in Figure 1-1. Key features of the proposed modification are shown in Figure 1-2. Section 3 describes the proposed modification in more detail.

A review of environmental factors (REF) was prepared for the Batemans Bay Bridge replacement on November 2017 (referred to in this addendum REF as the project REF). The project REF was placed on public display between 8 November and 7 December 2017 for community and stakeholder comment. A submissions report, dated May 2018, was prepared to respond to issues raised.

An environmental impact statement (EIS) was also published for the project in November 2017, as a small part of the project is located in an area to which State Environmental Planning Policy No. 14 – Coastal Wetlands (SEPP 14) (now repealed) applied. Development consent for this part of the project was issued by Eurobodalla Shire Council in May 2018.

In addition, the following addendum REFs and REF Consistency Reviews have been approved for the project:

- Batemans Bay Bridge replacement - former bowling club demolition Addendum REF 1 (September 2018)
- Batemans Bay Bridge replacement REF Consistency Review 1 – Kings Highway slip lanes and utility adjustment works (January 2019)
- Batemans Bay Bridge replacement - precast ancillary facility Addendum REF 2 (March 2019)
- Batemans Bay Bridge replacement REF Consistency Review 2 – Temporary boat ramp (April 2019)
- Batemans Bay Bridge replacement REF Consistency Review 5 – Stockpile on Kings Highway (April 2019)
- Batemans Bay Bridge replacement REF Consistency Review 4 – Pier 1 temporary working platform and temporary Bailey bridge (May 2019)
- Batemans Bay Bridge replacement REF Consistency Review 3 – Detailed design changes 1 (October 2019)

- Batemans Bay Bridge replacement REF Consistency Review 6 – Precast ancillary facility boundary adjustment (May 2020).



Figure 1-1: Location of the proposed modification



Figure 1-2: Key features of the proposed modification

1.2 Purpose of the report

This addendum REF has been prepared by Qubist on behalf of TfNSW. 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, submissions report and previous addendum REFs and REF Consistency Reviews for the project. The purpose of this addendum REF is to describe the proposed modification, document and assess the likely impacts of the proposed modification on the environment, and detail mitigation and management measures to be implemented.

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

In doing so, the addendum REF helps to fulfil the requirements of Section 5.5 of the EP&A Act including that 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 findings of the addendum REF would be considered when assessing:

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

2. Need and options considered

2.1 Strategic need for the proposed modification

Chapter 2 of the project REF addresses the strategic need for the project, the project objectives and the options that were considered. The proposed modification described and assessed in this addendum REF is consistent with the strategic need for the project, as outlined in sections 2.1.8 and 2.1.9 of the project REF and described below.

The proposed modification is required to meet the project REF's commitment to provide berthing space for marine vessels that would be too large to travel under the New Batemans Bay Bridge due to its fixed height. Retention of the existing T-Wharf and construction of a new floating pontoon will meet the needs of the local community and users of the Clyde River by providing additional berthing capacity and will offer flexibility for marine vessels to access the Batemans Bay Central Business District (CBD).

Overall, the proposed modification would improve access for vessels along the Clyde River, supporting sustainable recreational and commercial uses of the estuary into the future. It would also improve connectivity between the local community and the natural environment. Berthing space for vessels would be increased as a result of the proposed modification and encourage increased use of the waterway by the local community and visitors, enhancing the recreational and natural values of the Clyde River environment. The location of the proposed new floating pontoon in close proximity to the Batemans Bay commercial district has the potential to deliver socio-economic benefits for the community through increased foot traffic and improved access via the Clyde River.

2.2 Proposal objectives and development criteria

Section 2.3 of the project REF identifies the project objectives. The proposed modification supports the overall project objectives through providing benefits to the community in terms of improved access and connectivity to the Clyde River and Batemans Bay town centre which align with the expressed needs of the community and stakeholders. The proposed modification would also improve the amenity of the southern foreshore, encouraging greater appreciation and use of the area, with associated benefits for visitor experiences and local businesses. The proposed modification balances minimal environmental impacts and maximum socio-economic benefits.

2.3 Alternatives and options considered

Section 3.2.3 of the project REF describes the foreshore works proposed for the Batemans Bay Bridge replacement project including the replacement of the existing T-Wharf.

The project REF proposed replacement of the existing T-Wharf downstream of the existing bridge to compensate for the loss of access for larger marine vessels, such as large yachts, which would be unable to pass under the New Batemans Bay Bridge. The submissions report considered that the proposed replacement of the T-Wharf would provide a floating structure to allow for a range of marine vessel sizes to berth and access the CBD.

The options considered for the proposed modification are reviewed in the following sections.

2.3.1 Methodology for selection of preferred option

Selection of the preferred option for the proposed modification involved consideration of the options against the following criteria:

- Value for money
- Consistency with existing environmental objectives and commitments
- Benefit and amenity in comparison with existing condition
- Extent of satisfaction of community and stakeholder feedback.

Each option was ranked based on the criterion with the preferred option being the option that best satisfied the criteria.

Existing conditions

To evaluate each option, the condition and amenity of the existing T-Wharf was assessed. The T-Wharf, built in the late 1970s, currently provides approximately 75 metres of berthing space and allows for restricted vehicle access. The structure is a fixed height, which limits its amenity for smaller vessels to berth due to tides.

Some timber structures are located on the downstream end of the T-Wharf, as shown in Figure 3-1 and Figure 3-2. These structures are remnants of a low level access and are in a poor and dilapidated condition. The structures are not currently being used for access onto the T-Wharf and their location in relation to the T-Wharf currently limits the useable berthing space of the existing T-Wharf.

2.3.2 Identified options

Option 1 - Do nothing

This option would involve retaining the existing T-Wharf in its current configuration, without the addition of a new floating pontoon.

Option 2 – Demolition and replacement of the existing T-Wharf with a new floating pontoon built in the location of existing T-Wharf (option assessed in project REF)

This option would involve demolition of the existing T-Wharf and construction of a new floating pontoon in the location of the existing T-Wharf.

Option 3 – Retention of the existing T-Wharf with new floating pontoons built off the existing T-Wharf

This option would involve retaining and rehabilitating the existing T-Wharf (excluding the remnant low level access structure) and building new floating pontoons extending from the existing T-Wharf oriented parallel to the foreshore to increase berthing capacity.

Option 4 – Retention of the existing T-Wharf and boundary adjustment to accommodate the new floating pontoon downstream of the existing T-Wharf (proposed modification)

This option would involve retaining the existing T-Wharf (excluding the remnant low level access structure) and building a new floating pontoon downstream of the existing T-Wharf. The floating pontoon would have access to the southern foreshore via a gangway and be independent of the existing T-Wharf.

2.3.3 Analysis of options

Option 1 - Do nothing

Retaining the existing T-Wharf in its current configuration would result in no improvement to accessibility for a variety of vessel sizes to the Batemans Bay CBD. This option would therefore be inconsistent with the commitment in the project REF.

Option 2 – Demolition and replacement of the existing T-Wharf with a new floating pontoon built in the location of existing T-Wharf (option assessed in project REF)

- This option would meet the project REF commitment to improve access for a variety of vessel sizes to access the Batemans Bay CBD.
- A floating pontoon structure is consistent with the commitment in the project REF Submissions Report section 2.3.3, with the berthing capacity of the new floating pontoon structure to be similar to the existing T-Wharf.
- Consultation with stakeholders and the community, including the Foreshore Advisory Committee (FAC), identified a preference to retain the existing T-Wharf.
- A new floating pontoon would provide flexibility for additional extensions if proposed in the future.
- The new floating pontoon design would include provision for the future or temporary installation of a davit system to assist people with a disability to access the river and load materials onto vessels.
- The floating pontoon structure would not be designed to cater for vehicle loads.
- No temporary or alternative berthing facility would be provided during the replacement of the existing T-Wharf.

Option 3 – Retention of the existing T-Wharf with new floating pontoons built off the existing T-Wharf

- This option would meet the project REF commitment to improve access for a variety of vessel sizes to access the Batemans Bay CBD.
- A floating pontoon structure is consistent with the commitment in the project REF Submissions Report section 2.3.3, with the new floating pontoon structures to provide additional berthing capacity to the existing T-Wharf.
- Consultation with stakeholders and the community, including the FAC, identified a preference to retain the existing T-Wharf.
- Floating pontoon structures built off the existing T-Wharf would increase berthing capacity on the southern foreshore.
- The new floating pontoon design would include provision for the future or temporary installation of a davit system to assist people with a disability to access the river and load materials onto vessels.
- Retention of the T-Wharf was considered beneficial as existing vehicle access to berthed vessels would not be affected.
- The existing T-Wharf is in poor condition and would require substantial rehabilitation and have high operational maintenance requirements. This option represents lower value for money compared to the other options considered.

- No temporary or alternative berthing facility would be provided during construction of the new floating pontoons off the existing T-Wharf.

Option 4 – Retention of the existing T-Wharf and boundary adjustment to accommodate the new floating pontoon downstream of the existing T-Wharf (proposed modification)

- This option would meet the project REF commitment to improve access for a variety of vessel sizes to access the Batemans Bay CBD.
- A floating pontoon structure is consistent with the commitment in the REF Submissions Report section 2.3.3, with the berthing capacity of the new floating pontoon structure to be similar to the existing T-Wharf.
- Consultation with stakeholders and the community, including the FAC, identified a preference to retain the existing T-Wharf.
- This option would provide more than 130 metres of additional berthing frontage on the southern foreshore.
- The new floating pontoon structure would have a connection point to the southern foreshore downstream of the existing T-Wharf providing improved access to public amenities and local businesses.
- Retention of the T-Wharf was considered beneficial as existing vehicle access to berthed vessels would not be affected.
- A new floating pontoon would provide flexibility for additional extensions if proposed in the future.
- The new floating pontoon design would include provision for the future installation of a davit system to assist people with a disability to access the river and load materials onto vessels.
- Retention of the existing T-Wharf would allow continued partial access to the T-Wharf during construction for both pedestrians and vessels.

2.4 Preferred option

Option 4 is the preferred option. This option is preferable as it would provide multiple benefits and improvements to amenity for both the community and key stakeholders. Retention of the existing T-Wharf and a boundary adjustment to accommodate the new floating pontoon located downstream of the T-Wharf would provide an overall increase in berthing capacity, allow greater flexibility for berthing and use by a greater variety of vessels types and sizes, and maintain existing vehicle access to the T-Wharf while also improving accessibility to the Batemans Bay CBD. This option would also provide best value for money through removing the requirement to demolish the existing T-Wharf (excluding the remnant low level access structure) while also providing additional berthing frontage.

This option best incorporates feedback received during consultation with the community and stakeholders to retain the existing T-Wharf while providing an increase in space for vessels to berth through provision of a new floating pontoon. The design of the new pontoon includes the flexibility for extension in the future as growth in demand for facilities occurs. Option 4 also meets community needs as it would allow boats that prefer a fixed structure to continue to use the T-Wharf.

3. Description of the proposed modification

3.1 The proposed modification

TfNSW proposes to modify the project to retain the existing T-Wharf and adjust the downstream project boundary to accommodate the new floating pontoon on the southern foreshore. The proposed modification is shown in Figure 1-2.

Key features of the proposed modification would include:

- Retention of the existing T-Wharf main structure. The remnant low level access structure immediately downstream of the main T-Wharf structure would be removed
- Boundary adjustment to accommodate the new floating pontoon on the southern foreshore of the Clyde River
- Construction and removal of a temporary working platform to facilitate construction of the pontoon.

These features are described in greater detail in section 3.2.3. An indicative concept design for the new floating pontoon is provided in Appendix A.

3.2 Design

3.2.1 Design criteria

The proposed modification would be designed using the same standards and criteria described in section 3.2 of the project REF.

In addition, the following standards and criteria would apply for the design of the new floating pontoon:

- AS 4997: 2005 – Guidelines for the design of maritime structures
- AS 3962: 2001 – Guidelines for design of marinas
- Policy and Guidelines for Fish Habitat Conservation and Management (Department of Primary Industries (DPI), 2013).

3.2.2 Engineering constraints

The engineering constraints presented in section 3.2.2 of the project REF apply to the proposed modification and would be managed in the same manner as described in the project REF.

In addition, the following engineering constraints would apply for the design of the new pontoon:

- Navigable channel width – the new floating pontoon would need to have sufficient clear navigable width from the existing T-Wharf to allow vessels to safely access both the T-Wharf and the new floating pontoon.

3.2.3 Main features of the modification

Retention of the existing T-Wharf main structure and removal of the remnant low level access structure immediately downstream

As part of the proposed modification, the existing T-Wharf main structure would be retained in its existing location. The decision to retain the existing T-Wharf followed feedback and consultation with the asset owner (Crown Lands), Maritime Infrastructure Delivery Office, the community and the FAC which was formed at the start of the project. Feedback from the FAC suggested there was a strong desire to provide additional berthing capacity in the Batemans Bay CBD using floating pontoons, whilst there was also a desire to retain the existing T-Wharf. Details regarding consultation outcomes in relation to the design development of the proposed modification are provided in section 5.2 of this addendum REF.

The retention of the T-Wharf main structure in conjunction with the construction of a new floating pontoon will meet the project REF's commitment to provide berthing space for marine vessels that would be too large to travel under the New Batemans Bay Bridge as well as providing flexibility for vessels of all sizes to more easily access the Batemans Bay CBD.

Removal of the remnant low level access structure immediately downstream of the T-Wharf main structure will still be undertaken in accordance with the project REF. The remnant low level access structure is a dilapidated timber structure consisting of four timber piles and associated timber work. Removal of the structure has been identified as necessary to allow clear vessel movements between the T-Wharf and the new floating pontoon. The removal of the structure will also ensure ease of access to the T-Wharf itself.

Photos of the remnant low level access structure are shown in Figure 3-1 and Figure 3-2.

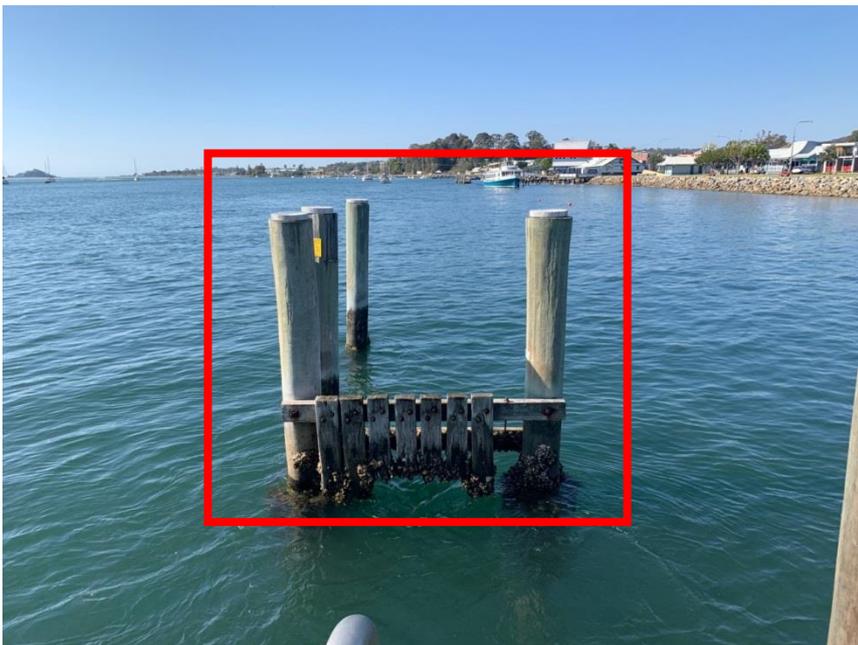


Figure 3-1: Remnant low level access structure – view from the T-Wharf, looking east



Figure 3-2: Remnant low level access structure - view from the southern foreshore

Boundary adjustment to accommodate the new floating pontoon on the southern foreshore

As part of the proposed modification, the new floating pontoon structure would be located downstream of the existing T-Wharf and would partially extend outside the approved project boundary. The proposed modification includes a boundary adjustment to accommodate the new floating pontoon structure downstream of the existing T-Wharf. The structure would consist of multiple prefabricated pontoon sections supported on driven piles and connected to the southern foreshore via a gangway. Vehicle access onto the floating pontoon structure would be prohibited. The design of the structure would consider assisted disabled access requirements, including measures such as gangway width and gradient, and the option to install a davit system.

Construction and removal of a temporary working platform to facilitate construction of the pontoon

Section 2.3.8 of the submissions report states that barges and temporary jetties would be used to facilitate construction of in-stream design elements for the project, and that rock working platforms would not be used in the Clyde River. Subsequent to the determination of the project, and during design development for the proposed modification, it was identified that construction of some structures for the new floating pontoon may be difficult to construct from land or barge.

Where feasible and practicable, construction activities would be conducted from land or barge. However, where construction cannot be solely undertaken from land or barges, for example where construction activity location restricts the capacity for appropriate plant or equipment to operate, a temporary working platform may be required to facilitate construction activities. A temporary working platform would provide a stable working area for access by a piling rig, crane and other plant and equipment to facilitate the installation of piles and gangway for the floating pontoon.

3.3 Construction activities

3.3.1 Work methodology

The methodology for the proposed modification would be generally consistent with the project REF and other existing environmental approvals referenced in section 1.1 of this addendum REF. The methodology would generally include:

- Site establishment, including installation of temporary fencing, construction signage and erosion and sedimentation controls
- Mobilisation and assembly of plant / machinery at site on the foreshore
- Piling of new pontoon foundations, conducted from either land or from water using barges
- Construction of a temporary working platform, if required
- Installation of gangway abutment
- Installation of scour protection
- Transport, delivery and installation of new pontoon segments, gangway and other fixed components
- Removal of temporary working platforms including removal of containment measures such as cofferdams (where used), and rehabilitation of the riverbank
- Removal of remnant low level access structure immediately downstream of the main T-Wharf structure
- Minor modifications for tie in with foreshore areas
- Reinstatement of foreshore areas and facilities following construction.

Temporary working platform

Should a working platform be required, it would be designed and constructed to minimise its footprint, would primarily incorporate clean rock fill, and would consider issues raised by the Department of Planning, Industry and Environment (DPIE) (Regions, Industry, Agriculture & Resources) (formerly DPI Fisheries) during the consultation process for the overall project and the proposed modification. The working platform would remain in place for a temporary period and be removed as soon as practicable following construction of the proposed modification.

If required, the temporary working platform would extend from the top of the existing rock wall no more than 12 metres into the waterway and no more than 12 metres along the foreshore. The temporary working platform would be primarily constructed using clean rock fill with no fines and not use earth fill. Any materials incorporating fines would be located above high astronomical tide and erosion and sediment controls used to prevent fines entering the waterway. A geofabric separation layer would be installed prior to the placement of rock fill.

The potential use of containment measures would be assessed as part of detailed design and constructability investigations. Containment measures may include cofferdams (from land or water) or sheet piles.

Removal of remnant low level access structure

The remnant low level access structure would be removed using practices that minimise disturbance to the surrounding environment. These methods may include vibratory pile extraction or the use of suction dredges around the pile base.

3.3.2 Construction hours and duration

The works associated with the proposed modification would be anticipated to commence in mid to late 2020. Construction would take up to six months but may be staged over a two year period.

Construction would be staged to minimise impacts to the southern promenade foreshore spaces along the Clyde River during peak holiday periods where possible. The loss of some car spaces would be experienced during construction.

Consistent with the project REF, the proposed work would be undertaken during the standard construction hours:

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

In accordance with the *Construction Noise and Vibration Guideline* (Roads and Maritime, 2016) (CNVG), activities with impulsive or tonal noise emissions would be carried out only within the following hours:

- Monday to Friday: 8 am to 5 pm
- Saturdays: 9 am to 1 pm
- Sundays and public holidays: no work.

Work with impulsive or tonal noise emissions would be carried out in continuous blocks not exceeding three hours each with a minimum respite of at least one hour between each block.

No out of hours or night works are anticipated for the proposed modification works. However, should OOHW be required they would be undertaken in accordance with the Contractor's Noise and Vibration Management Plan (NVMP), which complies with the CNVG and is consistent with the approved REF, and the project EPL.

3.3.3 Plant and equipment

Plant and equipment expected to be used for the proposed modification are generally consistent with those identified in the project REF and would include:

- Drilling rig
- Cranes
- Barge and boats
- Piling rig
- Excavators
- Chainsaws
- Suction dredge
- Generators
- Jackhammers
- Vibratory hammer

- Dewatering equipment
- Concrete trucks
- Trucks.

3.3.4 Earthworks

The earthworks for the proposed modification would be minimal, involving some minor excavation for construction of the new pontoon and temporary working platforms and associated containment measures. These activities are consistent with section 3.3.5 of the project REF.

3.3.5 Source and quantity of materials

As described in the project REF, the materials required for the proposed modification would be obtained from local sources where possible. Indicative types of material that would be required for construction of the proposed modification include:

- Piles
- Pontoon segments
- Gangway/ramps
- Fenders
- Handrails, fixtures, and fittings
- Clean rock of various sizes
- Geofabric
- Sheet piles
- Scour protection rock
- Steel
- Aluminium
- Concrete
- Timber
- Plastics
- Paving materials
- Fencing.

The source and quantity of materials required would be refined during detailed design for the proposed modification.

3.3.6 Traffic management and access

The traffic management and access requirements outlined in section 3.3.8 of the project REF would be applicable to the proposed modification.

A maritime exclusion zone may be in place for a section of the Clyde River immediately downstream of the T-Wharf. The navigation channel would be maintained past the worksite. Should there be a need to restrict marine vessels during certain construction activities, the community would be notified in accordance with section 5.6.3 of the project REF.

As part of the proposed modification, public access to the T-Wharf would be maintained throughout the duration of the work, although some short term disruptions to pedestrians may be experienced and temporary partial closures of the downstream side of the T-Wharf during construction activities would be required to ensure the safety of the public. The public would be notified of any temporary changes in access to the T-Wharf including amendments to parking.

3.4 Ancillary facilities

The ancillary facilities required for the project are described in section 3.4 of the project REF with land uses detailed in Table 3-5 of the project REF. No additional ancillary sites would be required for the proposed modification. The proposed modification would require the use of properties already leased for construction, as outlined in the Table 3-6 of the project REF. A description of the construction activities related to these properties is described in section 3.6 of this addendum REF.

As detailed in section 3.3.1 of the project REF, some temporary closures on the southern foreshore would be required for construction of the new floating pontoon. The extent of these potential temporary closures is described in section 3.6.

3.5 Public utility adjustment

The proposed modification would not require any changes to the utility adjustments described in section 3.5 of the project REF.

3.6 Property acquisition

There are no changes to the property acquisition requirements outlined in section 3.6 of the project REF. Table 3-6 of the project REF identifies both Lots 7321 and 7322 (DP 1160086) that have been leased from Crown Lands to undertake construction work for the project. This area is currently being used as a public car park and is located adjacent to the existing T-Wharf. As outlined in section 3.3.1 of the project REF, during construction of the proposed new floating pontoon, part or all of this site may be used as a construction area for access and storage of materials and equipment.

Upon completion of construction of the proposed modification, leased land would be rehabilitated to the property owner as outlined in section 3.6 of the project REF.

An additional area of the Clyde River off the southern foreshore would be leased from Crown Lands during construction of the proposed modification. This area of the Clyde River would comprise the proposed REF extension area downstream of the existing T-Wharf, as shown on Figure 1-2.

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 road infrastructure facilities and is to be carried out on behalf of TfNSW, it can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The proposed modification is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not require development consent or approval under State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP), State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (State Significant Precincts) 2005.

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 ISEPP (where applicable), is discussed in section 5 of this addendum REF.

State Environmental Planning Policy (Coastal Management) 2018

Since determination of the project REF, coastal management legislation has been amended to repeal State Environmental Planning Policy No. 14 – Coastal Wetlands, No. 71 – Coastal Protection and No. 26 – Littoral Rainforests, which were considered in the project REF.

The Coastal Management SEPP gives effect to the objectives of the Coastal Management Act 2016 from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone (DPE, 2018).

The project REF was prepared prior to the Coastal Management SEPP commencing. As such, the project and the proposed modification are subject to clause 21(2) 'Savings and transitional provisions' of the Coastal Management SEPP. While the Coastal Management SEPP does not apply to the proposed modification, as best practice, the provisions of the Coastal Management SEPP have been considered, as outlined below.

The proposed modification is located at least 120 metres from mapped Coastal Wetlands and at least 30 metres away from any proximity areas, as shown in Figure 4-1. Impacts to coastal wetlands (and their proximity areas) are therefore not anticipated and further consideration of the Coastal Management SEPP is not required.



Figure 4-1: Location of coastal wetlands and their proximity areas in relation to the proposed modification

4.1.2 Local Environmental Plans

Eurobodalla Local Environmental Plan 2012

Located within the Eurobodalla Local Government Area (LGA), the proposed modification is subject to the Eurobodalla Local Environmental Plan 2012 (Eurobodalla LEP). The proposed modification is located within land zoned RE1 Public Recreation. The new floating pontoon would extend into a section of the Clyde River zoned W2 Recreational Waterways under the Eurobodalla LEP. The proposed modification would require an extension of the REF area into a section of the Clyde River zoned W1 Natural Waterways. This area may be required during construction of the proposed modification. Table 4-1 outlines the land zoning objectives and development permissibility applicable to the land zones that would be subject to the proposed modification. The location of the proposed modification in relation to land zones is shown in Figure 4-2.

Table 4-1: Land zoning objectives and development permissibility

Land zone	Objectives of zone	Development permissibility
RE1 Public Recreation	<ul style="list-style-type: none"> • To provide a range of recreational settings and activities and compatible land uses • To protect and enhance the natural environment for recreational purposes • To conserve the scenic and environmental resources of the land including the protection of environmental assets such as remnant vegetation, waterways and wetlands, and habitats for threatened species, populations and communities. 	<p>Permitted without consent</p> <p>Environmental protection works.</p> <p>Permitted with consent</p> <p>Airstrips; Aquaculture; Boat launching ramps; Boat sheds; Building identification signs; Business identification signs; Camping grounds; Caravan parks; Centre-based child care facilities; Charter and tourism boating facilities; Community facilities; Emergency services facilities; Environmental facilities; Function centres; Heliports; Information and education facilities; Jetties; Kiosks; Marinas; Markets; Mooring pens; Moorings; Passenger transport facilities; Public administration buildings; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Research stations; Respite day care centres; Restaurants or cafes; Roads; Sewerage systems; Water recreation structures; Water supply systems; Wharf or boating facilities.</p> <p>Prohibited</p> <p>Any other development not specified above.</p>

Land zone	Objectives of zone	Development permissibility
W2 Recreational Waterways	<ul style="list-style-type: none"> To protect the ecological, scenic and recreation values of recreational waterways To allow for water-based recreation and related uses To provide for sustainable fishing industries and recreational fishing. 	<p>Permitted without consent</p> <p>Environmental protection works.</p> <p>Permitted with consent</p> <p>Aquaculture; Boat building and repair facilities; Boat launching ramps; Boat sheds; Building identification signs; Business identification signs; Charter and tourism boating facilities; Environmental facilities; Jetties; Kiosks; Marinas; Mooring pens; Moorings; Sewerage systems; Take away food and drink premises; Water recreation structures; Water supply systems; Wharf or boating facilities.</p> <p>Prohibited</p> <p>Industries; Multi dwelling housing; Residential flat buildings; Seniors housing; Warehouse or distribution centres.</p> <p>Any other development not specified above.</p>
W1 Natural Waterways	<ul style="list-style-type: none"> To protect the ecological and scenic values of natural waterways To prevent development that would have an adverse effect on the natural values of waterways in this zone To provide for sustainable fishing industries and recreational fishing. 	<p>Permitted without consent</p> <p>Environmental protection works.</p> <p>Permitted with consent</p> <p>Aquaculture Boat launching ramps; Boat sheds; Environmental facilities; Jetties; Mooring pens; Moorings; Sewerage systems; Water recreation structures; Water supply systems.</p> <p>Prohibited</p> <p>Business premises; Hotel or motel accommodation; Industries; Multi dwelling housing; Recreation facilities (major); Residential flat buildings; Restricted premises; Retail premises; Seniors housing; Service stations; Warehouse or distribution centres.</p> <p>Any other development not specified above.</p>

The proposed modification is consistent with the objectives of the RE1 Public Recreation zone as it would provide enhanced facilities and opportunities for recreational activities in the Batemans Bay CBD and encourage long-term appreciation of the Clyde River natural environment by waterway users. The proposed modification is consistent with the objectives of W1 and W2 as it would protect the scenic and recreation values of the Clyde River and promote long-term, sustainable use and enjoyment of the waterway.

As the proposed modification is permitted without consent under the ISEPP (refer to section 4.1.1), the development consent requirements of the Eurobodalla LEP do not apply.

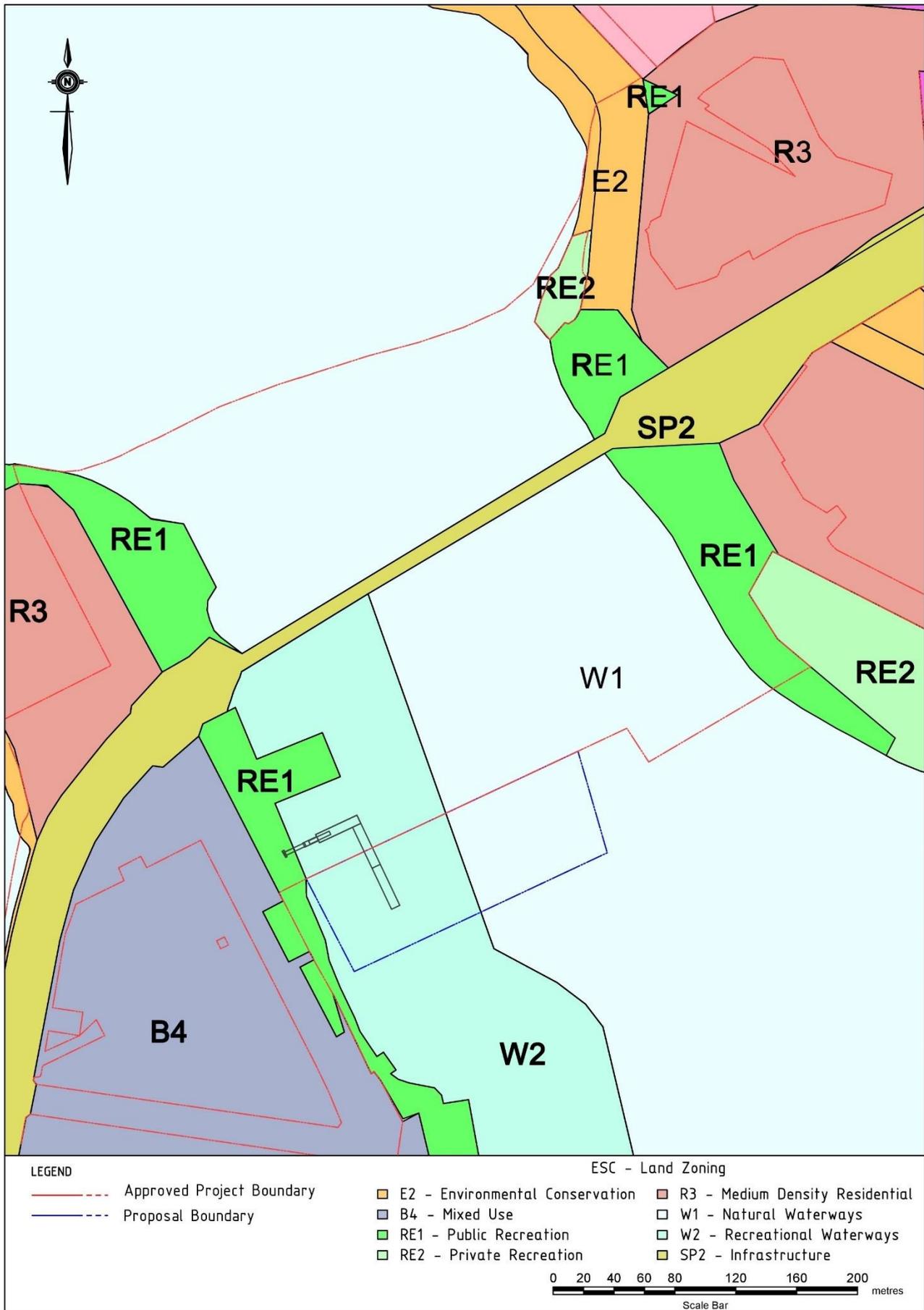


Figure 4-2: Land zoning in the vicinity of the proposed modification

4.2 Other relevant NSW legislation

4.2.1 Coastal Management Act 2016

The *Coastal Management Act 2016* (CM Act) replaced the *Coastal Protection Act 1979* which was repealed on 3 April 2018. The CM Act establishes a new strategic framework and objectives for managing coastal issues in NSW. The CM Act defines the coastal zone as comprising four coastal management areas: coastal wetlands and littoral rainforests area; coastal vulnerability area; coastal environment area; and coastal use area.

The proposed modification is situated within land identified by the Coastal Management SEPP as a coastal environment area and coastal use area.

Under section 8(2) of the CM Act, the management objectives for the coastal environment area are:

- (a) *‘to protect and enhance the coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes and coastal lagoons, and enhance natural character, scenic value, biological diversity and ecosystem integrity,*
- (b) *to reduce threats to and improve the resilience of coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change,*
- (c) *to maintain and improve water quality and estuary health,*
- (d) *to support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons,*
- (e) *to maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system operating at the relevant place,*
- (f) *to maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms.’*

Under section 9(2) of the CM Act, the management objectives for the coastal use area are:

- (a) *‘to protect and enhance the scenic, social and cultural values of the coast by ensuring that:*
 - (i) *the type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast, and*
 - (ii) *adverse impacts of development on cultural and built environment heritage are avoided or mitigated, and*
 - (iii) *urban design, including water sensitive urban design, is supported and incorporated into development activities, and*
 - (iv) *adequate public open space is provided, including for recreational activities and associated infrastructure, and*
 - (v) *the use of the surf zone is considered,*
- (b) *to accommodate both urbanised and natural stretches of coastline.’*

The proposed modification is consistent with the objectives for the coastal environment and coastal use areas as it would support the scenic, social and cultural values of the Clyde River and coastal area and improve the amenity of the Clyde River foreshore area, while avoiding adverse impacts on cultural and built environment heritage.

4.2.2 Marine Estate Management Act 2014

A summary of the *Marine Estate Management Act 2014* is included in section 4.3.2 of the project REF. The proposed modification is consistent with the intent of the *Marine Estate Management Act 2014* as outlined in the project REF.

As the proposed modification is adjacent to a marine park declared under the *Marine Estate Management Act 2014* (Batemans Marine Park), consultation with the DPIE (Regions, Industry, Agriculture & Resources), DPIE (Batemans Marine Park) and Eurobodalla Shire Council is required under the ISEPP (refer to section 5).

4.2.3 Protection of the Environment Operations Act 1997

A summary of the *Protection of the Environment Operations Act 1997* (POEO Act) is included in section 4.3.3 of the project REF. The proposed modification does not require a separate environment protection licence (EPL) for scheduled activities or scheduled development work outlined in Schedule 1 of the POEO Act. However the proposed modification would be carried out under the existing project EPL.

4.2.4 National Parks and Wildlife Act 1979

A summary of the *National Parks and Wildlife Act 1979* is included in sections 4.3.4 and 6.5 of the project REF. The proposed modification is not expected to result in any impacts to Aboriginal Cultural Heritage. The proposed modification therefore remains consistent with the requirements of the Act. An environmental assessment of impacts to Aboriginal cultural heritage is provided in section 6.5 of this addendum REF.

4.2.5 Heritage Act 1977

A summary of the *Heritage Act 1977* is included in section 4.3.5 of the project REF. The proposed modification is not expected to result in any impacts to non-Aboriginal heritage sites or values. The proposed modification therefore remains consistent with the requirements of the Act. An environmental assessment of impacts to non-Aboriginal heritage is provided in section 6.5 of this addendum REF.

4.2.6 Water Management Act 2000

A summary of the *Water Management Act 2000* is included in section 4.3.6 of the project REF. The proposed modification remains consistent with the requirements of the Act. An environmental assessment of impacts to water quality is provided in section 6.2 of this addendum REF.

4.2.7 Fisheries Management Act 1994

A summary of the *Fisheries Management Act 1994* is included in section 4.3.9 of the project REF. The proposed modification remains consistent with the requirements of the Act. An environmental assessment of impacts to biodiversity is provided in section 6.5 of this addendum REF.

4.2.8 Biodiversity Conservation Act 2016

A summary of the *Biodiversity Conservation Act 2016* is included in section 4.3.11 of the project REF. The proposed modification would not require any vegetation clearing additional to that assessed in the project REF, as amended by the submissions report, and is not expected to result in any impacts to threatened or endangered species or communities. The proposed modification therefore remains consistent with the requirements of the Act. An environmental assessment of impacts to biodiversity is provided in section 6.5 of this addendum REF.

4.2.9 Biosecurity Act 2015

The *Noxious Weeds Act 1993* (NW Act) is discussed in section 4.3.12 of the project REF. Since determination of the project, the NW Act was repealed by the *Biosecurity Act 2015* on 1 July 2017. Any noxious weeds identified during construction of the proposed modification would be managed in accordance with the requirements of the *Biosecurity Act 2015* and DPIE (Regions, Industry, Agriculture & Resources) requirements. Safeguards and management measures relevant to weed management are provided in Table 7-1 of this addendum REF.

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 section 6 and Appendix B of this addendum REF.

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

Potential impacts to these biodiversity matters are also considered as part of section 6 and Appendix B of this addendum REF.

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 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 Council is not required.

5. Consultation

5.1 Consultation strategy

The consultation strategy applied for the proposed modification is consistent with the strategy outlined in section 5.1 of the project REF.

The proposed modification has been developed following consultation with Crown Lands, Maritime Infrastructure Delivery Office, Eurobodalla Shire Council, DPIE (Regions, Industry, Agriculture & Resources), DPIE (Batemans Marine Park), the FAC and the community and other stakeholders, as outlined in the following section.

5.2 Consultation outcomes

Consultation with Foreshore Advisory Committee

To facilitate ongoing consultation between TfNSW, Eurobodalla Shire Council, agencies and the community on the design of the foreshore areas for the project, the FAC was formed to ensure the detailed design of the foreshore areas impacted by the construction of the New Batemans Bay Bridge effectively considered the recommendations and advice from key community stakeholders and community members.

The FAC comprises 13 members and includes representatives from Eurobodalla Shire Council, fishing and boating groups, local Aboriginal groups, disability groups, the wider community and local business operators. FAC members also sought and documented the advice and views from their networks.

Between October 2018 and May 2019 members of the FAC were provided with opportunities to present their views and opinions in regard to the foreshore design for consideration. The FAC was presented with a concept design for the construction of new floating pontoons extending from the existing T-Wharf oriented parallel to the foreshore to increase berthing capacity (option 3 in section 2.3). A report on the summary of feedback from the FAC was prepared by TfNSW in June 2019. The report includes feedback from the FAC in regard to design aspects of the southern foreshore and is summarised in Table 5-1.

Table 5-1: Feedback from Foreshore Advisory Committee and design improvements

Description of feedback, as presented in FAC report (June 2019)	Response
<ul style="list-style-type: none"> • A floating pontoon structure would improve accessibility from the water to the land. • Replacing the existing fixed pontoon structure with an equivalent sized floating pontoon structure is not enough to improve access between the town and river. It was also stated that the pontoon should be extendable in the future. • On-ramps to the floating pontoons should have suitable handrails. 	<ul style="list-style-type: none"> • The replacement of the T-Wharf has been reconsidered in consultation with Crown Lands based on feedback received from the committee and other stakeholders. • The existing T-Wharf will be retained which can continue to be used in its current capacity. The new floating pontoon structure would provide additional capacity and improve access between the town and the river. • The new floating pontoon design would provide the opportunity for additional extensions to be built following construction of the project. • The new floating pontoon will be an independent structure built downstream of the existing T-Wharf. The gangway between the land and floating pontoon will have appropriate safety features including handrails (This approach supersedes design improvements previously presented in the FAC report)

It should be noted that further design development of the proposed modification following preparation of the FAC report has resulted in some modifications to the design improvements that were initially presented by TfNSW. Comparison of the different design options for the proposed modification is presented in section 2.3 of this addendum REF. The proposed modification aligns with the desires expressed by the FAC and other stakeholders by retaining the existing T-Wharf in conjunction with construction of a new floating pontoon to improve accessibility between Batemans Bay town and the Clyde River while also increasing berthing capacity.

Consultation with the community and stakeholders

As part of the project consultation strategy, the community and stakeholders were invited in June 2019 to provide comments on the Urban Design and Landscaping Plan, including the proposed design for the foreshore areas. During this consultation process the community and stakeholders were presented with a concept design for the construction of new floating pontoons extending from the existing T-Wharf oriented parallel to the foreshore to increase berthing capacity (option 3 in section 2.3). The consultation included three drop-in sessions, an interactive map and survey, project information delivered to all residential properties in the north Eurobodalla area and displayed at advertised locations, in local newspapers and through digital and social media.

Feedback from the community and stakeholders on the Urban Design and Landscaping Plan, and specifically the option 3 presented during this stage of consultation, provided input into the development of the preferred option for the proposed modification. A summary of the key issues raised and how they have been addressed in the concept design is provided in Table 5-2, noting that final arrangement is subject to detailed design. The current concept design for the new floating pontoon is included at Appendix A.

Table 5-2: Summary of issues raised by the community and stakeholders

Group	Issue raised	Response
Community members	<ul style="list-style-type: none"> The pontoon design should allow for access and launching of small vessels such as kayaks and scull boats. 	<ul style="list-style-type: none"> The concept design for the new floating pontoon will allow for the berthing of small vessels.
Community members	<ul style="list-style-type: none"> Safety issues should be considered in the design of the new floating pontoon and gangway. 	<ul style="list-style-type: none"> The new floating pontoon will be designed to meet current Australian safety standards. Handrails have been incorporated into the design of the gangway.
Community members	<ul style="list-style-type: none"> The T-Wharf should be retained. 	<ul style="list-style-type: none"> The concept design for the new floating pontoon includes the retention of the existing main T-Wharf structure to provide additional berthing capacity and flexibility of access for users.
Community members	<ul style="list-style-type: none"> The new floating pontoon should be located downstream of the T-Wharf. 	<ul style="list-style-type: none"> The new floating pontoon is proposed to be located downstream of the existing T-Wharf with a minimum of 30 metres clearance between the structures.
Community members	<ul style="list-style-type: none"> The new floating pontoon should be designed for the long-term. 	<ul style="list-style-type: none"> The new floating pontoon will be designed and constructed to ensure that it provides long-term benefits and value for money for the community.
Community members Port Authority NSW	<ul style="list-style-type: none"> The piles for the pontoon should be installed to minimise the gap between the pontoon and vessels when tied up and remove any obstruction for vessels. 	<ul style="list-style-type: none"> Where feasible, edges of the new floating pontoon will be free from piles or the piles will be set flush alongside the pontoon to provide unobstructed access for vessels to berth while also ensuring safe access between the pontoon and vessels.
Community groups Port Authority NSW	<ul style="list-style-type: none"> The new pontoon design should consider disability access. 	<ul style="list-style-type: none"> The pontoon gangway will provide adequate width, gradient and handrails to support assisted disabled access. The concept design for the new floating pontoon includes provision for the future or temporary installation of a davit system to assist people with a disability to access vessels.
Local business group	<ul style="list-style-type: none"> Power and lighting should be incorporated into the design. 	<ul style="list-style-type: none"> Lighting will be provided for the new floating pontoon.

Group	Issue raised	Response
		<ul style="list-style-type: none"> The concept design for the new floating pontoon includes provision for utility services in the future.
Eurobodalla Shire Council	<ul style="list-style-type: none"> Signage welcoming visitors to Batemans Bay via the water should be included as part of the design. 	<ul style="list-style-type: none"> Any signage to be installed on the foreshore will be developed in consultation with Eurobodalla Shire Council.
Port Authority NSW	<ul style="list-style-type: none"> The pontoon design should consider the use of bollards for mooring of vessels. 	<ul style="list-style-type: none"> To cater for a variety of vessel types and sizes the new pontoon will incorporate a range of vessel securing options which may include cleats, bollards and piles.

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) consultation

As the proposed modification works are adjacent to a marine park declared under the *Marine Estate Management Act 2014* (Batemans Marine Park), consultation with DPIE (Regions, Industry, Agriculture & Resources) and DPIE (Batemans Marine Park) is required under the ISEPP. The ISEPP also requires consultation with Eurobodalla Shire Council. A consultation letter summarising the proposed modification was issued to DPIE (Regions, Industry, Agriculture & Resources), DPIE (Batemans Marine Park) and Eurobodalla Shire Council on 22 November 2019.

Appendix C contains an ISEPP consultation checklist that documents how ISEPP consultation requirements have been identified.

A combined response was received from DPIE (Regions, Industry, Agriculture & Resources) and DPIE (Batemans Marine Park). An informal response was received from Eurobodalla Shire Council. Issues that have been raised as a result of this consultation are outlined in Table 5-3.

Table 5-3: Summary of issues raised through ISEPP consultation

Agency	Issue raised	Response
DPIE (Regions, Industry, Agriculture & Resources) and DPIE (Batemans Marine Park)	<ul style="list-style-type: none"> Where any structure passes through zone of growth for seagrass it be surfaced with light penetrating mesh decking. 	<ul style="list-style-type: none"> The floating pontoon itself must be fully sealed and mesh decking is not appropriate. Other locations where mesh decking could be included (for example the gangway) will be investigated further during detailed design.
	<ul style="list-style-type: none"> Support for the location of the floating pontoon outside of the zone of growth for seagrass 	<ul style="list-style-type: none"> Noted.
	<ul style="list-style-type: none"> Construction methodologies should consider the need for a temporary working platform in the waterway. Low impact methodologies including land or barge-based long 	<ul style="list-style-type: none"> Consultation with DPIE (Regions, Industry, Agriculture & Resources) and DPIE (Batemans Marine Park) will be undertaken during detailed

Agency	Issue raised	Response
	reach plant and equipment are preferred.	design and will consider low impact constructability options.
	<ul style="list-style-type: none"> The removal of existing piles should be undertaken using best practice techniques which minimise disturbance to the environment, methodologies such as ‘wriggling’ them free or cutting them off, leaving the footings in place should be considered. 	<ul style="list-style-type: none"> The remnant low level access structure would be removed using practices that minimise disturbance to the surrounding environment. These methods may include vibratory pile extraction or the use of suction dredges around the pile base.
	<ul style="list-style-type: none"> Lighting design needs to minimise spill into adjacent aquatic environment. 	<ul style="list-style-type: none"> Detailed design of the new floating pontoon will include consideration of how to minimise light spill into the aquatic environment.
	<ul style="list-style-type: none"> Does the scope include ongoing maintenance dredging of the bar at the entrance to the Bay to facilitate access to the pontoon? 	<ul style="list-style-type: none"> This is outside of the scope of the project.
	<ul style="list-style-type: none"> Design of the facility should consider other waterway users including kayaks, PWC and small vessels. 	<ul style="list-style-type: none"> The concept design for the new floating pontoon will allow for the berthing of small vessels.
Eurobodalla Shire Council	<ul style="list-style-type: none"> The gangway of the new floating pontoon should align with the pedestrian crossing on Clyde Street as per its location in Eurobodalla Shire Council’s Batemans Bay Waterfront Activation Strategy and Master Plan. 	<ul style="list-style-type: none"> The feasibility of adjusting the location of the pontoon and/or gangway depicted in the concept design further downstream to align with the existing pedestrian crossing will be investigated during detailed design.

5.3 Ongoing or future consultation

The development of the proposed modification is in response to the stakeholder and community consultation described above. Ongoing consultation with sensitive receivers located near the proposed modification, Eurobodalla Shire Council, key agencies, and the wider community during construction in relation to the proposed modification would be consistent with the approaches described in section 5.6.3 of the project REF.

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 Batemans Bay Bridge replacement 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 B.

Chapter 6 of the project REF provides information about the existing environment, potential impacts from the project and site-specific safeguards and management measures to be implemented to ameliorate the identified potential impacts. After consideration of the issues raised in the submissions, the environmental management measures for the project were revised and included in the submissions report.

Potential impacts and safeguards and mitigations measures for the proposed modification are identified in the following sections. The addendum REF provides detailed information on the key issues associated with the proposed modification which are noise and vibration, soil and water quality, landscape character and visual impact and hydrology and coastal processes.

Desktop assessments of other issues, including biodiversity, traffic and transport, socio-economic, waste management, air quality, Aboriginal heritage, property and land use, non-Aboriginal heritage and climate change and sustainability impacts have also been carried out for this addendum REF and are assessed in section 6.5. Cumulative impacts associated with the proposed modification are discussed in section 6.6.

The safeguards and management measures identified in Table 7-1 are provided to ameliorate the potential impacts associated with the proposed modification identified by the environmental assessment conducted for this addendum REF.

6.1 Noise and vibration

6.1.1 Existing environment

A Noise and Vibration Assessment (NVA) was undertaken by Renzo Tonin & Associates (2017) for the project REF (Appendix I to the project REF). A further NVA was undertaken by Renzo Tonin & Associates (2018) as part of the submissions report to address design changes (Appendix E to the submissions report).

Existing noise environment

Four Noise Catchment Areas (NCAs) and monitoring locations near the overall project area were identified in the NVAs, as shown in Figure 6-2. Noise monitoring for the project REF NVA was undertaken from 5 to 15 June 2017 at the four monitoring locations to determine background noise levels and existing traffic noise on the Princes Highway.

The closest background noise monitoring location to the proposed modification is location M3 at 23 Clyde Street, approximately 150 metres from the proposed modification site, as shown on Figure 6-2. The background noise levels recorded at this location during monitoring for the project REF NVA are shown in Table 6-1. These background noise levels have been adopted for the proposed modification as they are considered to be representative of background noise levels in the vicinity of the proposed modification.

Table 6-1: Background noise levels at M3 obtained from project REF noise monitoring ((L_{A90}) (dBA))

Noise monitoring location	L _{A90} Background noise levels (dB(A))		
	Day	Evening	Night
M3 – 23 Clyde Street	57	46	42

Vibration sensitive structures

Some structures may be at greater risk of construction vibration-induced damage.

A non-Aboriginal heritage item has been identified as being located within the vicinity of the proposed modification, as summarised in Table 6-2. The heritage item identified is located within the Batemans Bay Foreshore Park on Clyde Street, downstream of the existing bridge (refer Figure 6-1).

Table 6-2: Identified non-Aboriginal heritage items

Item name	Description	Listing significance
Batemans Bay War Memorial	Red granite obelisk unveiled in 1917	Local
Site of Coal Bunker Wharf	There is currently no physical evidence of the remains of the Coal Bunker Wharf and therefore is not considered to be a vibration-sensitive structure.	Local

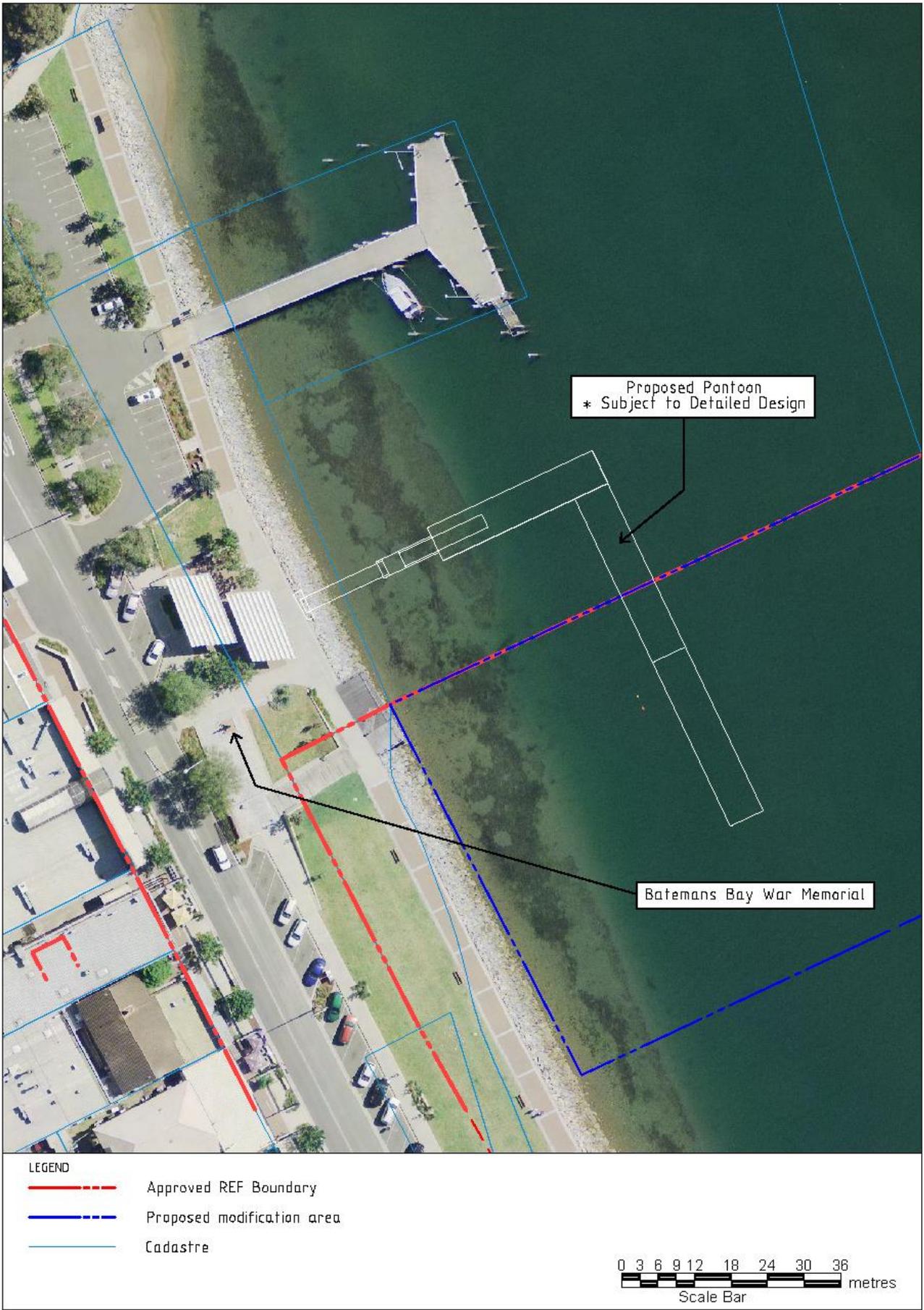


Figure 6-1: Location of non-Aboriginal heritage items in the vicinity of works

6.1.2 Noise and vibration management levels

Noise criteria

The noise management levels (NMLs) for residential receivers, based on the background levels at M3 adopted for the project REF (refer Table 6-1) are provided in Table 6-3. These NMLs have been adopted for the proposed modification.

Table 6-3: Noise management levels at residences ($L_{Aeq(15min)}$ (dBA))

NMLs $L_{Aeq(15min)}$ (dBA)		
Day	Evening	Night
67	51	47

The NMLs for passive recreation and commercial premises identified in the project REF are provided in Table 6-4. These NMLs are similarly considered to be appropriate for the proposed modification and have been adopted. Further details of the NMLs and how they were developed is provided in the noise summary report included at Appendix D to this addendum REF.

Table 6-4: Noise management levels for recreation and commercial land uses ($L_{Aeq(15min)}$ (dBA))

Land use	NML $L_{Aeq(15min)}$ (dBA)
Commercial	70
Passive recreation	60

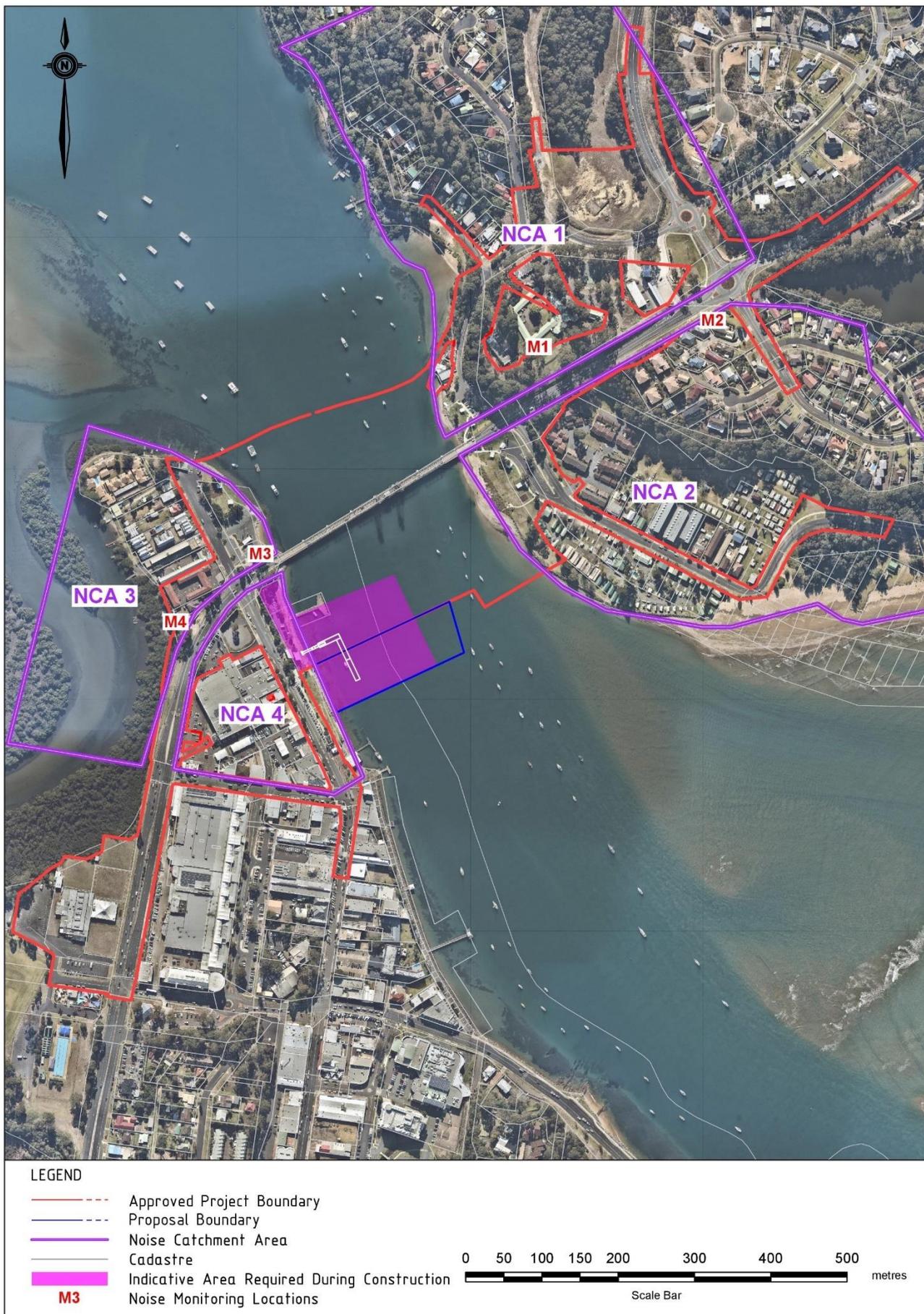


Figure 6-2: Project noise catchment areas and noise monitoring locations

Vibration criteria

Construction vibration criteria for disturbance to occupants and potential damage to buildings are summarised below.

Vibration sources may be continuous, impulsive or intermittent. Continuous vibration is from an uninterrupted source, impulsive vibration occurs where there are up to three instances of sudden impact, and intermittent vibration originates from activities that would result in continuous vibration if operated continuously. Generally, vibration from construction tends to be intermittent.

The preferred and maximum vibration dose values (VDV) for human comfort impacts for continuous, impulsive and intermittent vibration as defined in *Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation, 2006) are identified in Table 6-5.

Table 6-5: Acceptable vibration dose values for continuous, impulsive and intermittent vibration

Location	Daytime		Night-time	
	Preferred Value	Maximum Value	Preferred Value	Maximum Value
Continuous vibration (weighted root mean square vibration levels for continuous acceleration (m/s ²) in the vertical direction)				
Residences	0.010	0.020	0.007	0.014
Offices, schools, educational institutions and places of worship	0.020	0.040	0.020	0.040
Impulsive vibration (weighted root mean square vibration levels for impulsive acceleration (m/s ²) in the vertical direction)				
Residences	0.30	0.60	0.10	0.20
Offices, schools, educational institutions and places of worship	0.64	1.28	0.64	1.28
Intermittent vibration (m/s ^{1.75})				
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80

Note: ¹. Daytime is 7:00am to 10:00pm and night-time is 10:00pm to 7:00am

British Standard BS 7385 sets out vibration limits for transient vibration which are judged to give a minimal risk of vibration induced damage to effected buildings. The limits for residential and industrial buildings are shown in Table 6-6.

Table 6-6: British Standard BS 7385 structural damage criteria for transient vibration

Group	Type of Structure	Damage Level	Peak Component Particle Velocity ¹ (mm/s)		
			4 – 15 Hz	15 – 40Hz	≥40Hz
1	Reinforced or framed structures Industrial and heavy commercial buildings	Cosmetic	50	50	50
2	Un-reinforced or light framed structures Residential or light commercial type buildings	Cosmetic	15 - 20	20 - 50	50

Note: ¹ Peak Component Particle Velocity is the maximum Peak particle velocity in any one direction (x, y, z) as measured by a tri-axial vibration transducer.

German Standard DIN 4150 also provides recommended maximum levels of vibration that reduce the likelihood of building damage caused by vibration and are generally recognised to be conservative.

Criteria relating to heritage structures have been adopted from DIN 4150 and are summarised in Table 6-7. Based on DIN 4150, a measured value exceeding those listed in Table 6-7 will not necessarily lead to damage if it is significantly exceeded, however, further investigations may be necessary.

Table 6-7: German Standard DIN 4150 structural damage criteria

Type of structure	Guideline values for vibration velocity (mm/s)		
	1 - 10 Hz	10 - 50 Hz	50 - 100 Hz ¹
Structures that, because of their particular sensitivity to vibration, cannot be classified above and are of great intrinsic value (e.g. listed buildings under a preservation order).	3	3 - 8	8 - 10

¹ At frequencies above 100 Hz the values given in this column may be used as minimum values.

6.1.3 Construction noise assessment methodology

A noise assessment has been undertaken by Qubist Pty Ltd as part of the addendum REF to assess the potential noise impacts from the proposed modification. The Roads and Maritime Construction and Maintenance Noise Estimator has been used for the assessment and has been applied in accordance with the *Construction Noise and Vibration Guideline* (CNVG) (Roads and Maritime, 2016). The noise assessment is documented in the noise summary report in Appendix D.

Background noise levels at 23 Clyde Street in Batemans Bay (refer Figure 6-2) were adopted in the assessment to represent the background noise levels in the vicinity of the proposed modification. The adopted NMLs for the proposed modification are provided in Table 6-3 and Table 6-4.

The Construction and Maintenance Noise Estimator was used to calculate the predicted noise levels for standard construction hours due to the proposed modification. For the purposes of the noise assessment, the bridge works scenario in the distance-based scenario calculation sheet in the Construction and Maintenance Noise Estimator was used. This scenario is the closest scenario to the proposed works and represents a conservative 'worst case scenario' with a sound power level of L_{Aeq} 120 dB(A).

The CNVG provides a methodology to identify whether the works would affect many, few or no receivers, based on the 'Affected Distance', which is the distance up to which noise levels are expected to exceed the NML and within which receivers may be impacted to different degrees. The distance-based scenario calculation sheet for bridge works in the Construction and Maintenance Noise Estimator identified the 'Affected Distance' for residential and non-residential receivers during standard construction hours for the proposed modification works to be:

- 140 metres for residential receivers
- 85 metres for offices and retail outlets
- 215 metres for passive recreation areas.

In addition, where noise from construction may be propagated over water, i.e. across the Clyde River, the 'Affected Distance' for receivers during standard construction hours for the proposed modification works is estimated to be:

- 170 metres for residential receivers
- 100 metres for offices and retail outlets
- 280 metres for passive recreation areas.

The noise assessment carried out for the proposed modification included sensitive receivers located within these distances from the site of the proposed modification.

6.1.4 Potential impacts

Construction noise impacts

There are 13 potentially impacted receivers located near the proposed modification as shown in Figure 6-3 and listed in Table 6-8. There are no residential receivers located within the Affected Distance of the proposed modification. A total of 11 commercial / retail receivers are located in the vicinity of the Clyde Street retail / restaurant precinct adjacent to the southern foreshore. Two public picnic areas, considered to be of passive recreation land use, would be potentially impacted by noise due to the proposed modification. A public picnic and playground area known as the South Western Picnic Area, located adjacent to Clyde Street upstream of the existing Batemans Bay Bridge, would be within the Affected Distance of the proposed modification. A second public space and picnic area is located adjacent to the southern foreshore, downstream of the existing Batemans Bay Bridge and T-Wharf.

It should be noted that no residential receivers are expected to be potentially impacted by the proposed modification as no residential receivers fall within the relevant Affected Distance.

When considering propagation of noise from the proposed modification over the Clyde River, no receivers were identified as being within the Affected Distance of the works.

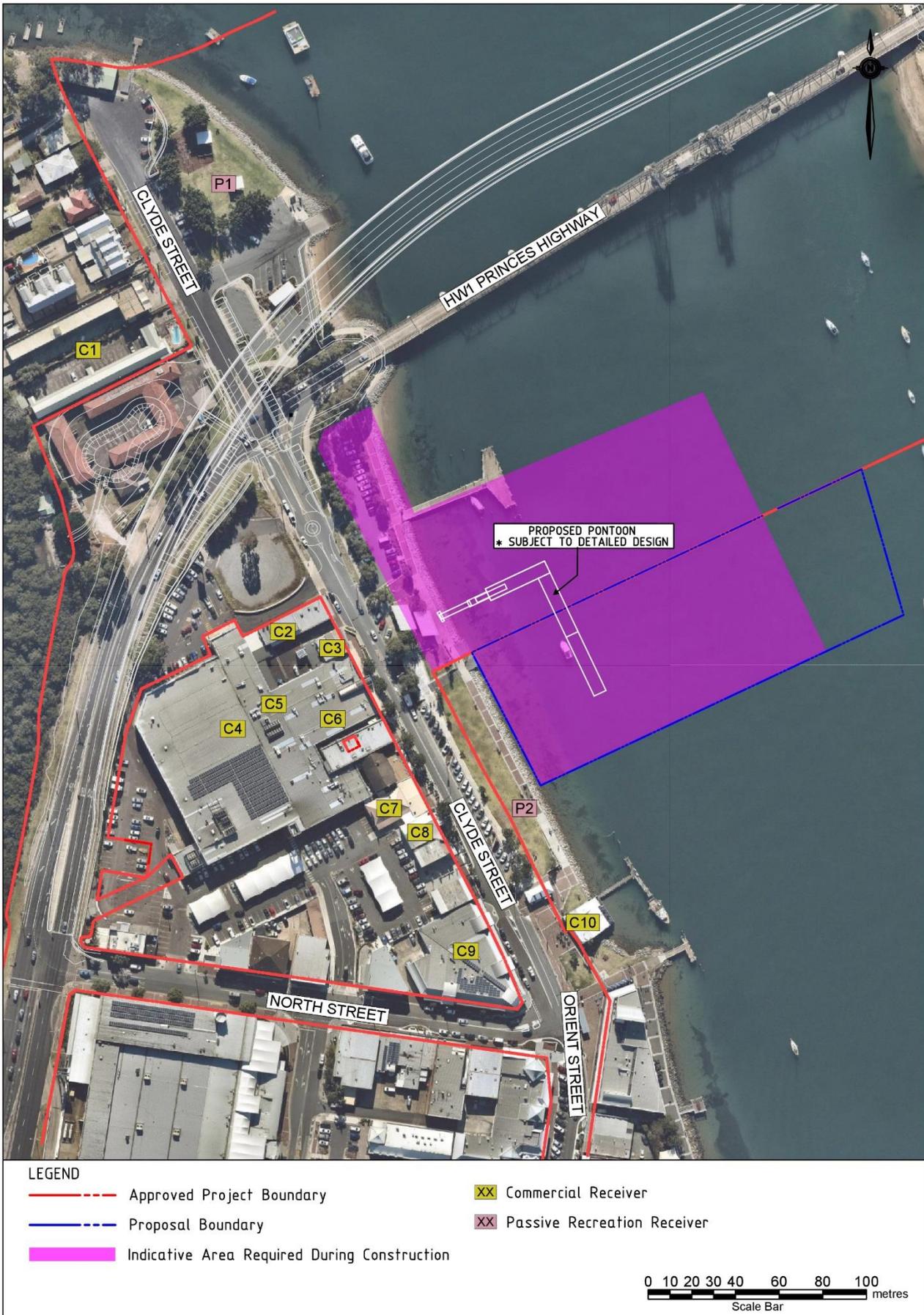


Figure 6-3: Potentially impacted receivers from the proposed modification

Construction noise impacts were predicted to the receiver locations surrounding the proposed modification by modelling the noise sources, receiver locations and construction activities as outlined in section 6.1.3.

The noise assessment predicted noise levels at potentially impacted receivers and compared these to the adopted NMLs. Results of the assessment are shown in Table 6-8. It should be noted that the construction noise impacts presented in Table 6-8 are based on the worst-case noise construction scenario and are a conservative estimate. Receivers highlighted in **bold** font indicate an increase in maximum predicted noise levels from construction of the proposed modification compared to the project REF, as amended by the submissions report.

Table 6-8: Predicted noise levels at receivers during standard construction hours

ID	Sensitive receiver	Type of receiver	Shortest distance from site (m)	NML (dB(A))	Predicted noise level L_{Aeq} (15 min) (dB(A))	Level above NML dB(A)
P1	South Western Picnic Area	Passive recreation	60	60	73	13
P2	Southern Foreshore Picnic Area	Passive recreation	0	60	93	33
C1	29 Clyde Street, Batemans Bay	Commercial	76	70	71	1
C2	19 Clyde Street, Batemans Bay	Commercial	15	70	84	14
C3	17 Clyde Street, Batemans Bay	Commercial	15	70	84	14
C4	13 Clyde Street, Batemans Bay	Commercial	15	70	84	14
C4	13 Clyde Street, Batemans Bay	Commercial	15	70	84	14
C5	11 Clyde Street, Batemans Bay	Commercial	15	70	84	14
C6	9 Clyde Street, Batemans Bay	Commercial	15	70	84	14
C7	7 Clyde Street, Batemans Bay	Commercial	38	70	76	6
C8	5 Clyde Street, Batemans Bay	Commercial	43	70	75	5
C9	1 Clyde Street, Batemans Bay	Commercial	62	70	73	3
C10	1C Orient Street, Batemans Bay	Commercial	60	70	73	3

Up to seven commercial receivers, highlighted in **bold** font in Table 6-8, are expected to experience an increase in maximum predicted noise levels compared to the project REF, as amended by the submissions report, for a single construction phase. The public green space/ picnic area on the southern foreshore was not considered in previous NVAs. The remainder of receivers would experience maximum predicted noise levels either equal to or less than the noise levels assessed in the project REF, as amended by the submissions report.

A total of eight receivers are predicted to exceed the highly noise affected level of 75 dB(A) during standard construction hours due to the proposed modification, as highlighted in **bold** font in Table 6-8. Seven receivers are commercial premises, including restaurants and shops located within the commercial retail/ dining district located on Clyde Street, adjacent to the southern foreshore. Exceedances of up to 14 dB(A) of the day time NMLs could occur at these sensitive receivers due to the proposed modification.

The Southern Foreshore Picnic Area is located directly adjacent to the construction area for the proposed modification. Exceedances of up to 33 dB(A) of the daytime NML could occur at this location during

construction of the proposed modification. Public enjoyment of this recreation area would likely be disturbed during some periods of construction.

No residential receivers are predicted to be impacted by noise as a result of the proposed modification.

The proposed modification would be expected to result in similar noise impacts to those assessed in the project REF for demolition of the existing T-Wharf. This is supported by the Construction and Maintenance Noise Estimator scenario for house/ building demolition which has an estimated total sound power level of L_{Aeq} 122 dB(A), compared to the bridge works scenario sound power level of L_{Aeq} 120 dB(A) that has been adopted for the noise assessment for the proposed modification.

Construction of the new floating pontoon about 40 metres downstream of the T-Wharf would result in a minor shift in location in the source point of construction noise compared to the project REF. The construction of the new floating pontoon would have the potential to result in minor increases in noise impacts for sensitive receivers located in close proximity to the proposed location for the new pontoon. However, sensitive receivers located in close proximity to the T-Wharf would have the potential to experience minor decreases in noise impacts due to the retention of the T-Wharf in its existing location.

The construction impacts presented in Table 6-8 are based on the worst-case noise construction scenario for bridge works assuming all equipment operates concurrently, that there are minimal offset distances between equipment and receivers and no barriers or site hoardings to mitigate noise measures.

The proposed modification is expected to produce noise levels less than those provided in Table 6-8. The Contractor would re-assess the construction noise impacts due to the proposed modification in accordance with the ICNG and CNVG based on actual construction scenarios, timings, offset distances and equipment developed as part of a construction noise and vibration impact statement (CNVIS). The CNVIS would describe the construction impacts and the necessary noise management and mitigation measures in line with the CNVG to be implemented through the Contractor's Noise and Vibration Management Plan (NVMP).

The CNVG provides a range of standard noise management measures to be implemented to reduce construction noise impacts to affected receivers. The Contractor's NVMP includes a range of best practice environmental control measures consistent with the CNVG to minimise noise impacts during construction.

Where standard mitigation measures have been applied and noise levels continue to exceed the NMLs, additional mitigation measures outlined in the CNVG should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Recommended additional feasible and reasonable mitigation measures, based on the results of the noise assessment, are identified by the Construction and Maintenance Noise Estimator. Users of the two public green space/picnic areas at the southern foreshore would be provided with advance warning of noise impacts to these amenities at least five working days prior to the commencement of works. Community notifications regarding these impacts may include installation of signage near the area, notifications on the project website and letterbox drops to nearby premises if considered effective. Verification of predicted noise levels would occur if required.

More stringent mitigation measures would be implemented to minimise potential noise impacts at commercial premises in the Clyde Street precinct near the proposed modification. The measures to be implemented would include letterbox drop or equivalent communications, phone calls, verification of predicted noise levels and respite offers. These additional mitigation measures are outlined in more detail in the noise summary report attached at Appendix D.

Mitigation measures to be implemented would be reconfirmed by the CNVIS prior to construction of the proposed modification, and any changes to the management measures considered appropriate to minimise noise impacts documented.

Construction traffic noise impacts

The nature and scale of construction traffic noise impacts is consistent with those described in section 6.6.4 of the project REF and section 4 of the NVA.

Construction vibration impacts

Vibration generated by construction plant for the project is discussed in section 6.6.4 of the project REF and section 5 of the NVA.

The expected major source of vibration from the proposed modification would be from piling activities for construction of the new floating pontoon. Vibration impacts would also likely occur during use of excavators and jackhammers during construction. The extent of potential construction vibration impact would depend on the type of equipment operating, activities being carried out, separation distances and intervening ground conditions.

The CNVG recommends minimum working distances for vibration intensive plant from sensitive receivers, which are consistent with those listed in section 5 of the NVA. Table 6-9 shows some of the indicative key plant items relevant to the proposed modification and their recommended working distances. Plant and equipment to be used for the proposed modification would be confirmed prior to commencement of construction. Note that the values for cosmetic damage in Table 6-9 relate to residential and commercial structures.

Table 6-9: Recommended minimum working distances for vibration intensive plant from sensitive receiver

Plant / activity	Rating description	Minimum working distance (m)		
		Cosmetic damage ¹	Heritage and sensitive structures ²	Human response ³
Vibratory pile driver	Sheet piles	2 to 20	5 to 30	20 to 50
Medium hydraulic hammer	900 kg (12 to 18 tonne)	7	15	23
Large hydraulic hammer	1600 kg (18 to 34 tonne)	22	44	73
Impact piling	Typical driven pile	20	30	110
Jackhammer	Hand held	1 (nominal)	3	5
Excavator	≤ 30 tonne (travelling/digging)	10	15	15
Truck movements	-	-	-	10
Heavy vehicle traffic	On uneven construction haul roads	5	10	20

¹ BS 7385 British Standard (1993). Evaluation and measurement for vibration in buildings Part 2

² German Standard DIN 4150. Structural vibration in buildings - Effects on Structure Part 3

³ Department of Environment and Conservation (2006) Assessing Vibration: a technical guideline

For the proposed modification, the approximate distance to the nearest buildings from the indicative construction area is 15 metres. However, vibration intensive plant such as equipment that may be required for piling for the new floating pontoon would be expected to operate at distances exceeding the minimum working distances from buildings detailed in Table 6-9. For structural impacts, it is considered that there

would be a low risk of cosmetic damage due to the proposed modification. However the vibration criteria for cosmetic damage must be complied with at all times and as such vibration monitoring would be undertaken when vibratory works are close to or within the recommended safe working distances to ensure that the criteria for cosmetic damage is not exceeded.

The DIN 4150 guidelines state that when vibration intensive works are to be conducted within 25 metres of any heritage items, sensitive structures or dwellings, there is potential to encroach on the safe working distance. One heritage item, the Batemans Bay War Memorial, would be located within 25 metres of the proposed location for construction of the new floating pontoon. The safe distances for some vibration intensive plant identified in Table 6-9 have the potential to encroach on this structure. Where works will potentially occur within the minimum working distance according to Table 6-9, all reasonable and feasible vibration mitigation measures would be implemented and vibration monitoring should be considered prior to commencing the activity to ensure that the DIN 4150 guidelines are not exceeded.

Vibration caused by piling activities for the proposed modification has a higher likelihood of causing human annoyance at greater distances from the construction area, with receivers up to 73 metres from the point source of the impact being potentially exposed to vibration levels in excess of the human response criteria. Due to the location of the proposed modification within a highly urbanised and pedestrianised area, there may be other instances during construction where vibration intensive activities occur within the minimum working distances for human response. However, in relation to human comfort (response), the minimum working distances in Table 6-9 relate to continuous vibration. Vibration emissions would generally be short and intermittent in nature for the proposed modification.

Operation noise and vibration impacts

No noise and vibration impacts additional to those assessed in the project REF, as amended by the submissions report, would occur due to the proposed modification during operation.

6.1.5 Safeguards and management measures

The impacts of the proposed modification would be managed through the implementation of the noise and vibration safeguards and management measures identified in Table 7-1 of this addendum REF. Specifically, the standard and additional safeguards documented in the Contractor's NVMP would be applied to the proposed modification to ensure that all reasonable and feasible effort is made to minimise noise and vibration generated by the proposed modification.

6.2 Soil and water quality

6.2.1 Existing environment

A summary of the existing soil and water quality environment is included in section 6.4.2 of the project REF.

6.2.2 Potential impacts

Potential soil and water quality impacts are identified in section 6.4.3 of the project REF and section 4.8.4 of the submissions report.

Construction

Potential impacts on soils and water quality from the proposed modification during construction include erosion and sedimentation, disturbance of the river bed and bank, spills and leaks of fuel, oils and other chemicals, acid sulfate soils and stockpiling of materials.

Land-based construction activities for the proposed modification that would have the potential to cause impacts to water quality would include establishment of a temporary construction and laydown area in the public car park area, land-based piling, minor excavation and other earthworks, concrete work and other minor works. Land on the southern foreshore of the Clyde River at the location of the proposed new pontoon was identified in the project REF as having a high probability of the presence of acid sulfate soils. Surface excavation required for the proposed modification could expose acid sulfate soils, with potential for acidification. Other potential impacts arising from land-based construction activities would include erosion, runoff and spills due to vehicles and plant. Stockpiling of materials for the proposed modification would be primarily limited to clean rock fill for construction of a temporary working platform, if used.

In-stream construction activities for the proposed modification that would have the potential to cause impacts to water quality would include piling, installation of the pontoon gangway and segments, removal of the remnant low level access structure downstream of the T-Wharf, installation and removal of a temporary working platform, cofferdams and containment structures if used, and vessel movements. The proposed modification would have the potential to impact water quality within the proposal area and downstream areas of the Clyde River. Minor water quality impacts that may occur due to piling and installation of the floating pontoon would be associated with disturbance to river bed sediments, causing a potential increase in turbidity. Potential release of sediments to the waterway would also be associated with the removal of the remnant low level access structure located downstream of the existing T-Wharf. In-stream works such as piling may also disturb acid sulfate soils, with potential for release of aluminium, iron and arsenic into the water column which may affect water quality and harm aquatic life.

The temporary working platform, if constructed for the proposed modification, would primarily involve installation and removal of clean rock and geofabric into the river bed. These activities would be likely to result in minor disturbance of river sediments, with potential for generation of turbidity. Containment measures such as a sheet piled cofferdam, if used, would reduce the potential for water quality impacts. Spills and leaks of fuel or oil from plant and equipment using the temporary working platform could contaminate the waterway. Dewatering activities may also result in contamination of the river if not adequately managed. A storm or flood event could cause inundation of the working platform, resulting in water quality impacts due to erosion and runoff and potential loss of equipment and materials into the river system. However, the design of the working platform would consider storm and flood events and may include containment measures. The working platform would present a negligible risk of eroding in a large storm or flood event. The temporary working platform would primarily use clean rock fill with no fines and would not use earth fill to minimise sedimentation. Any materials incorporating fines would be located above high astronomical tide and erosion and sediment controls used to prevent fines entering the waterway.

Installation and removal of cofferdams, if used for construction of the new floating pontoon, would have the potential to disturb the river bed, resulting in sedimentation and impacts on water quality. Scour of the river bed along the cofferdam may occur due to the tidal nature of the Clyde River. Cofferdams, if required, would be temporary in nature and removed following completion of construction.

With the implementation of appropriate safeguards and management measures the risk and extent of water quality impacts during construction would be expected to be minor.

Operation

During operation, provision of a new floating pontoon downstream of the existing T-Wharf would result in a new and additional source point for potential water quality impacts such as pollution from boat users. The increase in berthing space provided by the proposed modification would be expected to result in increased

use of the waterway by public boat users and tourist boat operators. An increase in maritime traffic may be associated with greater risk of water quality impacts to the river. Reduced water quality may have flow-on impacts on aquatic flora and fauna. The risk and extent of water quality impacts during operation would be expected to be minor.

6.2.3 Safeguards and management measures

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

6.3 Landscape character and visual impact

6.3.1 Existing environment

A summary of the existing landscape character and visual impact environment is included in section 6.1.2 of the project REF.

The southern foreshore area is located within landscape character zone H, The Promenade. The project REF assessed the level of sensitivity of this zone as high due to its popularity with the local community and visitors to the area. The T-Wharf and proposed new floating pontoon extend into landscape character zone A, rivers and creeks, which comprises the Clyde River. The project REF assessed the level of sensitivity of this zone as high due to its scenic and recreational value strongly contributing to the overall character of the setting.

6.3.2 Potential impacts

Potential impacts on landscape character and visual are included in section 6.1.3 of the project REF and section 4.8.1 of the submissions report.

Construction

The project REF assessed that the project would result in moderate to high impacts to the Clyde River (rivers and creeks) and southern foreshore (Promenade) visual catchments and landscape character zones. Temporary visual impacts on the southern foreshore and river could be reasonably expected during construction of the proposed modification. The proposed modification would result in a minor increase in the extent and intensity of visual impacts on the southern foreshore during construction. These impacts would be associated with construction of the new floating pontoon about 40 metres downstream of the existing T-Wharf. There would also be a minor increase in visual impacts due to construction of a working platform and containment measures off the southern foreshore, if used.

The in-stream construction area for the new floating pontoon would be visible from the southern foreshore and would extend into the Clyde River beyond the approved REF boundary. The works would also be visible by users of the waterway.

The proposed modification would result in a reduction of visual impacts associated with the demolition of the main T-Wharf structure. However, some visual impacts would still be associated with the presence of plant and equipment required for removal of the remnant low level access structure downstream of the existing T-Wharf.

Land used for construction of the proposed modification would be rehabilitated following construction, consistent with the commitment in the project REF.

While the proposed modification would result in some visual and landscape character impacts during construction, these impacts would be short term and temporary in nature.

Operation

The proposed modification would impact on the landscape character of the southern foreshore area during operation. The proposed modification would result in the addition of a new floating pontoon into the landscape, downstream of the existing T-Wharf which would be retained in place. The new floating pontoon would be located in a highly visible and heavily visited area by locals and tourists adjacent to the Clyde River. This would extend the area of visual impact with two structures in place during operation.

The location and design of the new floating pontoon would consider the proximity of community infrastructure such as walkways, public foreshore amenities and local businesses. The new floating pontoon would be designed and constructed to ensure that it contributes to the urban landscape and functioning of the southern foreshore area, consistent with the commitments in the project REF. Its design would ensure there are minimal impacts to existing views along the southern foreshore, with the design to include sight lines that respect and are sensitive to the existing surroundings.

Overall, there would be a permanent change in views and amenity along the southern foreshore and to vistas of the river due to the proposed modification. Urban design principles and objectives developed specifically for the project would be implemented to minimise the impact of the proposed modification during operation. A concept design for the new floating pontoon is included at Appendix A. The concept design highlights the incorporation of urban design principles for the proposed modification that are sensitive to the existing environment.

The proposed modification would have positive benefits to local amenity during operation as it would provide an increase in space for casual berthing of vessels of all sizes and improve the connection between the town and the river. The additional berthing space created by the new floating pontoon would also be likely to improve efficiency for those using these facilities to access the Clyde River and foreshore areas. The new facilities provided by the proposed modification would be likely to encourage an increase in use and appreciation of the foreshore area, with benefits for the functioning and value of the foreshore promenade landscape character.

The addition of the new floating pontoon combined with retention of the T-Wharf would be expected to enhance the experience for boat users on the Clyde River. This would enhance the recreational value of the waterway, having a positive impact on the river landscape character.

6.3.3 Safeguards and management measures

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

6.4 Hydrology and coastal processes

6.4.1 Existing environment

A summary of the hydrology and coastal processes are included in section 6.3.2 of the project REF. A hydrology and coastal processes assessment was included at Appendix E to the project REF. Subsequent to determination of the project, an independent coastal impact assessment for the project was prepared by GHD in March 2019. The stage one report assessed the impact that the project would have on the riverbed and shoreline as well as waves, flooding, tides and currents in the Clyde River compared to the existing bridge.

A hydrology and hydraulic memorandum was prepared by GHD in May 2020 to assess the impact of the proposed modification on hydrology and coastal processes. This included an assessment of the proposed modification on 1% Annual Exceedance Probability (AEP) and Probable Maximum Flood (PMF) conditions, during construction and operation. The assessment also considered the impacts of the proposed modification on local coastal erosion during construction and operation. Proposed mitigation measures to be adopted during design and construction are also provided within the assessment.

The hydrology and hydraulic memorandum is included at Appendix E of this addendum REF.

The riverbed and banks of the Clyde River in the vicinity of the proposed modification are primarily comprised of sands and gravels. The southern bank of the Clyde River downstream of the bridge near the proposed modification is fully protected by rock revetments and rock training walls. This would suggest that the southern riverbank in the vicinity of the proposed modification would be resilient to erosion and sediment movement.

6.4.2 Potential impacts

Potential impacts on hydrology and coastal processes associated with the determined project are included in section 6.3.3 of the project REF and section 4.1.2 of the submissions report.

Construction

If used for construction, the presence of a temporary working platform in the Clyde River environment would introduce an obstruction to river flows. Modelling carried out for the addendum REF considered the impact of the temporary working platform on water levels and river flow during a range of scenarios for 1% AEP flood and PMF events, taking into account the cumulative impacts of tides and storm surge.

The results of the modelling suggest that during a worst case 1% AEP flood or PMF event (with simultaneous tide and storm surge processes), a change in flow velocities has the potential to result in the accumulation of sediment around the temporary working platform. Sediment accumulation could occur in an area extending up to a 20 metre radius from the temporary platform. Increases in water levels would be up to 0.25 metres and may occur both upstream and downstream of the temporary working platform. Such minor increases would be mostly contained within the river.

The increases in water levels and flows due to the proposed modification during construction would be expected to be minor and unlikely to cause any adverse social and environmental impacts to the adjacent area. The magnitude of the changes would be imperceptible when considering natural variations associated with wind, waves, and tides in the river environment.

Flooding during construction of the proposed modification could result in damage or loss of materials, plant and equipment. Due to the location of the construction area for the proposed modification, flooding could result in erosion of the temporary work areas associated with construction of the new floating pontoon. Silt curtains installed in the Clyde River during construction could be washed downstream during a flood.

The proposed modification during construction is unlikely to have a substantial impact on hydrology and coastal processes, and would not be expected to exacerbate flood levels compared to the pre-construction scenario.

Operation

Hydraulic modelling carried out for the new floating pontoon found that while the introduction of the floating pontoon into the river environment would have the potential to impact on river flows downstream of the pontoon, it would not be expected to result in substantial impacts on water levels or river flows during a 1% AEP flood or PMF event. The modelling also considered the worst case scenario cumulative impacts of tides, storm surge and sea level rise with the flood events.

Modelled changes in water levels and flows in the Clyde River due to the new floating pontoon during operation would not be expected to result in any adverse social and environmental impacts in the surrounding area. It is considered that any increases to water levels and flows would be negligible when taking into account the natural variations associated with wind, waves, and tides during an intense flood event.

The impact from the new floating pontoon on the shoreline morphology would be largely limited due to the presence of the rock revetment on the southern shoreline of Clyde River which provides erosion protection.

A significant local flood event could produce flows in the Clyde River that could result in erosion of the riverbed, however, any scouring of the riverbed would be highly localised to the area in the immediate vicinity of the pontoon piles and existing revetment toe.

The new floating pontoon during operation is unlikely to have a substantial impact on hydrology and coastal processes, and would not be expected to exacerbate flood levels compared to the pre-construction scenario.

6.4.3 Safeguards and management measures

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

In addition to the safeguards and management measures detailed in Table 7-1, the following new measures are proposed:

ID	Impact	Environmental safeguard	Responsibility	Timing
H7	Temporary working platform	<i>Consideration will be given to construction methods that eliminate the need for a temporary working platform. If required for construction, the temporary working platform will be designed to minimise disturbance to the shoreline and riverbed. The temporary working platform would be designed in consultation with, and to the satisfaction of, DPIE (Regions, Industry, Agriculture & Resources and Batemans Marine Park).</i>	Contractor	Detailed design

ID	Impact	Environmental safeguard	Responsibility	Timing
H8	Temporary working platform - existing rock revetment	<p>Should a temporary working platform be required, the following will be undertaken:</p> <ul style="list-style-type: none"> • a review of work-as-constructed drawings (if available) • a dilapidation survey and condition assessment of the existing revetment on the southern foreshore at least 100m up- and downstream of the temporary working platform location prior to commencement of construction of the new floating pontoon • monitoring of the stability of the existing revetment will be carried out during construction • following a high-discharge flow event, an assessment will be undertaken to confirm the stability of the existing revetment at least 100m up- and downstream of the temporary working platform location. 	Contractor	Detailed design/construction
H9	Impact to riverbed and flow conditions	<p>The new floating pontoon will be designed to minimise scour and disturbance to the natural river flow conditions. The following measures should be considered during detailed design:</p> <ul style="list-style-type: none"> • minimising the number of piles in the waterway • alternative fixing methods such as elastic mooring and anchoring • minimising scour by providing additional pile length, implementation of scour protection, or a combination of multiple measures. 	Contractor	Detailed design

6.5 Other impacts

6.5.1 Existing environment and potential impacts

Environmental factor	Existing environment	Potential impacts
Biodiversity	<p>A summary of the existing environment is included in section 6.2.2 of the project REF and section 4.1.2 of the submissions report. A supplementary biodiversity assessment was carried out as part of the CEMP for the project. This assessment included mapping of seagrass along the foreshore of the Clyde River.</p> <p>The proposed modification is located on the southern foreshore and extends into the Clyde River. The foreshore area and riverbank in the vicinity of the proposed modification have been substantially modified for boat launching facilities and other recreational activities.</p> <p>The proposed modification is situated within an area of the Clyde River that is considered Type 2 (moderately sensitive sub-tidal sand flat and sparse <i>Zostera</i>), and Class 1 Major Key Fish Habitat. Seagrass and macroalgae beds are located within proximity of the proposed modification. However, the</p>	<p>Potential impacts on biodiversity are included in section 6.2.3 of the project REF and section 4.8.2 of the submissions report.</p> <p>Construction</p> <p>The proposed modification would involve construction activities adjacent to and within the Clyde River environment. Construction activities for the proposed modification that have the potential to disturb the riverbank or benthic substrates would include earthworks, piling, extraction of the remnant low level access structure and construction of a temporary working platform, cofferdams and containment measures, if required.</p> <p>These construction activities could result in increased turbidity of suspended sediments, erosion and sedimentation. These processes have the potential to reduce light penetration and cause smothering of marine vegetation, including seagrass and macroalgae beds. Areas of seagrass may be impacted during in-stream works for the new floating pontoon, however, the proposed modification would not result in any impact beyond what has been assessed in the project REF.</p> <p>Modelling of the impact of the temporary working platform on the river hydrology found that during a significant flood event, an accumulation of sediment may occur in an area surrounding the temporary working platform. This process could result in a blanketing effect of marine vegetation in the vicinity of the temporary working platform.</p> <p>As a consequence of these impacts, aquatic fauna would also potentially be affected both directly and indirectly through loss of habitat condition.</p>

Environmental factor	Existing environment	Potential impacts
	<p>seagrass beds are generally patchy and in poor condition.</p> <p>Biodiversity assessments and field surveys carried out for the project have identified the potential for presence of migratory and non-migratory aquatic fauna, including Australian Grayling, turtles, dolphins and seals in the Clyde River.</p>	<p>Works for the proposed modification may also disturb acid sulfate soils, with potential for release of aluminium, iron and arsenic into the water column which may affect aquatic flora and fauna. Water pollution resulting from leaks or spills from construction vehicles, vessels, barges or equipment operating adjacent to or within the river could reduce water quality and may impact aquatic habitats and species.</p> <p>Impacts to aquatic biodiversity would be generally consistent with the impacts assessed in the project REF and no additional areas of clearing of seagrass would be required for the proposed modification.</p> <p>Operation</p> <p>Provision of a new pontoon downstream of the existing T-Wharf would result in a new source point for potential water quality impacts such as pollution from boat users which may have flow-on impacts on aquatic flora and fauna. The risk and extent of these impacts would be minor.</p> <p>Light spill from lighting installed on the new floating pontoon would have the potential to impact aquatic fauna.</p> <p>The proposed modification would not result in any additional impacts terrestrial or marine vegetation, including seagrass. There would be no additional impacts to 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 proposed modification is not likely to significantly impact threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the biodiversity safeguards and management measures identified in Table 7-1 of this addendum REF.</p>

Environmental factor	Existing environment	Potential impacts
		<p>Existing safeguard B9 has been modified to address potential light spill impacts from the new floating pontoon on the aquatic environment:</p> <p>Measures to minimise light spill into the waterway and vegetated areas from the new bridge and approaches and new floating pontoon on the southern foreshore will be considered during detailed design.</p>
Traffic and transport	A summary of the existing traffic and transport environment is included in section 6.7.2 of the project REF.	<p>Potential traffic and transport impacts are included in section 6.7.3 of the project REF and section 4.1.2 of the submissions report.</p> <p>Construction</p> <p>Construction of the proposed modification would result in negligible traffic impacts.</p> <p>Construction of a temporary working platform and cofferdams, if used for the proposed modification, would require importation of rock and other materials, as well as equipment and plant to the construction area, resulting in vehicle movements to transport these items to the construction area. .</p> <p>Public access to the T-Wharf would be maintained throughout the duration of the work however some temporary partial closures of the downstream side of the T-Wharf during construction of the new floating pontoon would be required. The proposed modification may require temporary changes to pedestrian movements and access along the southern foreshore during some construction activities to ensure the safety of the public. The public would be notified in advance of any changes to access to the T-Wharf and the southern foreshore area.</p> <p>The proposed modification would result in a reduction in vessel and barge movements associated with the demolition of the main T-Wharf structure. There would be some additional vessel and barge movements within the southern portion of the river in the proposal boundary area associated with construction of the new pontoon. Any additional maritime vessel or barge movements required for the proposed modification would be minor.</p>

Environmental factor	Existing environment	Potential impacts
		<p>A maritime exclusion zone may be temporarily implemented for a section of the Clyde River downstream of the T-Wharf to ensure the safety of the public. The navigation channel would be maintained past the worksite and access to the T Wharf would not be prohibited.</p> <p>Operation</p> <p>During operation, the proposed modification would result in positive impacts to maritime transport and access. Retention of the existing T-Wharf in conjunction with construction of a new floating pontoon would provide additional berthing capacity for vessels. Retention of the T-Wharf would allow boats that prefer a fixed structure to continue to use the T-Wharf, providing benefits in terms of flexibility of use by different vessel types. These improvements would have the potential to result in minor increases in maritime traffic on the river, with potential associated increases in vehicle and pedestrian movements in the southern foreshore area.</p> <p>By retaining the T-Wharf, current vehicle access amenity would not be affected.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the traffic and transport safeguards and management measures identified in Table 7-1 of this addendum REF.</p>
Socio-economic	A summary of the existing socio-economic environment is included in section 6.9.2 of the project REF.	<p>Potential socio-economic impacts of the project are included in section 6.9.3 of the project REF and section 4.1.2 of the submissions report.</p> <p>Construction</p> <p>No socio-economic impacts additional to those assessed in the project REF, as amended by the submissions report, would be expected due to the proposed modification during construction.</p>

Operation

The proposed modification would directly and indirectly result in positive socio-economic benefits for the local community and more broadly.

Retention of the T-Wharf would have a positive socio-economic impact as this would meet the desired outcome of community members to retain the T-Wharf for use. By retaining the existing T-Wharf and constructing a new floating pontoon on the southern foreshore, the proposed modification would provide an increase in berthing capacity for various types of vessels, including cruise ship tenders, close to the Batemans Bay CBD. Vehicle access to the T-Wharf would not be affected, in line with the feedback from the community. The improved connection between the river and town centre would have the potential to result in economic benefits for the community through increased use of the foreshore area. However, the condition of the existing T-Wharf and its expected remaining useful life should be considered in the assessment of the benefits highlighted above.

The wider Batemans Bay business community would be likely to benefit from the positive flow-on impacts of increased tourism, foot traffic and use of the Clyde River generated by the upgraded recreational facilities and access provided by the proposed modification. The location of the new floating pontoon in closer proximity to the Batemans Bay town centre relative to the existing T-Wharf would have the potential to generate increased pedestrian traffic from both the local community and visitors to nearby retail businesses and restaurants, contributing to the local economy. The improved amenity and facilities delivered by the proposed modification, such as low level access and additional berthing capacity for a wider range of small vessels and personal watercraft, would enhance the draw for tourists to the local area, while also generating appreciation for the natural environment.

Safeguards and management measures

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

Environmental factor	Existing environment	Potential impacts
Waste management	A description of waste management for the project is included in section 6.11 of the project REF.	<p>Potential impacts of the project on waste management are included in section 6.11.1 of the project REF.</p> <p>Construction</p> <p>No additional waste impacts to those assessed in the project REF, as amended by the submissions report, would be expected due to the construction of the proposed modification. Waste materials generated by the proposed modification could include concrete, rock, clean rock fill, sediment, timber from the removal of the remnant low level access structure, safety fences and signage, erosion and sediment controls and general waste associated with workers. The types and quantity of waste materials expected to be generated due to the proposed modification would be consistent with those assessed in the project REF, as amended by the submissions report. Materials (e.g. clean rock) used to construct the temporary working platform could be re-used for other aspects of construction of the project before being recycled as a recovered aggregate (where possible). Sheet piles and other materials used for construction of cofferdams or other containment measures, if required, would also be re-used. Small quantities of these materials are expected to be treated as waste, however, this is not expected to be substantial.</p> <p>Due to the proposed modification there would be a reduction in waste that would otherwise be generated from demolition of the main T-Wharf structure.</p> <p>Operation</p> <p>No waste impacts additional to those assessed in the project REF, as amended by the submissions report, would be expected due to the proposed modification during operation.</p>

Environmental factor	Existing environment	Potential impacts
		<p data-bbox="976 236 1529 268"><i>Safeguards and management measures</i></p> <p data-bbox="976 284 2045 387">The impacts of the proposed modification would be managed through the implementation of the waste management safeguards and management measures identified in Table 7-1 of this addendum REF.</p>
Air quality	A summary of the existing air quality environment is included in section 6.12.2 of the project REF.	<p data-bbox="976 443 2018 507">Potential impacts of the project on air quality are included in section 6.12.3 of the project REF.</p> <p data-bbox="976 568 1160 600"><i>Construction</i></p> <p data-bbox="976 619 2085 834">Some construction activities associated with the proposed modification would result in the production of dust emissions. Vehicles and plant required during construction of the proposed modification would produce exhaust emissions. Excavation for earthworks required for construction of the new pontoon, working platform and cofferdams or other containment measures would be likely to produce airborne particles and dust.</p> <p data-bbox="976 858 2067 922">Due to the proposed modification there would be a reduction in emissions that would otherwise be generated from demolition of the main T-Wharf structure.</p> <p data-bbox="976 954 1727 986">Overall, air quality impacts would be short term and minor.</p> <p data-bbox="976 1046 1122 1078"><i>Operation</i></p> <p data-bbox="976 1098 2089 1201">No air quality impacts additional to those assessed in the project REF, as amended by the submissions report, would be expected due to the proposed modification during operation.</p>

Environmental factor	Existing environment	Potential impacts
		<p><i>Safeguards and management measures</i></p> <p>The impacts of the proposed modification would be managed through the implementation of the air quality safeguards and management measures identified in Table 7-1 of this addendum REF.</p>
Aboriginal heritage	<p>A summary of the existing Aboriginal heritage is included in section 6.5.2 of the project REF.</p> <p>An Aboriginal cultural heritage assessment and consultation in accordance with the <i>Procedure for Aboriginal cultural heritage consultation and investigation</i> (the PACHCI) was carried out for the project.</p> <p>Desktop research was carried out for the PACHCI assessment to determine the Aboriginal cultural, ethnographic and archaeological context for the project area. This included a search of the Office of Environment and Heritage Aboriginal Heritage Information Management System (AHIMS) database for any sites that had been previously recorded within proximity of the project area.</p> <p>Archaeological investigations identified five Aboriginal archaeological sites within the project area. None of the</p>	<p>Potential impacts on Aboriginal heritage associated with the determined project are included in section 6.5.3 of the project REF.</p> <p><i>Construction</i></p> <p>No impacts to Aboriginal heritage additional to the impacts assessed in the project REF, as amended by the submission report, would be expected due to construction of the proposed modification.</p> <p><i>Operation</i></p> <p>No impacts to Aboriginal heritage additional to the impacts assessed in the project REF, as amended by the submission report, would be expected due to the proposed modification during operation.</p> <p><i>Safeguards and management measures</i></p> <p>The impacts of the proposed modification would be managed through the implementation of the Aboriginal heritage management safeguards and management measures identified in Table 7-1 of this addendum REF.</p>

Environmental factor	Existing environment	Potential impacts
	<p>identified sites are located within the proposed modification area.</p> <p>A Cultural Heritage Assessment was completed for the Batemans Bay Bridge project REF in accordance with the PACHCI. The identified knowledge holders provided cultural and historical information on the broader cultural landscape of the region, however did not identify any specific locations of cultural significance within the REF proposal area. However, the knowledge holders noted that the Bhundoo (Clyde) River broadly, and more specifically the northern banks and river shallows, were a traditionally and historically important area for a wide range of water and land based resources.</p> <p>Directly impacted cultural heritage sites were assessed for their significance based on the principles of the Australia ICOMOS Burra Charter, 1999 (Australia ICOMOS 1999). An Aboriginal Heritage Impact Permit was issued for the project in June 2018.</p>	
Property and land use	A summary of existing property and land use is included in section 6.8.1 of the project REF.	Potential impacts on property and land use associated with the determined project are included in section 6.8.2 of the project REF and section 4.3.2 of the submissions report.

Environmental factor	Existing environment	Potential impacts
		<p>Construction</p> <p>No property acquisition is required for the proposed modification. TfNSW has obtained a lease from Crown Lands to undertake construction work in Property Lots 7321 and 7322 (DP1160086) as part of the project. This area is currently being used as a public car park and is located adjacent to the existing T-Wharf. The proposed modification would likely require use of part or all of this site to allow for storage of materials and equipment and direct access to the foreshore over a temporary period.</p> <p>No additional ancillary sites or additional areas on land to be used for site facilities would be required for the proposed modification.</p> <p>To enable construction of the new floating pontoon, an additional area (approximately 10,000 m²) of the Clyde River located off the southern foreshore and adjacent to the existing project REF boundary would be leased from Crown Lands during construction of the proposed modification. This area of the Clyde River would comprise the proposed extended REF area downstream of the existing T-Wharf, as shown in Figure 1-2. This area would include the main in-stream construction area for the new floating pontoon, and may require a temporary marine exclusion zone to be implemented to prevent entry by public vessels and ensure public safety.</p> <p>Operation</p> <p>Due to the addition of the new pontoon structure in the Clyde River there will be a corresponding change in land use.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the property and land use safeguards and management measures identified in Table 7-1 of this addendum REF.</p>

Environmental factor	Existing environment	Potential impacts
Non-Aboriginal heritage	<p>A summary of the existing non-Aboriginal heritage is included in section 6.10.2 of the project REF.</p> <p>One non-Aboriginal heritage item listed on the Eurobodalla LEP is present in the vicinity of the new floating pontoon, the Site of the Coal Bunker Wharf, however, there are no physical remains.</p> <p>The Batemans Bay War Memorial is located on Clyde Street at the southern end of the public car park, adjacent to the area required to be used for construction of the proposed modification. The war memorial, while not listed as a heritage item in the Eurobodalla LEP or other heritage registers, has local heritage significance and is used as a location for special events such as ANZAC Day and Remembrance Day.</p>	<p>Potential impacts on non-Aboriginal heritage associated with the determined project are included in section 6.10.3 of the project REF and section 4.8.7 of the submissions report.</p> <p>Construction</p> <p>The proposed modification is situated within an area assessed in the project REF as being of moderate archaeological potential. There is the potential for historical mapping inaccuracies or unrecorded archaeological remains to occur within this area. Excavation for earthworks activities at this location has the potential to impact unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin.</p> <p>Pedestrian access to the Batemans Bay War Memorial may be temporarily restricted during construction of the proposed modification to ensure the safety of the public.</p> <p>Operation</p> <p>No impacts to non-Aboriginal heritage additional to the impacts assessed in the project REF, as amended by the submission report, would be expected due to the proposed modification during operation.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the non-Aboriginal heritage management safeguards and management measures identified in Table 7-1 of this addendum REF.</p>
Climate change and sustainability	<p>A summary of the existing environment in regard to climate change and sustainability is included in section 6.13.1 of the project REF.</p>	<p>Potential climate change and sustainability impacts associated with the determined project are included in section 6.13.3 of the project REF.</p>

Environmental factor	Existing environment	Potential impacts
		<p>Construction</p> <p>Construction of the proposed modification would not be expected to generate an increase in the quantity of greenhouse gases (GHG) generated for the project. Vehicle movements arising from the importation and disposal of clean rock and other materials required for construction of the working platform and containment measures would generate GHG emissions.</p> <p>The increase of extreme weather events such as flooding and storm surges associated with climate change may impact the site of the proposed modification. Greater risk of environmental impacts due to such events would be associated with in-stream construction activities, the working platform and cofferdams or other containment measures for the proposed modification. However, considering the temporary nature of these activities and the fact that the proposed modification is expected to be completed within two years, it would not be likely to be impacted in the longer term by climate change.</p> <p>Operation</p> <p>No climate change and sustainability impacts additional to the impacts assessed in the project REF, as amended by the submission report, would be expected due to the proposed modification during operation.</p> <p>Safeguards and management measures</p> <p>The impacts of the proposed modification would be managed through the implementation of the climate change and sustainability management safeguards and management measures identified in Table 7-1 of this addendum REF.</p>

6.6 Cumulative impacts

6.6.1 Potential impacts

A summary of the nearby projects in regard to possible cumulative impacts is included in section 6.14.1 of the project REF.

Construction

No additional projects have been identified that may contribute to cumulative impacts associated with construction of the proposed modification.

Operation

No impacts additional to those assessed in the project REF, as amended by the submission report, would be expected due to the proposed modification during operation.

6.6.2 Safeguards and management measures

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

7. Environmental management

7.1 Environmental management plans

A number of safeguards and management measures have been identified to minimise adverse environmental and social impacts which could 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, incorporated into the Contractor's 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 for the project, as included in the submissions report, are summarised in Table 7-1. Additional and modified safeguards and management measures identified in this addendum REF are included in bold and italicised font. The safeguards and management measures will be incorporated into the detailed design phase of the proposed modification, 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	<p>A CEMP would be prepared in consultation with relevant government agencies and submitted for review and endorsement of the Roads and Maritime Representative prior to commencement of the activity.</p> <p>As a minimum, the CEMP would address the following:</p> <ul style="list-style-type: none"> • any requirements associated with statutory approvals • details of how the project would implement the identified safeguards outlined in the REF and EIS • 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 • a Demolition Management Plan for the existing bridge removal to address sequencing, contamination and safety issues. <p>The endorsed CEMP would be implemented during the undertaking of the activity.</p>	Contractor / TfNSW	Detailed design Pre-construction Construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
GEN2	General - notification	All businesses, residents and other key stakeholders (eg schools, local councils) affected by the activity would be notified at least five days prior to commencement of the activity.	Contractor	Pre-construction Construction	
GEN3	General – environmental awareness	All personnel working on site would receive training to ensure awareness of environment protection requirements to be implemented during the project. This would include up-front site induction and regular "toolbox" style briefings. Site-specific training would be provided to personnel engaged in activities or areas of higher risk. These include: <ul style="list-style-type: none"> • working in and near waterways • construction noise management • areas of Aboriginal heritage sensitivity • threatened species habitat • threatened ecological communities • SEPP 14 wetlands 	Contractor	Pre-construction Construction	Submissions report, Table 6-1
Landscape character and visual impact					
LC1	General	An Urban Design and Landscape Plan (UDLP) will be prepared to support the final detailed project design and implemented as part of the CEMP. The UDLP will present an integrated urban design for the project, providing practical detail on the application of design principles and objectives identified in the environmental assessment. The UDLP will include: <ul style="list-style-type: none"> • proposed revegetation plan that will include: <ul style="list-style-type: none"> • species to be used • screening of infrastructure where required and practical • minimising the impacts of headlight glare on surrounding residents • planting of foreshore areas to be to be determined in consultation with Council. • procedures for monitoring and maintaining landscaped or rehabilitated areas. • design treatments for: 	Contractor	Detailed design Pre-construction Construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> • built elements including retaining walls and the bridge and consider application of crime prevention through environmental design strategies • pedestrian and cyclist elements including shared use path locations, 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. <p>The UDLP will be prepared in accordance with relevant guidelines, including:</p> <ul style="list-style-type: none"> • Beyond the Pavement urban design policy, process and principles (Roads and Maritime 2014c) • Landscape Guideline (RTA 2008) • Bridge Aesthetics (Roads and Maritime 2012c) • Shotcrete Design Guideline (RTA 2005c). 			
LC2	Integration of earthworks design with existing landform	The potential visual impact of the earthworks will be minimised by careful design that integrates with adjoining landforms. This could be achieved through rounding of the top of cut batters, tailing off of cut batters and a gradual flattening of grades at ends of fill embankments in order to avoid sharp transitions at ends.	Contractor	Detailed design Construction	Submissions report, Table 6-1
LC3	Integration of earthworks design with existing landform	Retaining walls will be constructed to minimise the construction footprint and removal of existing vegetation, where possible. Consideration will be given to screen planting below walls and the use of visually recessive materials in order to minimise the visual dominance of retaining walls.	Contractor	Construction	Submissions report, Table 6-1
LC4	Retention of existing vegetation	The proposal will be designed to avoid impact to prominent trees and vegetation communities where possible. Water quality structures and drainage lines will be designed to avoid existing vegetation where possible.	Contractor	Detailed design	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity					
B1	Biodiversity – general	A Biodiversity Management Plan will be prepared as part of the CEMP and implemented throughout construction.	Contractor	Pre-construction Construction	Submissions report, Table 6-1
B2	Biodiversity – general	Roads and Maritime will determine and implement a suitable offset for impacts to key fish habitat and Illawarra and south coast lowland forest and woodland critically endangered ecological community 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) and OEH.	TfNSW	Detailed design	Submissions report, Table 6-1
B3	Removal of native vegetation	Measures to minimise clearing of native vegetation within the proposal area, including marine vegetation, will be investigated during detailed design and implemented where practicable and feasible.	Contractor	Detailed design Construction	Submissions report, Table 6-1
B4	Flora and flora management guidelines	Biodiversity management and mitigation will be undertaken in accordance with the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011) and the associated guides and procedures.	Contractor	Pre-construction Construction	Submissions report, Table 6-1
B5	Loss of potential microbat roosts on existing bridge	The whole of the existing bridge will be inspected for signs of roosting microbats by an ecologist prior to its demolition. Should any roosting microbats, or signs of them, be identified, a Microbat Management Plan will be prepared and implemented.	Contractor	Construction	Submissions report, Table 6-1
B6	Changes to hydrological regimes	The new bridge piers and drainage structures associated with the new road alignment will be located and designed to maintain or improve existing hydrological regimes as far as possible. Particular care should be taken to avoid or minimise additional scour of the extensive sandbar downstream of the existing bridge.	Contractor	Detailed design	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
B7	Turbidity, sedimentation and erosion	The extent of instream works will be kept to the minimum necessary for the proposal, and all instream works will be undertaken in a manner that reduces potential for increased turbidity (ie that minimises disturbance to and mobilisation of instream substrates, including potential acid sulfate soils).	Contractor	Construction	Submissions report, Table 6-1
B8	Turbidity, sedimentation and erosion	Bridge piles will be constructed using a system that minimises mobilisation of sediments, including acid sulfate soils.	Contractor	Construction	Submissions report, Table 6-1
B9	Increased light	Measures to minimise light spill into the waterway and vegetated areas from the new bridge and approaches and new floating pontoon on the southern foreshore will be considered during detailed design.	Contractor	Detailed design	Submissions report, Table 6-1
B10	Ancillary facilities	The Korner's Park ancillary facility boundary would be screened to reduce visual disturbance to threatened shorebirds from movements of vehicles, machinery and people.	Contractor	Construction	Submissions report, Table 6-1
B11	Disturbance to aquatic habitats	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 management measures of the Policy and guidelines for fish habitat conservation and management Update 2013 (DPI (Fisheries NSW) 2013).	Contractor	Construction	Submissions report, Table 6-1
B12	Aquatic pests and diseases	All machinery and vessels used during construction 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 consultation with DPI Aquatic Biosecurity and implemented during construction.	Contractor	Construction	Submissions report, Table 6-1
B13	Impacts to fish	Fisheries NSW is to be immediately notified of any fish kills in the vicinity of the works.	Contractor	Construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
Hydrology and coastal processes					
H1	General construction impacts	Temporary drainage structures will be constructed in accordance with the Technical Guideline – Temporary Stormwater Drainage for Road Construction (Roads and Maritime 2011c).	Contractor	Construction	Submissions report, Table 6-1
H2	Stormwater	<p>Additional or alternative ancillary facilities sites will meet the following site assessment criteria, where possible:</p> <ul style="list-style-type: none"> • operational during a flood event and avoid or minimise impacts to surrounding properties • more than 40 metres from a watercourse • more than 50 metres from residential dwellings • in previously disturbed areas that do not require the clearing of native vegetation • in plain view of the public to deter theft and illegal dumping • outside the drip line of trees • on relatively level ground • away from areas of heritage conservation value. <p>Where additional or alternative ancillary facilities do not meet all of the above criteria, additional relevant controls and assessment (where relevant) will be identified and implemented in consultation with the Roads and Maritime Senior Environment Officer.</p>	Contractor	Construction	Submissions report, Table 6-1
H3	Flooding	Further operational flood modelling will be undertaken during detailed design to confirm that afflux, flood extent and scour are equivalent to or better than assessed in the REF.	Contractor	Detailed design	Submissions report, Table 6-1
H4	Flooding	As part of the CEMP, a Flood Risk Management Plan will be prepared that details the processes for monitoring and mitigating flood risk. The plan will specify the steps to be taken in the event of a flood warning, including removal or securing of loose material, equipment, fuels and chemicals.	Contractor	Pre-construction Construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
H5	Flooding	Further modelling of the one per cent AEP flood event will be carried out for the construction phase of the proposal. This is to consider the cumulative impact of the existing and new bridges and temporary jetties in the Clyde River. Where required, appropriate mitigation will be implemented to avoid any newly flooded properties, buildings or additional flooding to flood evacuation routes.	Contractor	Detailed design	Submissions report, Table 6-1
H6	Scour	A bathymetric survey will be undertaken one to two years after removal of the existing bridge, during normal weather conditions. Survey data will be provided to DPI (Fisheries) for information.	TfNSW	Operation	Submissions report, Table 6-1
H7	Temporary working platform	Consideration will be given to construction methods that eliminate the need for a temporary working platform. If required for construction, the temporary working platform will be designed to minimise disturbance to the shoreline and riverbed. The temporary working platform would be designed in consultation with, and to the satisfaction of, DPIE (Regions, Industry, Agriculture & Resources and Batemans Marine Park).	Contractor	Detailed design	This addendum REF
H8	Temporary working platform - existing rock revetment	Should a temporary working platform be required, the following will be undertaken: <ul style="list-style-type: none"> a review of work-as-constructed drawings (if available) a dilapidation survey and condition assessment of the existing revetment on the southern foreshore at least 100m up- and downstream of the temporary working platform location prior to commencement of construction of the new floating pontoon monitoring of the stability of the existing revetment will be carried out during construction following a high-discharge flow event, an assessment will be undertaken to confirm the stability of the existing revetment at least 100m up- and downstream of the temporary working platform location. 	Contractor	Detailed design/construction	This addendum REF
H9	Impact to riverbed and flow conditions	The new floating pontoon will be designed to minimise scour and disturbance to the natural river flow conditions. The following measures should be considered during detailed design:	Contractor	Detailed design	This addendum REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> • <i>minimising the number of piles in the waterway</i> • <i>alternative fixing methods such as elastic mooring and anchoring</i> • <i>minimising scour by providing additional pile length, implementation of scour protection, or a combination of multiple measures.</i> 			
Soil and water quality					
SW1	Water quality monitoring	A water quality monitoring program would be developed in consultation with relevant government agencies and implemented during construction in accordance with Roads and Maritime Guideline for Construction Water Quality Monitoring (Roads and Maritime, 2003).	Contractor	Pre-construction Construction	Submissions report, Table 6-1
SW2	Contaminated land	<p>A Contamination Management Plan will be prepared in accordance with the Guideline for the Management of Contamination (Roads and Maritime, 2013) and implemented during construction. The plan would include, but not be limited to:</p> <ul style="list-style-type: none"> • capture and management of any contaminated surface runoff • further investigations required to determine the extent, concentration and type of contamination relevant to the proposal, including asbestos, lead and treated timber • remediation and subsequent validation of identified contaminated land, including any certification required • a procedure for the management of unexpected contamination identified during construction • measures to ensure the safety of site personnel, local communities and the environment during construction • identification of licenced contractor engaged to remove any asbestos containing materials. 	Contractor	Pre-construction Construction	Submissions report, Table 6-1
SW3	Contamination of surface water	All fuels, chemicals, and liquids stored on land will be stored at least 40 metres away from waterways (including existing	Contractor	Construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		stormwater drainage system) and will be stored in a sealed bunded area within the ancillary facility. On barges and jetties, fuels, chemicals and liquids will be stored within a bunded area.			
SW4	Contamination of surface water	The refuelling and maintenance of land-based plant and equipment will be undertaken in a designated sealed bunded area at ancillary facilities, where possible. Refuelling of marine based plant and vessels will be undertaken in a suitably bunded area (through use of silt curtain or booms) to minimise risk of spills.	Contractor	Construction	Submissions report, Table 6-1
SW5	Contamination of surface water	Vehicle wash downs and concrete washouts will be carried out within designated sealed bunded areas at ancillary facilities, or carried out off-site. All construction water will either be treated to appropriate levels for reuse or discharge or be removed from site to an appropriately licenced facility.	Contractor	Construction	Submissions report, Table 6-1
SW6	Contamination of surface water	Regular visual water quality checks (include for turbid plumes and hydrocarbon spills or slicks) will be carried out when working in or near the waterway.	Contractor	Construction	Submissions report, Table 6-1
SW7	Accidental spill	A site specific emergency spill plan will be developed, and include spill management measures in accordance with the Roads and Maritime Code of Practice for Water Management (RTA, 1999) and relevant Environment Protection Authority (EPA) guidelines. The plan would address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Roads and Maritime and EPA).	Contractor	Pre-construction Construction	Submissions report, Table 6-1
SW8	Accidental spill	Emergency spill kit would be kept on site at all times. Spill kits will be located at all ancillary facilities and main construction work areas, including barges and temporary jetties. All staff would be made aware of the location of the spill kit and trained in its use	Contractor	Construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW9	Acid sulfate soils	An Acid Sulfate Soils Management Plan will be developed as part of the CEMP and implemented during construction. This plan will be prepared in accordance with the Roads and Maritime Guidance for the Management of Acid Sulphate Materials 2005 (RTA 2005a).	Contractor	Pre-construction Construction	Submissions report, Table 6-1
SW10	Soil and water - general	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 would be addressed during construction. The SWMP will be reviewed by a soil conservationist on the Roads and Maritime list of Registered Contractors for Erosion, Sedimentation and Soil Conservation Consultancy Services.	Contractor	Pre-construction Construction	Submissions report, Table 6-1
SW11	Construction surface water	A site specific Erosion and Sediment Control Plan/s will be prepared and implemented as part of the Soil and Water Management Plan. This plan will develop further on the Conceptual Erosion and Sedimentation Management Report located in Appendix F of the REF. Erosion and sediment controls would be developed following the guidelines of the 'Blue Book' (Landcom, 2004 and DECC 2008). The Plan will include: <ul style="list-style-type: none"> • rock armouring of construction sediment basin outlets • preferential reuse of water in construction sediment basins • a basin dewatering procedure in accordance with Roads and Maritime's Technical Guideline Environmental Management of Construction Site Dewatering (2011) including use of floating siphon devices for dewatering where possible • 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 the event of wet weather. 	Contractor	Pre-construction Construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW12	Construction surface water	Surface water diversions will be installed in accordance with the erosion and sedimentation control plan (ESCP) prior to construction commencing.	Contractor	Pre-construction Construction	Submissions report, Table 6-1
SW13	Soil and water - general	A soil conservationist on the Roads and Maritime list of Registered Contractors for Erosion, Sedimentation and Soil Conservation Consultancy Services will be engaged and consulted throughout the construction of the overall proposal.	Contractor	Construction	Submissions report, Table 6-1
SW14	Stormwater runoff	Operational water quality treatment and quantity will be identified during detailed design in consideration of the Roads and Maritime Water Sensitive Urban Design Guidelines (2017), impacts to SEPP 14 wetlands and the capacity of Council's stormwater systems.	Contractor	Detailed design	Submissions report, Table 6-1
SW15	Spill containment	Operational spill containment of a minimum of 20,000 litres will be provided at either end of the bridge to ensure that spills on the new bridge and approaches can be captured before reaching sensitive environments.	Contractor	Detailed design	Submissions report, Table 6-1
SW16	Rehabilitation	Progressive rehabilitation will be carried out during construction, whereby rehabilitation will commence as soon as practicable after works are completed in any area.	Contractor	Construction	Submissions report, Table 6-1
SW17	Groundwater	Further investigations will be undertaken during detailed design to confirm the depth of groundwater near the overall proposal and any potential impacts. If groundwater impacts are likely, a Groundwater Management Plan will be developed and form part of the CEMP. If required, an approval under the <i>Water Management Act 2000</i> will also be obtained following consultation with the DPI Water.	Contractor	Detailed design	Submissions report, Table 6-1
Aboriginal heritage					
AH1	Aboriginal heritage - general	An Aboriginal Heritage Management Plan (AHMP) will be prepared in accordance with the Procedure for Aboriginal cultural heritage consultation and investigation (Roads and	Contacto	Pre-construction Construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		Maritime, 2012) and implemented as part of the CEMP. The AHMP will include the Standard Management Procedure - Unexpected Heritage Items (Roads and Maritime, 2015). 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 registered Aboriginal parties.			
AH2	AHIP	An Aboriginal heritage impact permit (AHIP) will be sought for the overall proposal area, including archaeological salvage excavation at sites B Bay Shell 1 and B Bay Shell 2. Salvage excavations will be completed prior to any activities (including pre-construction activities) which may harm Aboriginal objects at these site locations.	Contractor	Construction	Submissions report, Table 6-1
AH3	Unexpected finds	The Unexpected Heritage Items - Heritage Procedure 02 (Roads and Maritime, 2015) will be followed in the event that a potential heritage item is found during construction.	Contacto	Construction	Submissions report, Table 6-1
Noise and vibration					
NV1	Construction noise and vibration	<p>A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will be prepared in accordance with the Construction Noise and Vibration Guideline (Roads and Maritime 2016) and identify:</p> <ul style="list-style-type: none"> • all potential significant noise and vibration generating activities associated with the activity • a monitoring program to assess performance against the 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. 	Contacto	Pre-construction Construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NV2	Out of hours work	Out of hours works will be undertaken in accordance with the Construction Noise and Vibration Guideline (Roads and Maritime 2016).	Contractor	Construction	Submissions report, Table 6-1
NV3	Construction vibration	Attended vibration monitoring should be undertaken to determine site-specific minimum working distances for structural damage and human response. Site-specific minimum working distances should be determined whenever significant vibration generating plant will be working close to or within the recommended minimum working distances listed in Appendix I of the REF.	Contractor	Pre-construction Construction	Submissions report, Table 6-1
NV4	Construction vibration	Further attended vibration monitoring should be conducted whenever significant vibration generating plant items are operating close to or within the determined minimum working distances. Locations for vibration monitoring during particular works would be determined by the construction contractor.	Contractor	Construction	Submissions report, Table 6-1
NV5	Construction vibration	Dilapidation surveys will be conducted at all residential and other vibration sensitive receivers within 50 metres of the construction site. 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.	Contractor	Pre-construction	Submissions report, Table 6-1
NV6	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	Detailed design	Submissions report, Table 6-1
NV7	Operational noise mitigation	Where practical operational noise treatments would be implemented at the start of the construction period.	Contractor	Pre-construction	Submissions report, Table 6-1
NV8	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 two to twelve months of proposal completion, at selected representative locations along the proposal route.	TfNSW	Post-construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport					
T1	Traffic and transport - Construction impacts	<p>An overarching Traffic Management and Safety Plan (TM&SP) with targeted Traffic Management Plans (TMPs) will be prepared and implemented for road and marine traffic during construction. The road, marine and bridge segment delivery TMPs will be prepared in accordance with the Roads and Maritime Traffic Control at Work Sites Manual (Roads and Maritime, 2018) and Batemans Bay Bridge Project Specification D&C G10 Traffic Management (Roads and Maritime, 2017). The TMP will include:</p> <ul style="list-style-type: none"> • confirmation of haulage routes • measures to maintain access to local roads, properties and the waterway • site specific traffic control measures (including signage) to manage and regulate traffic movement • measures to maintain pedestrian and cyclist access • requirements and methods to consult and inform the local community of impacts on the local road network and the waterway • access to ancillary facility including entry and exit locations and measures to prevent construction vehicles queuing on public roads • a response plan for any construction road or marine 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. 	Contractor	Pre-construction Construction	Addendum REF 2
T2	Traffic and transport - Construction impacts	<p>Consultation would be undertaken with all local and regional bus companies that operate in Batemans Bay to confirm any bus diversions and bus stop relocations including a T-Wharf Road and Clyde Street during construction and any operational road network changes.</p>	Contractor	Pre-construction Construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
T3	Traffic and transport - Construction impacts	Partial road closures (or any short-term full road closures) would be timed to avoid peak periods such as holiday periods when vehicle traffic is high along the highway, where practicable.	Contractor	Construction	Submissions report, Table 6-1
T4	Traffic and transport - Construction impacts	Pedestrian and cyclists connectivity across the construction area would be maintained during construction. The community would be notified of any access changes including alternative routes.	Contractor	Construction	Submissions report, Table 6-1
T5	Traffic and transport - Construction impacts	Access to private properties would be maintained during construction, wherever possible. Where changes to access arrangements or disruption to access are necessary, owners and occupiers would be consulted regarding alternative access arrangements.	Contractor	Construction	Submissions report, Table 6-1
T6	Traffic and transport - Construction impacts	Traffic control plans would be prepared for the construction area and progressively updated as the works progress. The plans would be prepared and implemented by suitably qualified personnel.	Contractor	Construction	Submissions report, Table 6-1
T7	Traffic and transport - Construction impacts	A Road Occupancy Licence would be obtained where required.	Contractor	Construction	Submissions report, Table 6-1
T8	Traffic and transport - Construction impacts	Impacts to parking along the northern and southern foreshores of the Clyde River will be minimised during construction where possible. Where impacts are unavoidable, the community will be notified in advance.	Contractor	Construction	Submissions report, Table 6-1
T9	Traffic and transport - Construction impacts	Consultation would be undertaken with the relevant local schools with students who catch buses to and from Springwater Place, Jeremadra to confirm any changes to or bus stop relocations required during construction.	Contractor	Construction	Addendum REF 2

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
T10	Traffic and transport - Construction impacts	The local utility provider (Essential Energy) must be consulted as part of the bridge segments and other precast elements transport route assessment.	Contractor	Construction	Addendum REF 2
Property and land use					
P1	Property acquisition	All property acquisition will be carried out in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2012) and the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> .	TfNSW	Pre-construction Construction	Submissions report, Table 6-1
P2	Property acquisition	Property acquisition of Crown Land would be undertaken in accordance with the <i>Crown Lands Act 1989</i> .	TfNSW	Pre-construction and construction	Submissions report, Table 6-1
P3	Property acquisition	Consultation will be undertaken with the owners of properties to be acquired regarding the potential impacts of the acquisition. Where partial acquisition is required, adjustment methods such as vegetation screening requirements would be discussed.	TfNSW	Pre-construction Construction	Submissions report, Table 6-1
P4	Loss of car parking	Consultation will be carried out with Council and the shopping complex owners to identify alternative parking arrangements to replace car parking lost during construction	Contractor	Pre-construction Construction	Submissions report, Table 6-1
P5	Foreshore areas	Consultation will be carried out with Council regarding the rehabilitation and future use of foreshore areas.	TfNSW	Pre-construction Construction	Submissions report, Table 6-1
P6	River access	At least one of the two boat ramps within the proposal area will be available to the public at all times. The public will be notified in advance of access restrictions during construction.	Contractor	Construction	Submissions report, Table 6-1
P7	Changes to boat moorings	Roads and Maritime will consult with boat owners with moorings that will need to be relocated as a result of construction or operation of the new bridge.	TfNSW	Pre-construction Construction	Submissions report, Table 6-1
P8	Rehabilitation of land	Land leased during construction would be reinstated in a manner agreed with the property owner.	Contractor	Operation	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
Socio economic					
S1	Social impacts	<p>A Community and Stakeholder Engagement Plan will be prepared that details:</p> <ul style="list-style-type: none"> • management of complaints and enquires • 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 land owners, 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 (eg detours or lane closures) such as through advertisements in local media and advisory notices or variable message signs. 	Contractor	Pre-construction Construction	Submissions report, Table 6-1
S2	Foreshore works	Further consultation will be carried out with government agencies, stakeholders and the community regarding the final design of the river foreshore areas.	Contacto	Pre-construction	Submissions report, Table 6-1
S3	Businesses	Consultation will be carried out with Council regarding a signage strategy for the proposal.	Contacto	Pre-construction	Submissions report, Table 6-1
Non-Aboriginal heritage					
NAH1	Non-Aboriginal heritage - general	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, in particular for the southern Car Ferry Ramp.	Contacto	Pre-construction Construction	Submissions report, Table 6-1
NAH2	Unexpected finds	The Unexpected Heritage Items - Heritage Procedure 02 (Roads and Maritime, 2015) will be followed in the event that a potential heritage item is found during construction.	Contacto	Construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NAH3	Impacts to local heritage items	An archival record will be prepared for the Batemans Bay Bridge and the northern Car Ferry Ramp. All archival recording will be completed in accordance with the Heritage Branch guidelines How to Prepare Archival Records for Heritage Items and Photographic Recording of Heritage Items Using Film or Digital Capture (Heritage Office 2001, revised 2004, 2006). The archival recording will be deposited with the Roads and Maritime Library, NSW Heritage Division Library, Eurobodalla Shire Council Libraries and the NSW State Library.	TfNSW	Pre-construction	Submissions report, Table 6-1
NAH4	Impacts to local heritage items	A heritage interpretation strategy will be prepared including an interpretation of archaeological remains should any be uncovered. The interpretation strategy will emphasise and enhance heritage values of the existing bridge such as the commercial, social and economic development of Batemans Bay due to its proximity to the Clyde River.	Contractor	Operation	Submissions report, Table 6-1
NAH5	Heritage awareness	The site induction will include details of the kinds of historical relics, structures or deposits which may be encountered during the construction works and the process should unexpected archaeological remains are encountered.	Contractor	Pre-construction Construction	Submissions report, Table 6-1
NAH6	Removal of Batemans Bay Bridge	The Office of Environment and Heritage will be provided with written notice at least 14 days prior to the removal of the Batemans Bay Bridge from the Roads and Maritime section 170 Register.	TfNSW	Pre-demolition	Submissions report, Table 6-1
Waste management					
W1	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: <ul style="list-style-type: none"> measures to avoid and minimise waste associated with the project classification of wastes and management options (re-use, recycle, stockpile, disposal) 	Contractor	Pre-construction Construction Demolition	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> 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. <p>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.</p>			
W2	Waste management - general	All wastes will be managed and disposed of in accordance with the POEO Act.	Contractor	Construction	Submissions report, Table 6-1
W3	Waste management - general	Appropriate portable toilets or pump out facilities will be provided for construction sites workers and sewage will be disposed of appropriately and in accordance with relevant legislation.	Contractor	Construction	Submissions report, Table 6-1
W4	Waste management - general	Noxious weeds removed during construction will be managed in accordance with Department of Primary Industries requirements and relevant legislation.	Contractor	Construction	Submissions report, Table 6-1
W5	Waste management - general	Site inductions will include waste management and disposal requirements and facilities.	Contractor	Construction	Submissions report, Table 6-1
W6	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.	Contractor	Construction	Submissions report, Table 6-1
W7	Fill material	Any additional fill material required 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 Roads and Maritime guidelines.	Contractor	Construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
W8	Management of green waste	Where possible and suitable for use, mulch would be used on-site.	Contractor	Construction	Submissions report, Table 6-1
W9	Disposal of waste	All waste and excess excavated material will be disposed of at an appropriate licensed facility.	Contractor	Construction	Submissions report, Table 6-1
W10	Management of tannins	A tannin leachate management protocol will be developed in consultation with DPI (Fisheries) 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	Contractor	Construction	Submissions report, Table 6-1
Air quality					
A1	General air quality impacts	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include: <ul style="list-style-type: none"> • identification of potential risks/impacts due to the work/activities as dust generation activities • management measures to minimise risk of dust generation • a process for monitoring dust on-site • a process for altering management measures as required and reprogramming construction activities if the safeguards and management measures do not adequately restrict dust generation. 	Contractor	Pre-construction Construction	Submissions report, Table 6-1
A2	Dust emissions	Work will cease when levels of visible airborne dust become excessive.	Contractor	Construction	Submissions report, Table 6-1
A3	Dust emissions	Works that disturb vegetation, soil or stockpiles will not be carried out during strong winds (over 40 km/h) when this may affect receivers (visibility on roads dust and debris near recreational areas residences and commercial premises).	Contractor	Construction	Submissions report, Table 6-1
A4	Dust emissions	Stockpiled materials will be covered stabilised or stored in areas not subject to high wind.	Contractor	Construction	Submissions report, Table 6-1

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
A5	Dust emissions	All trucks will be covered when transporting material to and from the site.	Contractor	Construction	Submissions report, Table 6-1
Climate change and sustainability					
C1	Greenhouse gas emissions	The use of alternative fuels and power sources for construction plant and equipment will be investigated and implemented, where appropriate.	Contractor	Pre-construction	Submissions report, Table 6-1
C2	Greenhouse gas emissions	The energy efficiency and related carbon emissions will be considered in the selection of vehicle and plant equipment	Contractor	Pre-construction	Submissions report, Table 6-1
C3	Greenhouse gas emissions	Construction equipment, plant and vehicles will be appropriately sized for the task.	Contractor	Construction	Submissions report, Table 6-1
C4	Greenhouse gas emissions	Equipment will be serviced frequently to ensure they are operating efficiently.	Contractor	Construction	Submissions report, Table 6-1
C5	Greenhouse gas emissions	Where possible, materials will be delivered as full loads and local suppliers will be used.	Contractor	Construction	Submissions report, Table 6-1
Cumulative impacts					
CU1	Cumulative impacts	Ongoing coordination and consultation will be undertaken between the contractors from the Nelligen and Batemans Bay bridge replacement projects to ensure cumulative traffic impacts are appropriately assessed and managed particularly during peak holiday periods.	TfNSW / Contractor	Detailed design Construction	Submissions report, Table 6-1
CU2	Cumulative impacts	The CEMP will be revised to consider potential cumulative impacts from surrounding development activities as they become known.	Contractor	Construction	Submissions report, Table 6-1

7.3 Licensing and approvals

All relevant licenses, permits, notifications and approvals needed for the 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 approval required

Instrument	Requirement	Timing
<i>Protection of the Environment Operations Act 1997</i> (s43)	Modification to the existing environment protection licence (EPL) from the EPA to update the schedule of premise boundary.	Prior to start of the activity (being the proposed modification)
<i>Fisheries Management Act 1994</i> (s205)	Permit to harm marine vegetation from the Minister for Primary Industries.	Prior to start of the activity (being work that would impact protected marine vegetation)
<i>Marine Estate Management Act 2014</i>	Marine Parks Permit for work in the Batemans Bay Marine Park.	Prior to start of the activity (being work within the Batemans Marine Park).
<i>Crown Lands Management Act 2016</i> (s6)	A modification to the existing licence to occupy areas of Crown land will be required for the construction area for the new floating pontoon.	Prior to start of the activity (being the proposed modification)

8. Conclusion

8.1 Justification

The proposed modification is consistent with the intent of the project REF, submissions report and subsequent addendum REFs and REF Consistency Reviews. The proposed modification would:

- Enhance the recreational facilities and amenity of the Clyde River and southern foreshore area
- Provide increased berthing capacity for vessels on the Clyde River, improving access to and promoting the recreational value of the waterway
- Provide improved safe access to the Batemans Bay CBD, encouraging use of public amenities and supporting local businesses and the economy
- Meet the needs of the local community by retaining the existing T-Wharf and in conjunction, remove any environmental impacts associated with its demolition as proposed by the project REF
- Allow public access to the T-Wharf to be maintained virtually throughout the duration of construction of the project
- Provide the opportunity for additional extensions to the new southern floating pontoon to be built following construction the project.

The impacts of the proposed modification are minor and the management measures and safeguards specified in this addendum REF and those already adopted would avoid, minimise or mitigate any impacts such that the benefit of the proposed modification would outweigh any potential impacts. Due to the above considerations, the proposed modification is considered justified.

8.2 Objects of the EP&A Act

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	<p>The proposed modification would provide socio-economic benefits to the community through improving recreational facilities along the southern foreshore area which would result in greater access to the Batemans Bay CBD and local businesses and promote tourism in the area. The proposed modification would assist in promoting the social and economic welfare of the local Batemans Bay, and wider NSW south coast community.</p> <p>The proposed modification would not have a substantial impact on the development and conservation of the State's natural and other resources.</p>
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	<p>Ecologically sustainable development is considered in sections 8.2.1 to 8.2.4 of the project REF.</p> <p>The proposed modification would comply with the principles of ecologically sustainable development.</p>

Object	Comment
1.3(c) To promote the orderly and economic use and development of land.	The proposed modification would improve access and safety for recreational boat users on the Clyde River.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the proposed modification.
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.	The proposed modification would not require the removal of any additional vegetation and fauna habitat or threatened ecological communities. Any potential indirect impacts would be managed through the existing environmental safeguards identified in this addendum REF.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposed modification would not have the potential to impact on existing cultural heritage.
1.3(g) To promote good design and amenity of the built environment.	The proposed modification would provide improved amenities for the local community through upgrading the existing boating facilities on the southern foreshores, while retaining the existing T-Wharf in line with community feedback.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the proposed modification.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	The proposed modification would provide Eurobodalla Shire Council with flexibility to further expand boating facilities in future.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	The planning of the Batemans Bay Bridge replacement project, which would be supported by the implementation of the proposed modification, has involved extensive consultation with the local community. This included display of the project REF and EIS and publication of the submissions report. Further, consultation with the FAC, community members and community groups has been important in shaping the design of the proposed modification.

8.2.1 The precautionary principle

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

8.2.2 Intergenerational equity

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

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 included in section 8.2.3 of the project REF. The proposed modification is consistent with this assessment.

8.2.4 Improved valuation, pricing and incentive mechanisms

A summary of the assessment based on improved valuation, pricing and incentive mechanisms is included 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 *National Parks and Wildlife Act 1974*, 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 noise and vibration, soils and water, landscape character and visual, and hydrology and coastal processes. Safeguards and management measures as detailed in this addendum REF would ameliorate or minimise these expected impacts. The proposed modification would also provide positive impacts by improving amenity, access and promoting the recreational values of the Batemans Bay area. On balance the proposed modification is considered justified and the following conclusions are made.

Significance of impact under NSW legislation

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

Significance of impact under Australian legislation

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

9. Certification

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



Lucy Smith

Associate

Qubist

Date: 19/05/2020

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



Vivien Murnane

Project Manager

Regional Project Office

Date: 22/05/2020

10. References

- British Standard (1993) BS 7385 Evaluation and measurement for vibration in buildings Part 2.
- Department of Environment & Climate Change (2008) Managing Urban Stormwater V2A-2E.
- Department of Environment & Climate Change (2009) Interim Construction Noise Guideline.
- Department of Environment and Conservation (2006) Assessing Vibration - a technical 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?
- GHD (2019) Batemans Bay Independent Coastal Impact Assessment Stage One - Impacts of the Batemans Bay Bridge Replacement Project.
- Landcom (2004) Managing Urban Stormwater: Soils & Construction – Volume 1
- NSW Environment Protection Authority (2014) NSW Waste Avoidance and Resource Recovery Strategy 2014-21.
- NSW Environment Protection Authority (2014) Waste Classification Guidelines, Part 1 – Classifying Waste.
- Renzo Tonin & Associates (2017) Batemans Bay Bridge Replacement Noise and Vibration Assessment.
- Renzo Tonin & Associates (2018) Batemans Bay Bridge Replacement Noise and Vibration Assessment for Design Changes.
- Roads and Maritime (2016) Construction Noise and Vibration Guideline.
- Roads and Maritime (2017) Batemans Bay Bridge replacement review of environmental factors November 2017.
- Roads and Maritime (2017) Batemans Bay Bridge replacement environmental impact statement November 2017.
- Roads and Maritime (2018) Batemans Bay Bridge replacement review of environmental factors submissions report May 2018.

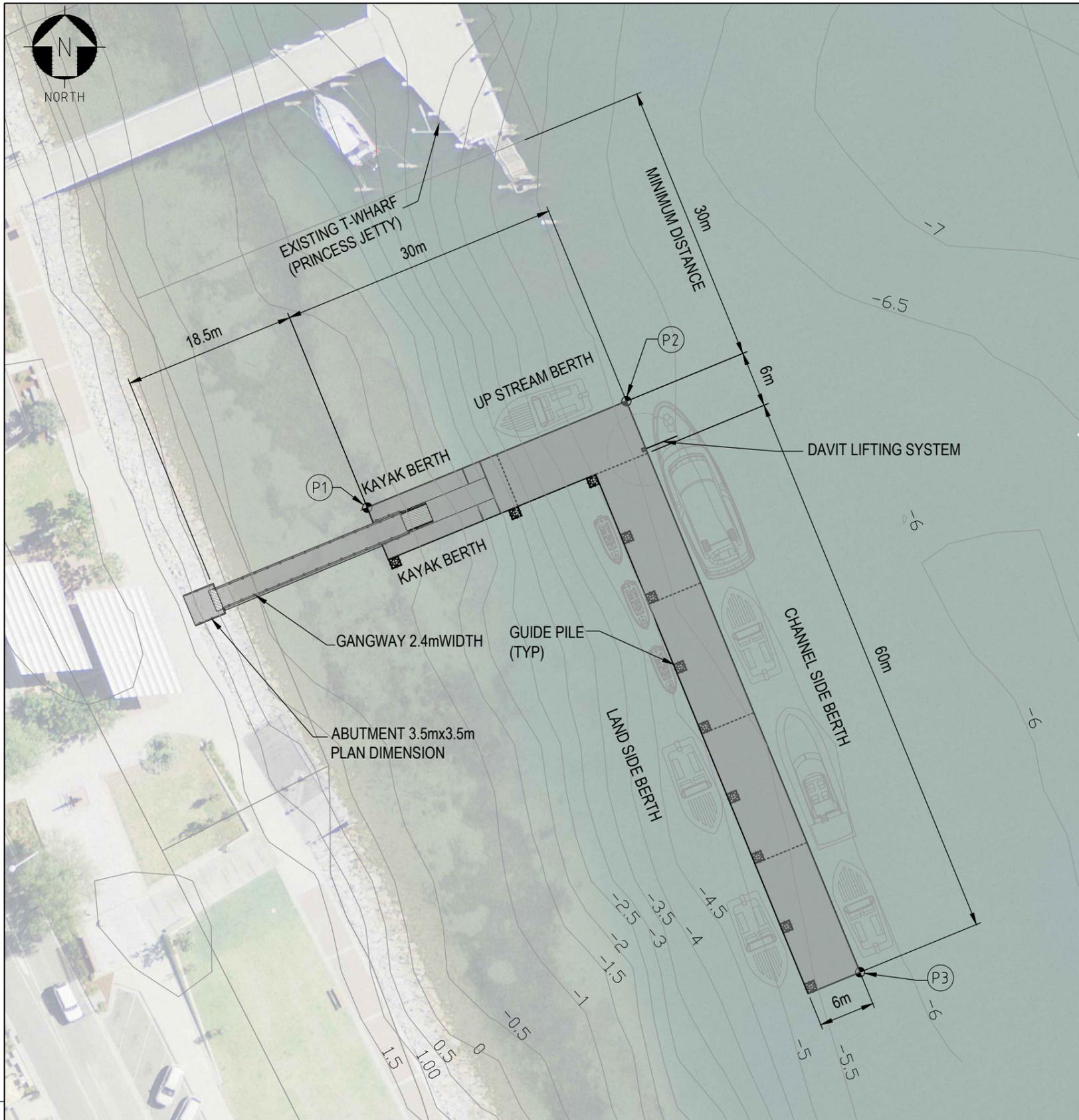
Terms and acronyms used in this addendum REF

Term / Acronym	Description
AEP	Annual exceedance probability
AHIP	Aboriginal heritage impact permit
BC Act	<i>Biodiversity Conservation Act 2016 (NSW).</i>
CBD	Central Business District
CEMP	Construction environmental management plan
CM Act	<i>Coastal Management Act 2016 (NSW)</i>
CNVG	<i>Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016)</i>
CNVIS	Construction noise and vibration impact statement
Coastal Management SEPP	State Environmental Planning Policy (Coastal Management) 2018
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment
DUAP	Department of Urban Affairs and Planning
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW).</i> Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth).</i> Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
EPL	Environment Protection Licence
Eurobodalla LEP	Eurobodalla Local Environmental Plan 2012
FAC	Foreshore Advisory Committee
FM Act	<i>Fisheries Management Act 1994 (NSW)</i>
GHG	Greenhouse gas
Heritage Act	<i>Heritage Act 1977 (NSW)</i>
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LAeq or Leq	The “equivalent noise level” is the summation of noise events and integrated over a selected period of time, which would produce the same energy as a fluctuating sound level.

Term / Acronym	Description
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
MNES	Matters of national environmental significance under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
NCA	Noise Catchment Area
NML	Noise management level
NSW	New South Wales
NVA	Noise and Vibration Assessment
NVMP	Noise and Vibration Management Plan
OEH	Office of Environment and Heritage
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
Project, the	Batemans Bay Bridge replacement
REF	Review of Environmental Factors
Roads and Maritime	NSW Roads and Maritime Services
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
SEPP 14	State Environmental Planning Policy No.14 – Coastal Wetlands
TfNSW	Transport for New South Wales
UDLP	Urban design and landscape plan

Appendix A

Design of proposed modification



GENERAL ARRANGEMENT
SCALE 1:500

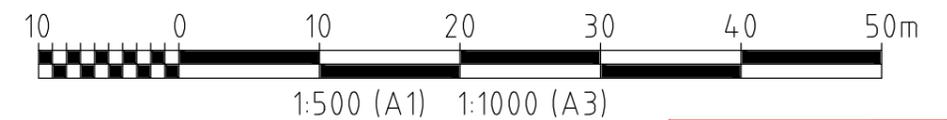
NOTES:

1. ALL LEVELS ARE IN METERS TO AUSTRALIAN HEIGHT DATUM (AHD) UNLESS NOTED OTHERWISE.
2. SETTING OUT COORDINATES P1 TO P3 REFER TO PONTOON HULL EDGE.
3. NEW PONTOON FACILITY TO BE MINIMUM 30m DOWNSTREAM FROM EXISTING T-WHARF PROPERTY BOUNDARY ID 17a.
4. CHANNEL SIDE BERTHING LINE TO BE APPROXIMATELY COLINEAR WITH BERTHING LINE OF EXISTING T-WHARF.
5. MINIMUM DEPTH OF WATER
 - CHANNEL SIDE BERTH AT LAT = $(-5.5 + 0.82) = -4.68\text{mAHD}$
 - LANDSIDE AND UPSTREAM BERTH AT LAT = $(-3.5 + 0.82) = -2.68\text{mAHD}$
7. BERTHING ARRANGEMENTS SHOWN ARE INDICATIVE ONLY.

TIDE BAR
AUSTRALIAN HEIGHT DATUM

+1.08	HAT
+0.68	MHWS
+0.48	MHWN
+0.08	MSL
-0.32	MLWN
-0.52	MLWS
-0.82	LAT

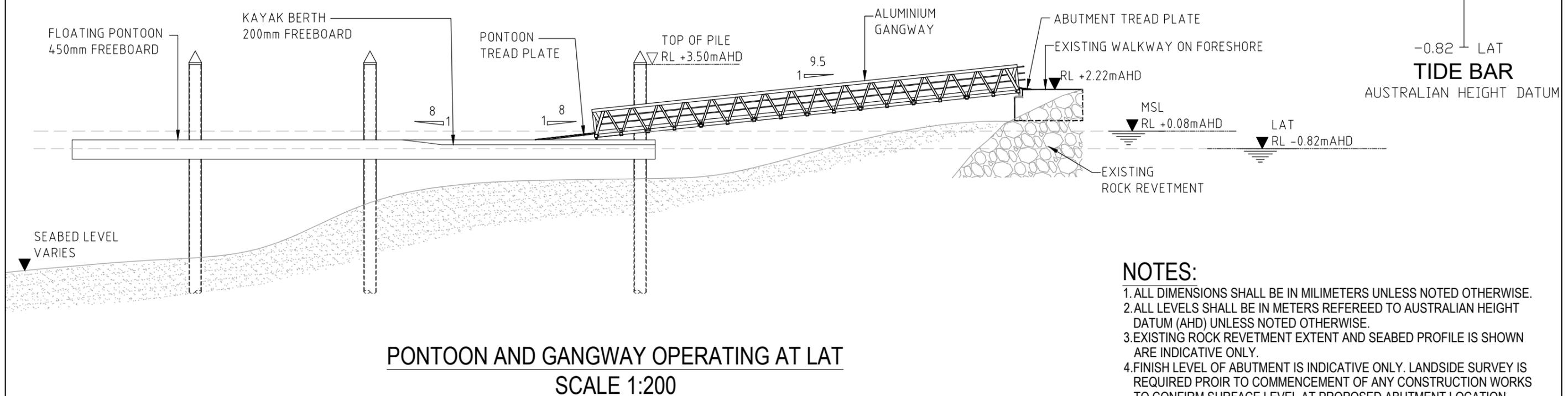
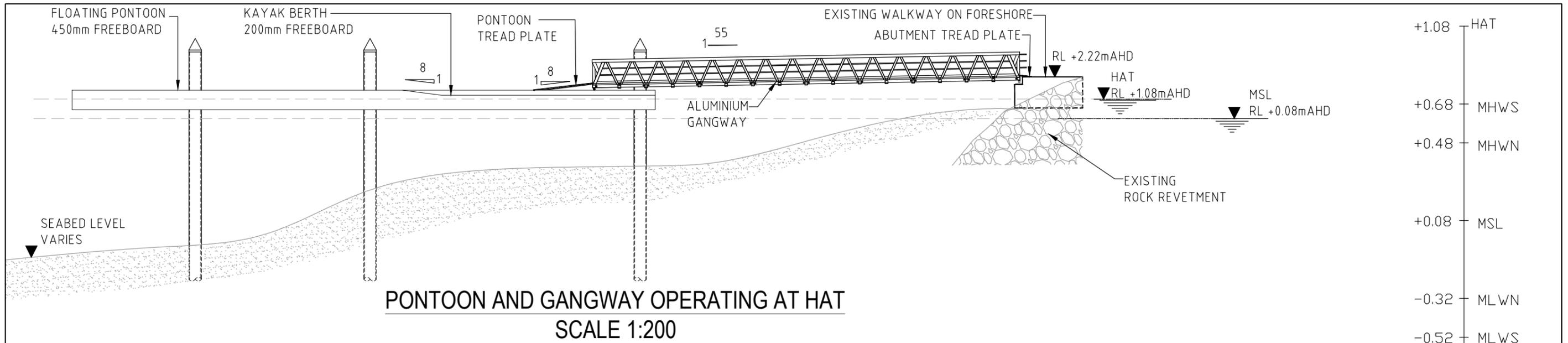
CO-ORDINATE SCHEDULE		
SET OUT POINT	EASTING (m)	NORTHING (m)
P1	244652.316	6045193.064
P2	244680.075	6045204.438
P3	244705.099	6045143.365



FOR INFORMATION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED 150mm ON A3 SIZE ORIGINAL

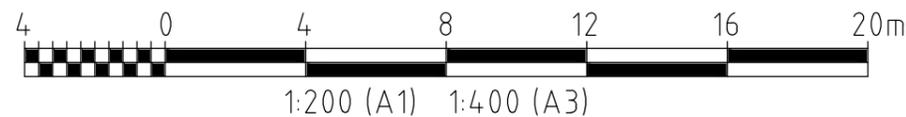
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	0	31-JAN-2020	CONCEPT DESIGN - CLIENT REVIEW					DRAWN	A. KADAM	31/01/20		
					CO-ORDINATE SYSTEM MGA ZONE 56			HEIGHT DATUM AHD	DRG CHECK	N. BULDO	31/01/20	ISSUE STATUS FOR INFORMATION
								DESIGN	N. BULDO	31/01/20	© Roads and Maritime Services	
								DESIGN CHECK	H. SINGH	31/01/20		
								DESIGN MNGR	S. WATKIN	31/01/20		
								PROJECT MNGR	P. CHON	31/01/20		



TIDE BAR
AUSTRALIAN HEIGHT DATUM

NOTES:

1. ALL DIMENSIONS SHALL BE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. ALL LEVELS SHALL BE IN METERS REFERRED TO AUSTRALIAN HEIGHT DATUM (AHD) UNLESS NOTED OTHERWISE.
3. EXISTING ROCK REVETMENT EXTENT AND SEABED PROFILE IS SHOWN ARE INDICATIVE ONLY.
4. FINISH LEVEL OF ABUTMENT IS INDICATIVE ONLY. LANDSIDE SURVEY IS REQUIRED PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION WORKS TO CONFIRM SURFACE LEVEL AT PROPOSED ABUTMENT LOCATION.
5. GANGWAY TO BE DESIGNED TO NOT EXCEED A SLOPE OF 1:8 (V:H) AT LAT AND NOT EXCEED A SLOPE OF 1:12 MORE THAN 20% OF THE TIME.
6. THE GANGWAY SHALL BE DESIGNED FOR A GENERAL LIVE LOAD OF 4kPa.
7. HANDRAILS ON ABUTMENT AND PONTOON HAVE BEEN OMITTED FROM VIEW.
8. TOP OF PILE LEVEL +3.50m AHD TO CATER FOR A 1:100 AEP STORM TIDE LEVEL OVER A 50 YEAR DESIGN LIFE. PILE CUT OFF LEVELS TO BE DETERMINED FOLLOWING GEOTECHNICAL INVESTIGATION.



FOR INFORMATION

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					CO-ORDINATE SYSTEM MGA ZONE 56			HEIGHT DATUM AHD	DRG CHECK	N. BULDO	31/01/20	ISSUE STATUS FOR INFORMATION
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1 | VIEW LOOKING NORTH FROM BATEMANS BAY SOUTHERN FORESHORE
NTS

NOT FOR CONSTRUCTION

DRAWING FILE LOCATION \ NAME - PLOT DATE \ TIME - PLOT BY P:\2018\18044 Batemans Bay Bridge D&C\6.1 CAD\30 Sheets\DOCUMENTATION\MS1\MS1-DG-01.dwg - 3/02/2020 11:58:28 AM - sqju		PROJECT BREAKDOWN STRUCTURE		JACOBS DOCUMENT NUMBER BBB-CMP-DWG-MS-0503	PLOT DATE / TIME 3/02/2020	PLOT BY sqju	CLIENT Transport Roads & Maritime Services	EUROBODALLA SHIRE COUNCIL HW1 PRINCES HIGHWAY BATEMANS BAY BRIDGE PROJECT BRIDGE OVER CLYDE RIVER SMALL CRAFT PONTOON STRUCTURE VIEW 1	A3				
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Appendix B

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?	Minor, short-term negative and long-term positive impacts
b. Any transformation of a locality?	Nil
c. Any environmental impact on the ecosystems of the locality?	Nil
d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	Nil
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?	Nil
f. Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974)?	Nil
g. Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?	Nil
h. Any long-term effects on the environment?	Nil
i. Any degradation of the quality of the environment?	Nil
j. Any risk to the safety of the environment?	Nil
k. Any reduction in the range of beneficial uses of the environment?	Nil
l. Any pollution of the environment?	Nil
m. Any environmental problems associated with the disposal of waste?	Nil
n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply?	Nil
o. Any cumulative environmental effect with other existing or likely future activities?	Nil
p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?	Nil

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?	Nil
b. Any impact on a National Heritage place?	Nil
c. Any impact on a wetland of international importance?	Nil
d. Any impact on a listed threatened species or communities?	Nil
e. Any impacts on listed migratory species?	Nil
f. Any impact on a Commonwealth marine area?	Nil
g. Does the proposed modification involve a nuclear action (including uranium mining)?	Nil
Additionally, any impact (direct or indirect) on Commonwealth land?	Nil

Appendix C

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		ISEPP cl. 95A
Bus Depots	Does the project propose a bus depot?	No		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		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		ISEPP cl. 15A

Note: See interactive map here: <https://www.planning.nsw.gov.au/policy-and-legislation/coastal-management>. Note the coastal vulnerability area has not yet been mapped.

Note: a certified coastal zone management plan is taken to be a certified coastal management program

Council related infrastructure or services

Issue	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	ISEPP clause
Stormwater	Are the works likely to have a <i>substantial</i> impact on the stormwater management services which are provided by council?	No		ISEPP cl.13(1)(a)
Traffic	Are the works likely to generate traffic to an extent that will <i>strain</i> the capacity of the existing road system in a local government area?	No		ISEPP cl.13(1)(b)

Issue	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	ISEPP clause
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will this connection have a <i>substantial</i> impact on the capacity of any part of the system?	No		ISEPP cl.13(1)(c)
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a <i>substantial</i> volume of water?	No		ISEPP cl.13(1)(d)
Temporary structures	Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a <i>minor</i> or <i>inconsequential</i> disruption to pedestrian or vehicular flow?	No		ISEPP cl.13(1)(e)
Road & footpath excavation	Will the works involve more than <i>minor</i> or <i>inconsequential</i> excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	No		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 <i>minor</i> or <i>inconsequential</i> ?	No		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 <i>minor</i> extent?	No		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 additions to, or the demolition of, a building, emergency works or routine maintenance	No		ISEPP cl.15AA

Note: Flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled *Floodplain Development Manual: the management of flood liable land* published by the New South Wales Government.

Public authorities other than councils

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the <i>National Parks and Wildlife Act 1974</i> , or on land acquired under that Act?	No	DPIE (Environment, Energy and Science) (formerly 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	DPIE (Environment, Energy and Science)	ISEPP cl. 16(2)(b)
Aquatic reserves and marine parks	Are the works adjacent to an aquatic reserve or a marine park declared under the <i>Marine Estate Management Act 2014</i> ?	Yes	DPIE (Regions, Industry, Agriculture & Resources) and DPIE (Batemans Marine Park)	ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the <i>Sydney Harbour Foreshore Authority Act 1998</i> ?	No	Sydney Harbour Foreshore Authority	ISEPP cl.16(2)(d)

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

Growth Centres SEPP

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

Appendix D

Noise summary report

Batemans Bay Bridge replacement - New floating pontoon

Addendum review of environmental factors 3

Noise summary report

Transport for New South Wales | May 2020

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Attachments

Attachment 1 Construction and Maintenance Noise Estimator output sheets

Attachment 2 Construction Noise and Vibration Guideline standard mitigation measures

1 Background

Transport for New South Wales (TfNSW) proposes to modify the Batemans Bay Bridge replacement project (the project) to retain the existing T-Wharf on the southern foreshore and adjust the downstream project boundary to accommodate the new permanent floating pontoon on the Clyde River (proposed modification). A review of environmental factors (REF) was prepared in November 2017 (project REF) to assess the potential impacts of the project. A submissions report was subsequently prepared in May 2018. An addendum REF has been prepared to describe the proposed modification, document and assess the likely impacts of the proposed modification on the environment, and detail mitigation and management measures to be implemented.

The project REF included a Noise and Vibration Assessment (NVA) undertaken by Renzo Tonin & Associates (2017) (Appendix I to the project REF). A further NVA was undertaken by Renzo Tonin & Associates (2018) as part of the submissions report to address design changes (Appendix E to the submissions report).

Four Noise Catchment Areas (NCAs) and monitoring locations near the overall project area were identified in the NVAs as shown on Figure 1-1. The proposed modification is located adjacent to NCA 4. Noise monitoring for the project REF NVA was undertaken from 5 to 15 June 2017 at the four monitoring locations to determine background noise levels and existing traffic noise on the Princes Highway. The closest background noise monitoring location to the proposed modification is location M3 at 23 Clyde Street, approximately 150 metres from the proposed modification site, as shown on Figure 1-1.

An additional noise assessment has been carried out by Qubist Pty Ltd to assess the potential noise impacts of the proposed modification. The Roads and Maritime Services Construction and Maintenance Noise Estimator has been used for the assessment and has been applied in accordance with the *Construction Noise and Vibration Guideline (CNVG)* (Roads and Maritime Services, 2016). Further detail around the methodology used for the noise assessment is provided in section 3.

This noise summary report has been prepared to support the addendum REF and presents the results of the noise assessment for the proposed modification.

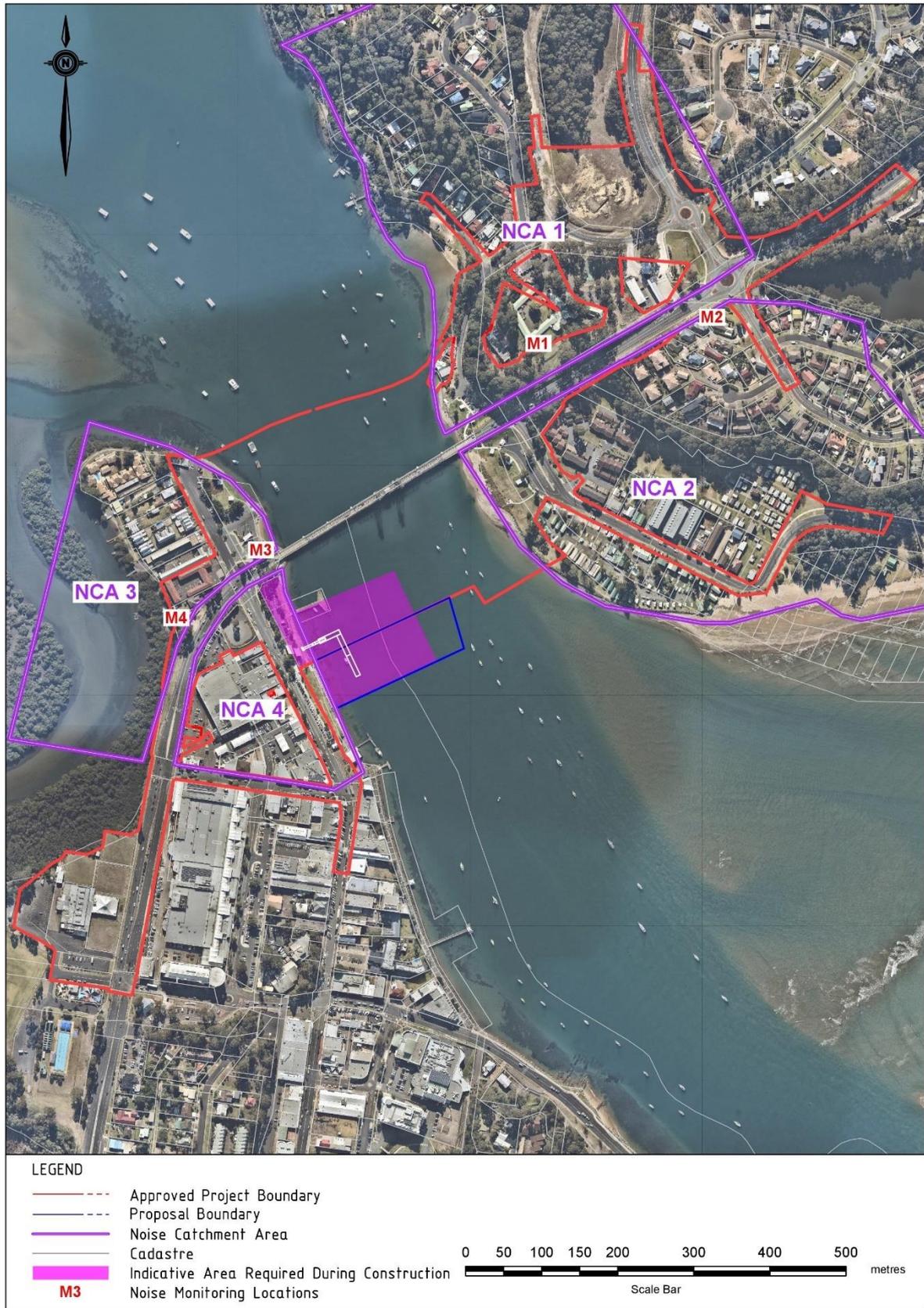


Figure 1-1: Noise catchment areas and noise monitoring locations

2 Proposed modification description

2.1 Location

The proposed modification is located adjacent to Clyde Street on the southern foreshore of the Clyde River, to the east of the existing Batemans Bay Bridge. The indicative area required during construction for the proposed modification is shown on Figure 1-1.

Whilst the gangway to the new floating pontoon would be inside the approved REF boundary, the floating pontoon would extend beyond the downstream extent of the approved REF boundary.

2.2 Construction methodology

The proposed works comprise the construction of a new floating pontoon on the southern foreshore and would generally include:

- Site establishment, including installation of temporary fencing, construction signage and erosion and sedimentation controls
- Mobilisation and assembly of plant / machinery at site on the foreshore
- Piling of new pontoon foundations, conducted from either land or from water using barges
- Construction of a temporary working platform, if required
- Installation of gangway abutment
- Installation of scour protection
- Transport, delivery and installation of new pontoon segments, gangway and other fixed components
- Removal of temporary working platforms including removal of containment measures such as cofferdams (where used), and rehabilitation of the riverbank
- Removal of remnant low level access structure immediately downstream of the main T-Wharf structure
- Minor modifications for tie in with foreshore areas
- Reinstatement of foreshore areas and facilities following construction.

2.3 Duration

The works associated with the proposed modification would be anticipated to commence in mid to late 2020. Construction would take up to six months however may be staged over a two year period. Construction would be staged to minimise impacts on foreshore facilities during peak holiday periods.

Following site establishment, piling of the new pontoon foundations would commence. The location of piling (land and/or water) would be determined during further development of the concept design for the pontoon. Piling works would be expected to be more noise and vibration intensive, however they will be short-term in nature. Minor noise impacts associated with the transport of materials to and from the foreshore area would occur throughout construction of the proposed modification.

2.4 Hours of work

Consistent with the project REF, the works for the proposed modification would be undertaken during the standard construction hours of:

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

In accordance with the CNVG, activities with impulsive or tonal noise emissions would only be carried out within the following hours:

- Monday to Friday: 8 am to 5 pm
- Saturday: 9 am to 1 pm
- no work on Sundays and public holidays.

Work with impulsive or tonal noise emissions would be carried out in continuous blocks not exceeding three hours each with a minimum respite of at least one hour between each block.

No out of hours works or night works are anticipated for the proposed modification.

As described in the project REF, works would be undertaken in accordance with the CNVG and the project Environment Protection Licence (EPL), if required.

3 Noise assessment methodology

3.1 Construction and Maintenance Noise Estimator tool

The Roads and Maritime Services Construction and Maintenance Noise Estimator has been used for this noise assessment and has been applied in accordance with the CNVG.

The Construction and Maintenance Noise Estimator is a quantitative noise assessment tool that allows noise levels from construction work to be predicted and compared with noise management levels (NMLs). The inputs to the noise assessment include the background noise levels, type of plant that will be used and distance between the plant and a receiver. These inputs to the noise assessment are described in sections 3.2, 3.4 and 3.5, respectively. NMLs for residential, commercial and recreation receivers are identified in section 3.3.

The output from the Construction and Maintenance Noise Estimator includes distances at which receivers will be impacted and a list of additional mitigation measures consistent with the CNVG that should be considered where noise from construction works is above the 'noise affected' levels. Summary outputs of the noise assessment for each receiver are included at Attachment 1.

3.2 Background noise levels

The NVA prepared for the project REF identified four NCAs. The closest NCA to the proposed modification is NCA 4, however noise monitoring was not undertaken for NCA 4 as this area contains commercial premises and noise guideline values for commercial premises are not based on existing noise levels. The closest noise monitoring location for determining background noise levels for the proposed modification is location M3 at 23 Clyde Street in NCA 3, approximately 150 metres from the proposed modification site (refer Figure 1-1).

The background noise levels adopted for the proposed modification are shown in Table 3-1 below.

Table 3-1: Background noise levels adopted for the proposed modification

Noise monitoring location	L _{A90} Background noise levels (dB(A))		
	Day	Evening	Night
M3 – 23 Clyde Street	57	46	42

The background noise levels in Table 3-1 are consistent with the typical background noise levels for Urban/Industrial noise environments provided in the CNVG.

3.3 Noise management levels

Construction NML are determined by the *Interim Construction Noise Guideline* (DECC, 2009) (ICNG) in accordance with the CNVG.

The rating background level (RBL) is used when determining the NML. The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours).

Table 3-2 (reproduced from Table 2 of the ICNG) sets out the NMLs for residences and how they are to be applied. Note that the proposed modification is located adjacent to NCA 4. NCA 4 comprises commercial receivers and as such NMLs based on Table 3-2 would not be applicable to receivers located in NCA 4.

Table 3-2: Noise Management Levels at residential receivers

Time of day	NML $L_{Aeq} (15 \text{ min})^*$	How to apply
<p>Recommended standard hours:</p> <p>Monday to Friday 7 am to 6 pm</p> <p>Saturday 8 am to 1 pm</p> <p>No work on Sundays or public holidays</p>	<p>Noise affected RBL + 10 dB</p>	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <ul style="list-style-type: none"> • Where the predicted or measured $L_{Aeq} (15 \text{ min})$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	<p>Highly noise affected 75 dB(A)</p>	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <ul style="list-style-type: none"> • Where noise is above this level, the relevant authority may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: <ul style="list-style-type: none"> - times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences); - if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Time of day	NML $L_{Aeq(15\text{ min})}$ *	How to apply
Outside recommended standard hours	Noise affected RBL + 5 dB	<ul style="list-style-type: none"> • A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.

*Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 metres from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 metres of the residence. Noise levels may be higher at upper floors of the noise affected residence.

The construction NMLs (noise affected level) adopted for the project were based on the measured background noise levels described in section 3.2 and have been developed in accordance with the ICNG management levels outlined in Table 3-2 and the CNVG.

Table 3-3 identifies the NMLs for residential receivers adopted for NCA 3 in the project REF.

Table 3-3: Noise management levels at residential receivers in NCA 3

NMLs $L_{Aeq(15\text{ min})}$ (dBA)		
Day	Evening	Night
67	51	47

The NMLs for commercial premises and passive recreation as identified in the NVA are provided in Table 3-4. The NMLs are consistent with those used in the project REF and the Construction and Maintenance Noise Estimator.

Table 3-4: Noise management levels for commercial and recreation land uses

Land use	NML $L_{Aeq(15\text{ min})}$ (dBA)
Commercial	70
Passive recreation	60

3.4 Construction noise sources

Indicative plant and equipment that would be used for the proposed modification and the associated sound power levels (SWL) are listed in Table 3-5. The SWLs have been generally sourced from Table F.1 of the CNVG.

Table 3-5: Noise levels for construction equipment

Plant / equipment	$L_{Aeq(15 \text{ min})}$ SWL (dB(A))
Drilling rig	105
Excavator (tracked) 35 tonne	110
Franna crane 20 tonne	98
Barge	100
Piling rig - driven	116
Chainsaw	114
Suction dredge	107
Generator	103
Jackhammer	115
Vibratory hammer	115
Truck (medium rigid)	103
Concrete truck	109
Light vehicles	88

The distance-based scenario calculation sheet in the Construction and Maintenance Noise Estimator was used to determine the predicted noise levels for standard construction hours due to the proposed modification.

For the purposes of this assessment, the bridge works scenario in the Construction and Maintenance Noise Estimator was utilised, which has a SWL of 120 dB(A). This SWL is the scenario closest suited to the proposed works, would be a 'worst-case scenario' and is based on using the following combination of equipment using the highest allowable noise levels for each piece of equipment, as listed in Table F.1 of the CNVG:

- Piling rig (driven) - L_{Aeq} SWL = 116 dB(A)
- Concrete truck - L_{Aeq} SWL = 109 dB(A)
- Compressor - L_{Aeq} SWL = 109 dB(A)
- Concrete pump - L_{Aeq} SWL = 102 dB(A)

- Power generator - LAeq SWL = 100 dB(A)
- Franna crane 20t- LAeq SWL = 98 dB(A).

3.5 Identifying sensitive receivers

The CNVG provides a methodology to identify whether the works would affect many, few or no receivers, based on the 'Affected Distance', which is the distance up to which noise levels are expected to exceed the NML and within which receivers may be impacted to different degrees.

The distance based scenario calculation sheet for bridge works in the Construction and Maintenance Noise Estimator identified the 'Affected Distance' for receivers during standard construction hours for the proposed modification works to be:

- 140 metres for residential receivers
- 85 metres for offices and retail outlets
- 215 metres for passive recreation areas.

In addition, where noise from construction may be propagated over water, i.e. across the Clyde River, the 'Affected Distance' for receivers during standard construction hours for the proposed modification works is estimated to be:

- 170 metres for residential receivers
- 100 metres for offices and retail outlets
- 280 metres for passive recreation areas.

The noise assessment has considered receivers located within the above listed distances from the site of the proposed modification.

4 Construction noise assessment

4.1 Potentially impacted receivers

The potentially impacted receivers from the proposed modification based on the Affected Distances described in section 3.5 are shown in Table 4-1. The distances shown in Table 4-1 are the closest distances measured from the edge of the area required for construction of the proposed modification to the edge of the sensitive receivers as shown on Figure 4-1. This is a conservative approach as most receivers would actually be situated at a greater distance from the works.

Table 4-1: Potentially impacted receivers

ID	Sensitive receiver	Type of receiver	Approximate shortest distance from proposed modification (m)
P1	South Western Picnic Area	Passive recreation	60
P2	Southern Foreshore Picnic Area	Passive recreation	0
C1	29 Clyde Street, Batemans Bay	Commercial	76
C2	19 Clyde Street, Batemans Bay	Commercial	15
C3	17 Clyde Street, Batemans Bay	Commercial	15
C4	13 Clyde Street, Batemans Bay	Commercial	15
C4	13 Clyde Street, Batemans Bay	Commercial	15
C5	11 Clyde Street, Batemans Bay	Commercial	15
C6	9 Clyde Street, Batemans Bay	Commercial	15
C7	7 Clyde Street, Batemans Bay	Commercial	38
C8	5 Clyde Street, Batemans Bay	Commercial	43
C9	1 Clyde Street, Batemans Bay	Commercial	62
C10	1C Orient Street, Batemans Bay	Commercial	60

The majority of the sensitive receivers potentially impacted by the proposed modification are commercial premises such as retail businesses and restaurants located along Clyde Street adjacent to the southern foreshore area. Two public picnic areas, considered to be of passive recreation land use, would be potentially impacted by noise due to the proposed modification. A public picnic and playground area known as the South Western Picnic Area, located adjacent to Clyde Street upstream of the existing Batemans Bay Bridge, would be within the Affected Distance of the proposed modification. A second public space and picnic

area is located adjacent to the southern foreshore, downstream of the existing Batemans Bay Bridge and T-Wharf.

It should be noted that no residential receivers are expected to be potentially impacted by the proposed modification as no residential receivers fall within the relevant Affected Distance.

When considering propagation of noise from the proposed modification over the Clyde River, no receivers were identified as being within the Affected Distance of the works.

The potentially impacted receivers in Table 4-1 are classified as ‘few’ according to the CNVG. Where there are few receivers within the Affected Distance it may be possible to meet with all receivers to discuss the works and any noise impacts during the works.

4.2 Predicted noise levels for standard work hours

The assessment process in the CNVG for few receivers and duration of impact works between three to six weeks has been adopted to assess noise impacts for the proposed modification.

The scenario calculation sheet in the Construction and Maintenance Noise Estimator was used to determine the predicted noise levels for standard work hours using the bridge works scenario (SWL L_{Aeq} of 120 dB(A)). This scenario represents a conservative ‘worst-case scenario’ as discussed previously in section 3.4.

The noise levels predicted using the Construction and Maintenance Noise Estimator for standard work hours are shown in Table 4-2. Receivers highlighted in **bold** font indicate an increase in maximum predicted noise levels from construction of the proposed modification compared to the project REF, as amended by the submissions report.

No out of hours works (OOHW) are proposed for the modification therefore no assessment has been provided for OOHW. However, should OOHW be required they would be undertaken in accordance with the Contractor’s Noise and Vibration Management Plan (NVMP), which complies with the CNVG and is consistent with the project REF, and the project EPL.

Construction and Maintenance Noise Estimator output sheets for each of the receivers listed in Table 4-2 are included in Attachment 1.

Table 4-2: Predicted noise levels at receivers during standard work hours

ID	Sensitive receiver	Type of Receiver	NML (dB(A))	Predicted noise level L_{Aeq} (15 min) (dB(A))	Level above NML dB(A)
P1	South Western Picnic Area	Passive recreation	60	73	13
P2	Southern Foreshore Picnic Area	Passive recreation	60	93	33
C1	29 Clyde Street, Batemans Bay	Commercial	70	71	1
C2	19 Clyde Street, Batemans Bay	Commercial	70	84	14

ID	Sensitive receiver	Type of Receiver	NML (dB(A))	Predicted noise level L _{Aeq} (15 min) (dB(A))	Level above NML dB(A)
C3	17 Clyde Street, Batemans Bay	Commercial	70	84	14
C4	13 Clyde Street, Batemans Bay	Commercial	70	84	14
C4	13 Clyde Street, Batemans Bay	Commercial	70	84	14
C5	11 Clyde Street, Batemans Bay	Commercial	70	84	14
C6	9 Clyde Street, Batemans Bay	Commercial	70	84	14
C7	7 Clyde Street, Batemans Bay	Commercial	70	76	6
C8	5 Clyde Street, Batemans Bay	Commercial	70	75	5
C9	1 Clyde Street, Batemans Bay	Commercial	70	73	3
C10	1C Orient Street, Batemans Bay	Commercial	70	73	3

Up to seven commercial receivers, highlighted in **bold** font in Table 4-2, are expected to experience an increase in maximum predicted noise levels compared to the project REF, as amended by the submissions report, for a single construction phase. The public green space/ picnic area on the southern foreshore was not considered in previous NVAs. The remainder of receivers would experience maximum predicted noise levels either equal to or less than the noise levels assessed in the project REF, as amended by the submissions report.

A total of eight receivers are predicted to exceed the highly noise affected level of 75 dB(A) during standard construction hours due to the proposed modification, as highlighted in **bold** font in Table 4-2. Seven receivers are commercial premises, including restaurants and shops located within the commercial retail/ dining district located on Clyde Street, adjacent to the southern foreshore. Exceedances of up to 14 dB(A) of the daytime NML could occur at these sensitive receivers due to the proposed modification.

The Southern Foreshore Picnic Area is located directly adjacent to the construction area for the proposed modification. Exceedances of up to 33 dB(A) of the daytime NML could occur at this location during construction of the proposed modification. Public enjoyment of this recreation area would likely be disturbed during some periods of construction.

Where noise from construction works is expected to be above the noise affected levels, the Contractor would inform potentially affected receivers of the activities to be carried out, the expected noise impacts and duration and contact details for enquiries and noise complaints. Where construction activities are predicted to exceed the highly noise affected level, respite periods may be required to reduce impacts on receivers by restricting the hours that the very noisy activities can occur. Consultation in accordance with the Community Involvement Plan would be carried out with identified commercial receivers to ensure that adverse impacts on business arising from noise associated with construction of the proposed modification are avoided or minimised.

No residential receivers are predicted to be impacted by noise as a result of the proposed modification.

The construction noise impacts presented in Table 4-2 are based on the representative worst-case noise construction scenario assuming all equipment operates concurrently, that there are minimal offset distances between equipment and receivers and no barriers or site hoardings to mitigate noise measures.

The proposed modification is expected to produce noise levels less than those provided in Table 4-2. The Contractor's NVMP requires the development of a Construction Noise and Vibration Impact Statement (CNVIS) for any activities not covered by the NVMP. Accordingly, the Contractor would develop a CNVIS for the proposed modification. The CNVIS would re-assess the construction noise impacts in accordance with the ICNG and CNVG based on actual construction scenarios, timings, offset distances and equipment, and would describe the construction impacts and the necessary noise and vibration management and mitigation measures.



Figure 4-1: Potentially impacted receivers from the proposed modification

5 Mitigation measures

The CNVG provides a range of standard noise management measures to be implemented to reduce construction noise impacts to affected receivers. These measures are included in Attachment 2 of this report. The Contractor's NVMP includes a range of best practice environmental control measures consistent with the CNVG to minimise noise impacts during construction.

Where standard mitigation measures have been applied and noise levels continue to exceed the NMLs, additional mitigation measures outlined in the CNVG, which largely focus on engagement with affected sensitive receivers, should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Recommended additional feasible and reasonable mitigation measures, based on the results of the noise assessment, are identified by the Construction and Maintenance Noise Estimator. The relevant measures recommended for sensitive receivers affected by noise impacts associated with the proposed modification are shown in Table 5-1.

A description of the CNVG additional mitigation measures is provided in Table 5-2.

Mitigation measures to be implemented would be reconfirmed by the CNVIS prior to construction of the proposed modification, and any changes to management measures and consultation activities considered appropriate to minimise noise impacts documented.

Table 5-1: Recommended additional noise mitigation measures for receivers

Sensitive receiver	Additional mitigation measures
South Western Picnic Area	N, V
Southern Foreshore Picnic Area	N, V, PC, RO
29 Clyde Street, Batemans Bay	-
19 Clyde Street, Batemans Bay	N, V, PC, RO
17 Clyde Street, Batemans Bay	N, V, PC, RO
13 Clyde Street, Batemans Bay	N, V, PC, RO
13 Clyde Street, Batemans Bay	N, V, PC, RO
11 Clyde Street, Batemans Bay	N, V, PC, RO
9 Clyde Street, Batemans Bay	N, V, PC, RO
7 Clyde Street, Batemans Bay	N, V, PC, RO
5 Clyde Street, Batemans Bay	N, V, PC, RO
1 Clyde Street, Batemans Bay	-
1C Orient Street, Batemans Bay	-

Notes: N= Notification (letterbox drop or equivalent)
V = Verification of predicted noise level

PC = Phone calls
RO = Respite offers

Table 5-2: CNVG additional mitigation measures

Additional mitigation measure	Description
Notification (letterbox drop or equivalent) (N)	Advanced warning of works and potential disruptions can assist in reducing the impact on the community. The notification may consist of a letterbox drop (or equivalent) detailing work activities, time periods over which these will occur, impacts and mitigation measures. Notification should be a minimum of five working days prior to the start of works.
Verification (V)	Verification of construction noise and vibration levels should occur to ensure the actual impacts are consistent with the predicted levels. Appendix F of the CNVG contains further details about verification of Noise and Vibration levels as part of routine checks of noise levels or following reasonable complaints.
Phone calls (PC)	Phone calls detailing relevant information made to affected stakeholders within seven calendar days of proposed work. Phone calls provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs.
Respite Offers (RO)	<p>Respite Offers should be considered where there are high noise and vibration generating activities near receivers. As a guide work should be carried out in continuous blocks that do not exceed three hours each, with a minimum respite period of one hour between each block. The actual duration of each block of work and respite should be flexible to accommodate the usage of and amenity at nearby receivers.</p> <p>The purpose of such an offer is to provide residents with respite from an ongoing impact. This measure is evaluated on a project-by-project basis, and may not be applicable to all projects.</p>
Specific notifications (SN)	<p>Specific notifications are letterbox dropped (or equivalent) to identified stakeholders no later than 5 working days ahead of construction activities that are likely to exceed the noise objectives. The specific notification provides additional information when relevant and informative to more highly affected receivers than covered in general letterbox drops.</p> <p>This form of communication is used to support periodic notifications, or to advertise unscheduled works.</p>
Individual briefings (IB)	Individual briefings are used to inform stakeholders about the impacts of high noise activities and mitigation measures that will be implemented. Project representatives would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project. Where the resident cannot be met with individually then an alternative form of engagement should be used.

Additional mitigation measure	Description
Respite Period 1 (R1)	Out of hours construction noise in out of hours period 1 shall be limited to no more than three consecutive evenings per week except where there is a Duration Respite. For night work these periods of work should be separated by not less than one week and no more than 6 evenings per month
Respite Period 2 (R2)	Night time construction noise in out of hours period 2 shall be limited to two consecutive nights except for where there is a Duration Respite. For night work these periods of work should be separated by not less than one week and 6 nights per month. Where possible, high noise generating works shall be completed before 11pm.
Duration respite (DR)	<p>Respite offers and respite periods 1 and 2 may be counterproductive in reducing the impact on the community for longer duration projects. In this instance and where it can be strongly justified it may be beneficial to increase the work duration, number of evenings or nights worked through Duration Respite so that the project can be completed more quickly.</p> <p>RMS staff should engage with the community where noise levels are expected to exceed the NML to demonstrate support for Duration Respite.</p>
Alternative accommodation (AA)	Alternative accommodation options may be offered (as a last resort) to residents living in close proximity to construction works that are likely to experience highly intrusive noise levels. The specifics of the offer will be identified on a project-by-project basis, however an AA offer is unlikely to be made for maintenance works. Additional aspects for consideration shall include whether the highly intrusive activities occur throughout the night or before midnight.

Further safeguards and management measures to address noise impacts are provided in the project REF, as amended by the submission report, and are included in section 7 of the addendum REF.

6 Terms and acronyms used in this noise summary report

Term / acronym	Description
AREF	Addendum review of environmental factors
CEMP	Construction environmental management plan
CNVG	Construction noise and vibration guideline (Roads and Maritime Services, 2016)
CNVIS	Construction noise and vibration impact statement
EPL	Environment Protection Licence
ICNG	Interim construction noise guideline
NCA	Noise catchment areas
NML	Noise Management Level
NVA	Noise and vibration assessment
NVMP	Noise and Vibration Management Plan
OOHW	Out of hours works
REF	Review of environmental factors
Roads and Maritime	NSW Roads and Maritime Services
SWL	Sound power levels
TfNSW	Transport for New South Wales

7 References

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

Renzo Tonin & Associates (2017) Batemans Bay Bridge Replacement Noise and Vibration Assessment.

Renzo Tonin & Associates (2018) Batemans Bay Bridge Replacement Noise and Vibration Assessment for Design Changes.

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

Roads and Maritime Services (2017) Batemans Bay Bridge replacement review of environmental factors November 2017.

Roads and Maritime Services (2018) Batemans Bay Bridge replacement review of environmental factors submissions report May 2018.

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Attachment 1 Construction and Maintenance Noise Estimator output sheets



Noise Estimator (Scenario)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Batemans Bay Bridge replacement
Scenario name	New floating pontoons proposed modification
Receiver address	South Western Picnic Area
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	User Input

Noise area category	Representative Noise Environment		User Input
	RBL or LA90 Background level (dB(A))	Day	
Evening			46
Night			42
LAeq(15minute) Noise mangement level (dB(A))	Day		67
	Day (OOHW)		62
	Evening		51
	Night		47

Representative distance (m)	60
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Bridge works	120	Yes	0	60	73

Total SPL LAeq(15minute) (dBA)	73
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Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise speccilast for more information)

	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	67	55	65	55	65	60	75	70
	Day (OOHW)	62	55	65	55	65	60	75	70
	OOHW Period 1	51		65	55	65	60	75	70
	OOHW Period 2	47		65	55			75	70
Level above background (dB(A))	Standard hours	16							
	Day (OOHW)	16							
	OOHW Period 1	27							
	OOHW Period 2	31							
Level above NML (dB(A))	Standard hours	6	18	8	18	8	13		3
	Day (OOHW)	11	18	8	18	8	13		3
	OOHW Period 1	22		8	18	8	13		3
	OOHW Period 2	26		8	18				3
Additional mitigation measures	Standard Hours	-	N, V	-	N, V	-	N, V	-	-
	Day (OOHW)	N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 1	V, N, R1, DR		N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, N, R2, DR	V, IB, N, PC, SN, R2, DR			-	N



Noise Estimator (Scenario)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Batemans Bay Bridge replacement
Scenario name	New floating pontoon proposed modification
Receiver address	Southern Foreshore Picnic Area, Batemans Bay
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	User Input

Noise area category	Representative Noise Environment		User Input
	RBL or LA90 Background level (dB(A))	Day	
Evening			46
Night			42
LAeq(15minute) Noise mangement level (dB(A))	Day		67
	Day (OOHW)		46
	Evening		51
	Night		47

Representative distance (m)	0
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Bridge works	120	Yes	0	0	93

Total SPL LAeq(15minute) (dBA)	93
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Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise speccilast for more information)

	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	67	55	65	55	65	60	75	70
	Day (OOHW)	62	55	65	55	65	60	75	70
	OOHW Period 1	51		65	55	65	60	75	70
	OOHW Period 2	47		65	55			75	70
Level above background (dB(A))	Standard hours	36							
	Day (OOHW)	36							
	OOHW Period 1	47							
	OOHW Period 2	51							
Level above NML (dB(A))	Standard hours	26	38	28	38	28	33	18	23
	Day (OOHW)	31	38	28	38	28	33	18	23
	OOHW Period 1	42		28	38	28	33	18	23
	OOHW Period 2	46		28	38			18	23
Additional mitigation measures	Standard Hours	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO
	Day (OOHW)	V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN
	OOHW Period 1	V, IB, N, R1, DR, PC, SN		V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN	V, IB, N, R1, DR, PC, SN
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		AA, V, IB, N, PC, SN, R2, DR	AA, V, IB, N, PC, SN, R2, DR			V, IB, N, PC, SN, R2, DR	V, IB, N, PC, SN, R2, DR



Noise Estimator (Scenario)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Batemans Bay Bridge replacement
Scenario name	New floating pontoons proposed modification
Receiver address	29 Clyde Street, Batemans Bay
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	User Input

Noise area category	Representative Noise Environment		User Input
	RBL or LA90 Background level (dB(A))	Day	
Evening			46
Night			42
LAeq(15minute) Noise mangement level (dB(A))	Day		67
	Day (OOHW)		62
	Evening		51
	Night		47

Representative distance (m)	76
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Bridge works	120	Yes	0	76	71

Total SPL LAeq(15minute) (dBA)	71
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Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise speccilast for more information)

	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	67	55	65	55	65	60	75	70
	Day (OOHW)	62	55	65	55	65	60	75	70
	OOHW Period 1	51		65	55	65	60	75	70
	OOHW Period 2	47		65	55			75	70
Level above background (dB(A))	Standard hours	14							
	Day (OOHW)	14							
	OOHW Period 1	25							
	OOHW Period 2	29							
Level above NML (dB(A))	Standard hours	4	16	6	16	6	11		1
	Day (OOHW)	9	16	6	16	6	11		1
	OOHW Period 1	20		6	16	6	11		1
	OOHW Period 2	24		6	16				1
Additional mitigation measures	Standard Hours	-	N, V	-	N, V	-	N, V	-	-
	Day (OOHW)	N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 1	V, N, R1, DR		N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 2	V, IB, N, PC, SN, R2, DR		V, N, R2, DR	V, IB, N, PC, SN, R2, DR			-	N



Noise Estimator (Scenario)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Batemans Bay Bridge replacement
Scenario name	New floating pontoons proposed modification
Receiver address	19 Clyde Street, Batemans Bay
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	User Input

Noise area category	Representative Noise Environment		User Input
	RBL or LA90 Background level (dB(A))	Day	
Evening			46
Night			42
LAeq(15minute) Noise mangement level (dB(A))	Day		67
	Day (OOHW)		62
	Evening		51
	Night		47

Representative distance (m)	15
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Bridge works	120	Yes	0	15	84

Total SPL LAeq(15minute) (dBA)	84
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Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise speccilast for more information)

	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	67	55	65	55	65	60	75	70
	Day (OOHW)	62	55	65	55	65	60	75	70
	OOHW Period 1	51		65	55	65	60	75	70
	OOHW Period 2	47		65	55			75	70
Level above background (dB(A))	Standard hours	27							
	Day (OOHW)	27							
	OOHW Period 1	38							
	OOHW Period 2	42							
Level above NML (dB(A))	Standard hours	17	29	19	29	19	24	9	14
	Day (OOHW)	22	29	19	29	19	24	9	14
	OOHW Period 1	33		19	29	19	24	9	14
	OOHW Period 2	37		19	29			9	14
Additional mitigation measures	Standard Hours	N, V	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO
	Day (OOHW)	V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 1	V, IB, N, R1, DR, PC, SN		V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, IB, N, PC, SN, R2, DR	AA, V, IB, N, PC, SN, R2, DR			V, N, R2, DR	V, N, R2, DR



Noise Estimator (Scenario)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Batemans Bay Bridge replacement
Scenario name	New floating pontoons proposed modification
Receiver address	17 Clyde Street, Batemans Bay
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	User Input

Noise area category	Representative Noise Environment		User Input
	RBL or LA90 Background level (dB(A))	Day	
Evening			46
Night			42
LAeq(15minute) Noise mangement level (dB(A))	Day		67
	Day (OOHW)		62
	Evening		51
	Night		47

Representative distance (m)	15
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Bridge works	120	Yes	0	15	84

Total SPL LAeq(15minute) (dBA)	84
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Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise speccilast for more information)

	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	67	55	65	55	65	60	75	70
	Day (OOHW)	62	55	65	55	65	60	75	70
	OOHW Period 1	51		65	55	65	60	75	70
	OOHW Period 2	47		65	55			75	70
Level above background (dB(A))	Standard hours	27							
	Day (OOHW)	27							
	OOHW Period 1	38							
	OOHW Period 2	42							
Level above NML (dB(A))	Standard hours	17	29	19	29	19	24	9	14
	Day (OOHW)	22	29	19	29	19	24	9	14
	OOHW Period 1	33		19	29	19	24	9	14
	OOHW Period 2	37		19	29			9	14
Additional mitigation measures	Standard Hours	N, V	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO
	Day (OOHW)	V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 1	V, IB, N, R1, DR, PC, SN		V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, IB, N, PC, SN, R2, DR	AA, V, IB, N, PC, SN, R2, DR			V, N, R2, DR	V, N, R2, DR



Noise Estimator (Scenario)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Batemans Bay Bridge replacement
Scenario name	New floating pontoons proposed modification
Receiver address	13 Clyde Street, Batemans Bay
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	User Input

Noise area category	Representative Noise Environment		User Input
	RBL or LA90 Background level (dB(A))	Day	
Evening			46
Night			42
LAeq(15minute) Noise mangement level (dB(A))	Day		67
	Day (OOHW)		62
	Evening		51
	Night		47

Representative distance (m)	15
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Bridge works	120	Yes	0	15	84

Total SPL LAeq(15minute) (dBA)	84
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Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise speclliast for more information)

	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	67	55	65	55	65	60	75	70
	Day (OOHW)	62	55	65	55	65	60	75	70
	OOHW Period 1	51		65	55	65	60	75	70
	OOHW Period 2	47		65	55			75	70
Level above background (dB(A))	Standard hours	27							
	Day (OOHW)	27							
	OOHW Period 1	38							
	OOHW Period 2	42							
Level above NML (dB(A))	Standard hours	17	29	19	29	19	24	9	14
	Day (OOHW)	22	29	19	29	19	24	9	14
	OOHW Period 1	33		19	29	19	24	9	14
	OOHW Period 2	37		19	29			9	14
Additional mitigation measures	Standard Hours	N, V	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO
	Day (OOHW)	V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 1	V, IB, N, R1, DR, PC, SN		V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, IB, N, PC, SN, R2, DR	AA, V, IB, N, PC, SN, R2, DR			V, N, R2, DR	V, N, R2, DR



Noise Estimator (Scenario)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Batemans Bay Bridge replacement
Scenario name	New floating pontoons proposed modification
Receiver address	11 Clyde Street, Batemans Bay
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	User Input

Noise area category	Representative Noise Environment		User Input
	RBL or LA90 Background level (dB(A))	Day	
Evening			46
Night			42
LAeq(15minute) Noise mangement level (dB(A))	Day		67
	Day (OOHW)		62
	Evening		51
	Night		47

Representative distance (m)	15
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Bridge works	120	Yes	0	15	84

Total SPL LAeq(15minute) (dBA)	84
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Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise speccilast for more information)

	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	67	55	65	55	65	60	75	70
	Day (OOHW)	62	55	65	55	65	60	75	70
	OOHW Period 1	51		65	55	65	60	75	70
	OOHW Period 2	47		65	55			75	70
Level above background (dB(A))	Standard hours	27							
	Day (OOHW)	27							
	OOHW Period 1	38							
	OOHW Period 2	42							
Level above NML (dB(A))	Standard hours	17	29	19	29	19	24	9	14
	Day (OOHW)	22	29	19	29	19	24	9	14
	OOHW Period 1	33		19	29	19	24	9	14
	OOHW Period 2	37		19	29			9	14
Additional mitigation measures	Standard Hours	N, V	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO
	Day (OOHW)	V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 1	V, IB, N, R1, DR, PC, SN		V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, IB, N, PC, SN, R2, DR	AA, V, IB, N, PC, SN, R2, DR			V, N, R2, DR	V, N, R2, DR



Noise Estimator (Scenario)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Batemans Bay Bridge replacement
Scenario name	New floating pontoon proposed modification
Receiver address	9 Clyde Street, Batemans Bay
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	User Input

Noise area category	Representative Noise Environment		User Input
	RBL or LA90 Background level (dB(A))	Day	
Evening			46
Night			42
LAeq(15minute) Noise mangement level (dB(A))	Day		67
	Day (OOHW)		62
	Evening		51
	Night		47

Representative distance (m)	15
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Bridge works	120	Yes	0	15	84

Total SPL LAeq(15minute) (dBA)	84
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Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise speccilast for more information)

	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	67	55	65	55	65	60	75	70
	Day (OOHW)	62	55	65	55	65	60	75	70
	OOHW Period 1	51		65	55	65	60	75	70
	OOHW Period 2	47		65	55			75	70
Level above background (dB(A))	Standard hours	27							
	Day (OOHW)	27							
	OOHW Period 1	38							
	OOHW Period 2	42							
Level above NML (dB(A))	Standard hours	17	29	19	29	19	24	9	14
	Day (OOHW)	22	29	19	29	19	24	9	14
	OOHW Period 1	33		19	29	19	24	9	14
	OOHW Period 2	37		19	29			9	14
Additional mitigation measures	Standard Hours	N, V	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO
	Day (OOHW)	V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 1	V, IB, N, R1, DR, PC, SN		V, N, R1, DR	V, IB, N, R1, DR, PC, SN	V, N, R1, DR	V, N, R1, DR	N, R1, DR	N, R1, DR
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, IB, N, PC, SN, R2, DR	AA, V, IB, N, PC, SN, R2, DR			V, N, R2, DR	V, N, R2, DR



Noise Estimator (Scenario)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Batemans Bay Bridge replacement
Scenario name	New floating pontoons proposed modification
Receiver address	7 Clyde Street, Batemans Bay
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	User Input

Noise area category	Representative Noise Environment		User Input
	RBL or LA90 Background level (dB(A))	Day	
Evening			46
Night			42
LAeq(15minute) Noise mangement level (dB(A))	Day		67
	Day (OOHW)		62
	Evening		51
	Night		47

Representative distance (m)	38
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Bridge works	120	Yes	0	38	76

Total SPL LAeq(15minute) (dBA)	76
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Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

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	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	67	55	65	55	65	60	75	70
	Day (OOHW)	62	55	65	55	65	60	75	70
	OOHW Period 1	51		65	55	65	60	75	70
	OOHW Period 2	47		65	55			75	70
Level above background (dB(A))	Standard hours	19							
	Day (OOHW)	19							
	OOHW Period 1	30							
	OOHW Period 2	34							
Level above NML (dB(A))	Standard hours	9	21	11	21	11	16	1	6
	Day (OOHW)	14	21	11	21	11	16	1	6
	OOHW Period 1	25		11	21	11	16	1	6
	OOHW Period 2	29		11	21			1	6
Additional mitigation measures	Standard Hours	-	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO
	Day (OOHW)	N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	-	N, R1, DR
	OOHW Period 1	V, IB, N, R1, DR, PC, SN		N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	-	N, R1, DR
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, N, R2, DR	V, IB, N, PC, SN, R2, DR			N	V, N, R2, DR



Noise Estimator (Scenario)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Batemans Bay Bridge replacement
Scenario name	New floating pontoon proposed modification
Receiver address	5 Clyde Street, Batemans Bay
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	User Input

Noise area category	Representative Noise Environment		User Input
	RBL or LA90 Background level (dB(A))	Day	
Evening			46
Night			42
LAeq(15minute) Noise mangement level (dB(A))	Day		67
	Day (OOHW)		62
	Evening		51
	Night		47

Representative distance (m)	43
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Bridge works	120	Yes	0	43	75

Total SPL LAeq(15minute) (dBA)	75
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Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise specliaist for more information)

	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	67	55	65	55	65	60	75	70
	Day (OOHW)	62	55	65	55	65	60	75	70
	OOHW Period 1	51		65	55	65	60	75	70
	OOHW Period 2	47		65	55			75	70
Level above background (dB(A))	Standard hours	18							
	Day (OOHW)	18							
	OOHW Period 1	29							
	OOHW Period 2	33							
Level above NML (dB(A))	Standard hours	8	20	10	20	10	15	0	5
	Day (OOHW)	13	20	10	20	10	15	0	5
	OOHW Period 1	24		10	20	10	15	0	5
	OOHW Period 2	28		10	20			0	5
Additional mitigation measures	Standard Hours	-	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO
	Day (OOHW)	N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	-	N, R1, DR
	OOHW Period 1	V, N, R1, DR		N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	-	N, R1, DR
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, N, R2, DR	V, IB, N, PC, SN, R2, DR			-	V, N, R2, DR



Noise Estimator (Scenario)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Batemans Bay Bridge replacement
Scenario name	New floating pontoon proposed modification
Receiver address	1 Clyde Street, Batemans Bay
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	User Input

Noise area category	Representative Noise Environment		User Input
	RBL or LA90 Background level (dB(A))	Day	
Evening			46
Night			42
LAeq(15minute) Noise mangement level (dB(A))	Day		67
	Day (OOHW)		62
	Evening		51
	Night		47

Representative distance (m)	62
-----------------------------	----

Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Bridge works	120	Yes	0	62	73

Total SPL LAeq(15minute) (dBA)	73
---------------------------------------	-----------

Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise speccilast for more information)

	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	67	55	65	55	65	60	75	70
	Day (OOHW)	62	55	65	55	65	60	75	70
	OOHW Period 1	51		65	55	65	60	75	70
	OOHW Period 2	47		65	55			75	70
Level above background (dB(A))	Standard hours	16							
	Day (OOHW)	16							
	OOHW Period 1	27							
	OOHW Period 2	31							
Level above NML (dB(A))	Standard hours	6	18	8	18	8	13		3
	Day (OOHW)	11	18	8	18	8	13		3
	OOHW Period 1	22		8	18	8	13		3
	OOHW Period 2	26		8	18				3
Additional mitigation measures	Standard Hours	-	N, V	-	N, V	-	N, V	-	-
	Day (OOHW)	N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 1	V, N, R1, DR		N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, N, R2, DR	V, IB, N, PC, SN, R2, DR			-	N



Noise Estimator (Scenario)

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Batemans Bay Bridge replacement
Scenario name	New floating pontoon proposed modification
Receiver address	1C Orient Street, Batemans Bay
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	User Input

Noise area category	Representative Noise Environment		User Input
	RBL or LA90 Background level (dB(A))	Day	
Evening			46
Night			42
LAeq(15minute) Noise mangement level (dB(A))	Day		67
	Day (OOHW)		62
	Evening		51
	Night		47

Representative distance (m)	60
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Bridge works	120	Yes	0	60	73

Total SPL LAeq(15minute) (dBA)	73
---------------------------------------	-----------

Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
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 - (b) background noise levels.
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 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads and Maritime noise speccilast for more information)

	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	67	55	65	55	65	60	75	70
	Day (OOHW)	62	55	65	55	65	60	75	70
	OOHW Period 1	51		65	55	65	60	75	70
	OOHW Period 2	47		65	55			75	70
Level above background (dB(A))	Standard hours	16							
	Day (OOHW)	16							
	OOHW Period 1	27							
	OOHW Period 2	31							
Level above NML (dB(A))	Standard hours	6	18	8	18	8	13		3
	Day (OOHW)	11	18	8	18	8	13		3
	OOHW Period 1	22		8	18	8	13		3
	OOHW Period 2	26		8	18				3
Additional mitigation measures	Standard Hours	-	N, V	-	N, V	-	N, V	-	-
	Day (OOHW)	N, R1, DR	V,N, R1, DR	N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 1	V, N, R1, DR		N, R1, DR	V,N, R1, DR	N, R1, DR	N, R1, DR	-	-
	OOHW Period 2	AA, V, IB, N, PC, SN, R2, DR		V, N, R2, DR	V, IB, N, PC, SN, R2, DR			-	N

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Attachment 2 Construction Noise and Vibration Guideline standard mitigation measures

The following standard actions and mitigation measures are reproduced from Appendix B of the CNVG. These noise and vibration controls should be implemented on all construction projects where reasonable and feasible.

Action required	Applies to	Details
Management measures		
Implementation of any project specific mitigation measures required.	Airborne noise.	Implementation of any project specific mitigation measures required.
Implement community consultation or notification measures (refer to Table 5-2 for further details of each measure).	Airborne noise. Ground-borne noise & vibration.	<p>Notification detailing work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number.</p> <p>Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required. Please contact Roads and Maritime Communication and Stakeholder Engagement for guidance.</p> <ul style="list-style-type: none"> • Website (If required) • Contact telephone number for community • Email distribution list (if required) • Community drop in session (if required by approval conditions).

Action required	Applies to	Details
Site inductions.	Airborne noise. Ground-borne noise & vibration.	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: <ul style="list-style-type: none"> • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures • site opening/closing times (including deliveries) • environmental incident procedures.
Behavioural practices.	Airborne noise.	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors.
Verification.	Airborne noise. Ground-borne noise & vibration.	Where specified under Table 5-2 a noise verification program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements.	Ground-borne vibration.	Where required attended vibration measurements should be undertaken at the commencement of vibration generating activities to confirm that vibration levels are within the acceptable range to prevent cosmetic building damage.
Update Construction Environmental Management Plans.	Airborne noise. Ground-borne noise & vibration.	The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies.
Building condition surveys.	Vibration. Blasting.	Undertake building dilapidation surveys on all buildings located within the buffer zone prior to commencement of activities with the potential to cause property damage.

Action required	Applies to	Details
Source controls		
Construction hours and scheduling.	Airborne noise. Ground-borne noise & vibration.	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.
Construction respite period during normal hours and out-of-hours work.	Ground-borne noise & vibration. Airborne noise.	Please refer to the Additional Mitigation Measures in Table 5-2 for more details on the following respite measures: <ul style="list-style-type: none"> • Respite Offers (RO) • Respite Period 1 (R1) • Respite Period 2 (R2) • Duration Respite (DR).
Equipment selection.	Airborne noise. Ground-borne noise & vibration.	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits. Ensure plant including the silencer is well maintained.
Plant noise levels.	Airborne-noise.	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria in Appendix H of the CNVG. Implement a noise monitoring audit program to ensure equipment remains within the more stringent of the manufacturers specifications or Appendix H of the CNVG.
Rental plant and equipment.	Airborne-noise.	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 2 of the CNVG.
Use and siting of plant.	Airborne-noise.	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised.

Action required	Applies to	Details
		<p>Plant used intermittently to be throttled down or shut down.</p> <p>Noise-emitting plant to be directed away from sensitive receivers.</p> <p>Only have necessary equipment on site.</p>
Plan worksites and activities to minimise noise and vibration.	<p>Airborne noise.</p> <p>Ground-borne vibration.</p>	<p>Locate compounds away from sensitive receivers and discourage access from local roads.</p> <p>Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.</p> <p>Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible.</p> <p>Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm.</p> <p>Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.</p> <p>If programmed night work is postponed the work should be re-programmed and the approaches in this guideline apply again, in particular ensuring accurate community notification has occurred.</p>
Reduced equipment power.	<p>Airborne noise.</p> <p>Ground-borne vibration.</p>	Use only the necessary size and power.
Non-tonal and ambient sensitive reversing alarms.	Airborne noise.	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site for any out of hours work.

Action required	Applies to	Details
		Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.
Minimise disturbance arising from delivery of goods to construction sites.	Airborne noise.	<p>Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers.</p> <p>Select site access points and roads as far as possible away from sensitive receivers.</p> <p>Dedicated loading/unloading areas to be shielded if close to sensitive receivers if possible.</p> <p>Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.</p> <p>Avoid or minimise these out of hours movements where possible.</p>
Blasting regime.	Airborne noise. Ground-borne vibration.	<p>The noise and vibration impacts of blasting operations can be minimised by:</p> <ul style="list-style-type: none"> • Choosing the appropriate blast charge configurations • Ensuring appropriate blast-hole preparation • Optimising blast design, location, orientation and spacing • Selecting appropriate blast times, and • Utilising knowledge of prevailing meteorological conditions. <p>AS 2187.2 Explosives-Storage, transport and use, Part 2: Use of Explosives provides more detailed advice on ground vibration and airblast overpressure impact minimisation options.</p>
Engine compression brakes.	Construction vehicles.	<p>Limit the use of engine compression brakes at night and in residential areas.</p> <p>Ensure vehicles are fitted with a maintained Original Equipment Manufacturer exhaust silencer or a silencer that complies with the National Transport Commission's 'In-service test procedure' and standard.</p>

Action required	Applies to	Details
Path controls		
Shield stationary noise sources such as pumps, compressors, fans etc.	Airborne noise.	Stationary noise sources should be enclosed or shielded where feasible and reasonable whilst ensuring that the occupational health and safety of workers is maintained. Appendix D of AS 2436:2010 lists materials suitable for shielding.
Shield sensitive receivers from noisy activities.	Airborne noise.	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.
Receptor controls		
Structural surveys and vibration monitoring.	Ground-borne vibration.	Pre-construction surveys of the structural integrity of vibration sensitive buildings may be warranted. At locations where there are high-risk receptors, vibration monitoring should be conducted during the activities causing vibration.
See Table 5-2 for additional measures.	Airborne noise. Ground-borne vibration.	In some instances additional mitigation measures may be required.

Appendix E

Hydrology and hydraulic memorandum



Transport for New South Wales
Batemans Bay Bridge Replacement - New Floating Pontoon
Hydrology and Hydraulic Memo for Addendum REF

May 2020

Executive summary

In May 2018, as part of the Batemans Bay Bridge Replacement project, Transport for NSW (TfNSW, then Roads and Maritime Services) determined the Review of Environmental Factors (REF) and submissions report which committed to the replacement of the existing T-Wharf in its existing location. Since the REF determination, TfNSW has received feedback from the community and stakeholders relating to the use of the T-Wharf. In response to this feedback, TfNSW is investigating a modification to the project proposal, which consists of:

- Retention of the existing T-Wharf main structure
- Construction of a floating pontoon on the southern foreshore downstream of the retained T-Wharf
- A temporary working platform (optional; only to be constructed if necessary to facilitate construction) measuring 12 m long by 12 m wide with surface elevation typically at RL 2.08 m.

Due to the above modification and to fulfil the requirements of Division 5.1 of the EP&A Act, an addendum REF is required to evaluate the associated environmental impacts. GHD has been engaged by TfNSW to prepare a hydrodynamic modelling report to supplement the addendum REF.

Objectives

The objectives of this study are to:

- Evaluate the impacts of the modification on 1% Annual Exceedance Probability (AEP) design flood and the Probable Maximum Flood (PMF) check flood conditions, during construction and post-construction periods.
- Investigate the impacts of the modification on local coastal erosion during construction and post-construction periods.
- Recommend mitigation options to be implemented during design and construction.

Conclusions

Overall, the following points can be concluded:

- The hydrodynamics and sediment transport impact zone associated with the temporary working platform under the two flood events examined is up to 30 m up- and downstream of the platform.
- The flow velocity impact zone caused by the pontoon under the two flood events examined is up to 130 m downstream of the pontoon. Impacts to the water level and sediment transport from the pontoon was not observed from the model.
- Due to the resolution and accuracy of the boundary input data and bathymetry/topography surveys, combined with limitations in a numerical model, the magnitude of water level and flow velocity differences should be regarded as indicative only.
- In reality, the impacts simulated in the model would be imperceptible given the natural variations associated with wind, waves and tides; particularly under the design flood event.

- The impact from the modification on shoreline morphology is considered to be minimal, due to the fact that the southern shoreline of Clyde River is armoured with rock revetment (i.e. resistant to shoreline erosion).
- Riverbed scour associated with the modification would be limited to the immediate vicinity of the works. Depending on the design of the existing revetment i.e. extent and burial depth of toe, there exists a possibility that the revetment toe may be exposed as a result of riverbed scour.
- Based on the model outcomes, it can be concluded that the modification (both the temporary working platform and the floating pontoon) will have limited effects on the hydrodynamics and coastal erosion in the broader Batemans Bay area, and is not expected to exacerbate the flood levels compared to the pre-construction scenario.
- On the basis that the arrangement of gangway and pontoon remains the same as that examined in this report, it is expected that moving the pontoon up to 20 metres either upstream or downstream of its currently-proposed location would have negligible additional impacts on the hydrodynamic and sediment transport of the Clyde River.

Recommendations

Based on the modelled outcomes and subject to further design investigation by others, GHD would recommend the following measures.

Design phase

- The hydraulic stability of the armour rocks at the temporary working platform (if required to be built) under flood conditions should be reviewed and checked.
- The pontoon piles should be adequately designed to minimise scouring on the riverbed whilst allow for scour depth. Mitigation measures may include additional pile length, implementation of scour protection, or a combination of multiple measures.
- Scour depth around the pontoon piles should be calculated and determined as part of the pontoon pile design process.
- To minimise the disturbance to the flow condition, the number of piles to secure the pontoon should be reduced as much as possible. Alternative fixing methods such as elastic mooring and anchoring may be considered.
- Consideration could be given to design of the temporary working platform with smooth transitions up- and downstream of the platform from the shoreline (in plan view), to guide the river flow and to minimise the disturbance to riverbed and benthic habitat (where available). Unless necessary to facilitate the construction, the platform may be designed as a 'low-crest' structure, meaning the freeboard from the platform surface to the water level is minimal.

Construction phase

- In order to minimise the impact from the temporary working platform, it is recommended that a risk assessment be undertaken during detailed design to review the relevant risks of a flood event occurring during the planned construction period and to consider alternative construction methods/plant that would eliminate the requirement for a temporary working platform.
- If a working platform is still deemed necessary to facilitate the construction, prior to constructing the working platform the following is suggested to be undertaken:

- Review the as-constructed drawings of the existing revetment, if available
- Undertake a dilapidation survey and condition assessment of the existing revetment
- During the period where the temporary working platform is in place, a continuous monitoring effort should be made to observe the stability of the existing revetment. After a high-discharge flow event, an assessment should be undertaken to confirm the integrity of the existing revetment at least 100 m up- and downstream the platform location.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.5 and the assumptions and qualifications contained throughout the Report.

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1. Introduction

1.1 Background

In May 2018, as part of the Batemans Bay Bridge Replacement project, Transport for NSW (TfNSW, then Roads and Maritime Services) determined the Review of Environmental Factors (REF) and submissions report which committed to the replacement of the existing T-Wharf in its existing location. Since the REF determination, TfNSW has received feedback from the community and stakeholders relating to the use of the T-Wharf. In response to this feedback, TfNSW is investigating a modification to the project proposal, which consists of:

- Retention of the existing T-Wharf main structure (as opposed to complete removal)
- Construction of a floating pontoon on the southern foreshore downstream of the retained T-Wharf (as opposed to being the replacement for the T-Wharf)
- A temporary working platform (optional; only to be constructed if necessary to facilitate construction) measuring 12 m long by 12 m wide, with top elevation typically at RL 2.08 m.

Due to the above modification and to fulfil the requirements of Division 5.1 of the EP&A Act, an addendum REF is required to evaluate the associated environmental impacts. GHD has been engaged by TfNSW to prepare hydrodynamic modelling to supplement the addendum REF prepared by others.

1.2 Scope of works

Various structure layouts considered in the study for both construction impact assessment and operational impact assessment are presented in Table 1 and Table 2 respectively.

Table 1 Composition of layouts and modifications – construction period

Item	Base layout	Modified layout
Bridge layout	New + Existing Bridge	New + Existing Bridge
T-Wharf	Present-day T-Wharf	Present-day T-Wharf + temporary working platform

Table 2 Composition of layouts and modifications – operation period

Item	Base layout	Modified layout
Bridge layout	New Bridge	New Bridge
T-Wharf	Present-day T-Wharf	Present-day T-Wharf + pontoon

It is noted that there may be a period where the temporary working platform exists together with the pontoon, however, this duration is expected to be brief and as such, this layout is not included in the scope.

1.3 Objectives

The objectives of this study are to:

- Evaluate the impacts of the modification on 1% Annual Exceedance Probability (AEP) design flood and Probable Maximum Flood (PMF) check flood conditions during construction and post-construction periods.

- Investigate the impacts of the modification on local coastal erosion during construction and post-construction periods.
- Recommend mitigation options to be implemented during design and construction

1.4 Purpose of this report

This technical report is an addendum to the Review of Environmental Factors previously prepared by Aurecon. This report assesses potential hydrology impacts of the proposed modification at the southern shoreline of the Clyde River near the Batemans Bay central business district.

This technical report is to present the assumptions, processes, outcomes, and assessment of the modelled results for the scope of work as discussed in Section 1.5.

The use or interpretation of this report to fulfil objectives other than those noted in Section 1.3 is not recommended and would solely be the responsibility of the party that does so.

1.5 Assumptions and limitations

Numerical models are simplifications and abstractions of the natural system. The accuracy of a model depends on the quality of input data and assumptions made to simplify the complex behaviour of the natural system. In this section, general considerations and assumptions made in the study are documented, supplemented with brief discussions on the implication(s) of the assumptions.

It is important to note that whilst refinement of the model assumptions against additional data would improve the level of confidence and accuracy of the model, the adopted assumptions are considered suitable in the context of the objectives outlined in Section 1.3.

- The study is carried out using the numerical model developed as part of the Batemans Bay Independent Coastal Impact Assessment – Stage 1 model prepared by GHD in 2019. No additional verification tasks were carried out in this exercise.
- GHD assumed that the initial bathymetry was identical for all simulated scenarios. The approach allowed comparative assessment of bridge impacts of the current situation without introducing uncertainties from historic morphology evolution.
- The modelling work considered the project site holistically and did not focus on local-scale processes such as scouring, vortex shedding, upwelling and mixing near the proposed infrastructure considered as part of the modification.
- Estimation of scour depth/extent and the design of scour protection is not in the scope of this engagement.

1.6 Disclaimer

This report has been prepared by GHD for TfNSW and may only be used and relied on by TfNSW the purpose agreed between GHD and TfNSW as set out in Section 1.4 of this report.

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

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

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no

responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report and those noted in the Stage 1 Modelling Report of the Batemans Bay Independent Coastal Impact Assessment project. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by TfNSW and others who provided information to GHD (including government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

GHD has not contributed to nor reviewed the REF documentation other than the reports prepared by GHD for the Batemans Bay Bridge replacement project. GHD shall not be liable to any person for any error in, omission from, or false or misleading statement in any part of the documentation not prepared by GHD.

2. Modelling methodology

2.1 Model implementation

2.1.1 Boundary conditions

The hydrographs for the 1% AEP and the PMF estimated by Aurecon (2017) were applied as upstream river discharge boundary conditions. The phases of design hydrographs were artificially shifted to match the peak of the simulated typical spring tide using kinematic methods.

2.1.2 Bridge layouts and bathymetry

Pier designs contained in the Work as Executed drawings (Department of Main Roads NSW, 1954) and the detailed design drawings of the new Batemans Bay Bridge (John Holland/Jacobs, 2018) were used to set up the DHI MIKE model, as shown in Figure 1 and Figure 2.

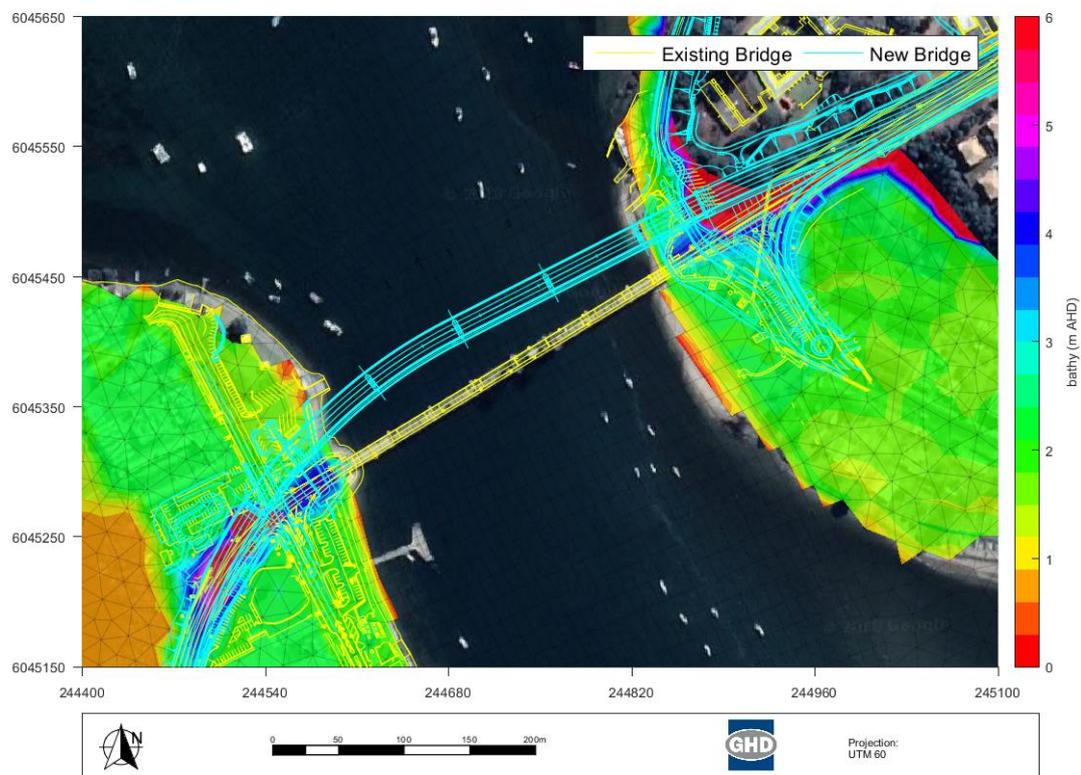


Figure 1 Existing and new bridge piers and abutments (cyan and yellow contours, and indigo to maroon colour patches on land)



Figure 2 New bridge piers and abutments (cyan contours and indigo to maroon colour patches on land)

2.1.3 Survey data

The model adopts the same compilation of topography and bathymetry data for Batemans Bay as discussed in the GHD Stage 1 Modelling Report.

2.1.4 T-wharf structural arrangement

The structural arrangement of the T-wharf, including the pile grid and deck height, is modelled based on the drawing 78127-3 of the 'Clyde River Batemans Bay Fishermen's Jetty' drawing set provided by TfNSW.

2.1.5 Implementation of the proposed modification

The proposed modification involves a temporary working platform (if required) measuring 12 m long by 12 m wide at a typical surface elevation RL 2.08 m as indicatively shown in Figure 3 and Figure 4, and 15 circular piles (assumed 750 mm diameter) as indicatively shown in Figure 5.



Figure 3 Indicative location of the temporary working platform

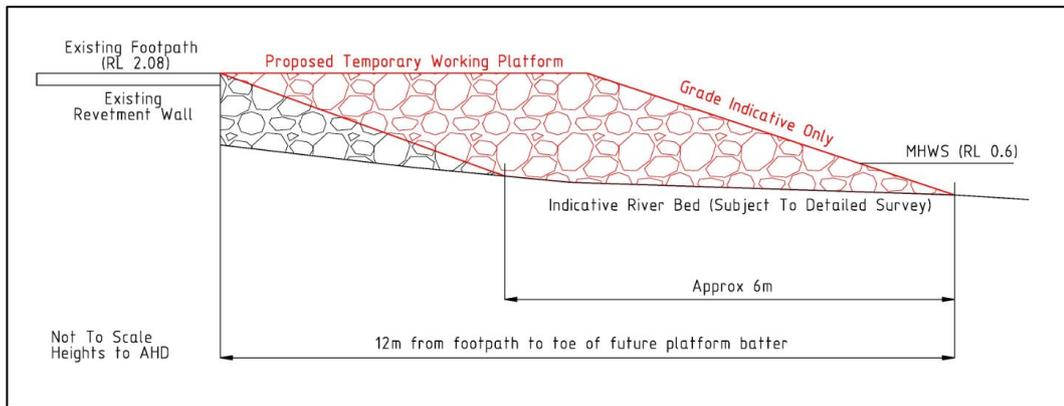


Figure 4 Indicative cross section of the temporary working platform



Figure 5 Indicative pile locations

Given that the detailed design has not been completed for the pontoon system at the time of preparing this study, an assumed 0.4 m draft, typical of pontoon systems deployed in a marina environment, is adopted.

The temporary working platform (if required) is represented in the model by modifying the bathymetry at the location of the platform to reflect the dimension and height of the structure. Following this modification, the model mesh was regenerated with increased density around the platform in order to capture its effects on hydrodynamic and sediment transport.

For the piles (both that for the T-head wharf and the proposed pontoon), they are conceptualised as cylinder-shaped piers with the superstructure (wharf deck or pontoon) modelled as a cuboid shape.

2.2 Scenarios

The assessment is based on comparisons between the 'pre-' and 'post-modification' works. Specifically:

- For the construction period, the modelled result will be compared against the 'construction base layout' where the new and existing bridges are in place together with the present-day T-Wharf
- For the operation period, the modelled result will be compared against the 'operation base layout', which consists of the new bridge (only) together with the present-day T-Wharf

The model scenarios are summarised in Table 3.

Table 3 Summary of model scenarios

Scenario	Construction period		Operation period	
	Base layout	Modified layout	Base layout	Modified layout
	New + Existing Bridge T-Wharf	New + Existing Bridge T-Wharf + working platform	New Bridge T-Wharf	New Bridge T-Wharf + Pontoon
1% AEP design flood + Tide + storm surge	SC01	SC11	SC05	SC15
PMF check flood + Tide + storm surge	SC02	SC12	SC06	SC16
1% AEP design flood + Tide + storm surge + SLR ^[1]	-	-	SC07	SC17
PMF check flood + Tide + storm surge + SLR	-	-	SC08	SC18

¹ Sea Level Rise in accordance with the projection estimated by Eurobodalla Shire Council (https://www.esc.nsw.gov.au/development-and-planning/tools/development-control-plans/Interim-Coastal-Hazard-Adaptation-Code_Amended-post-WRL-hazard-study.pdf)

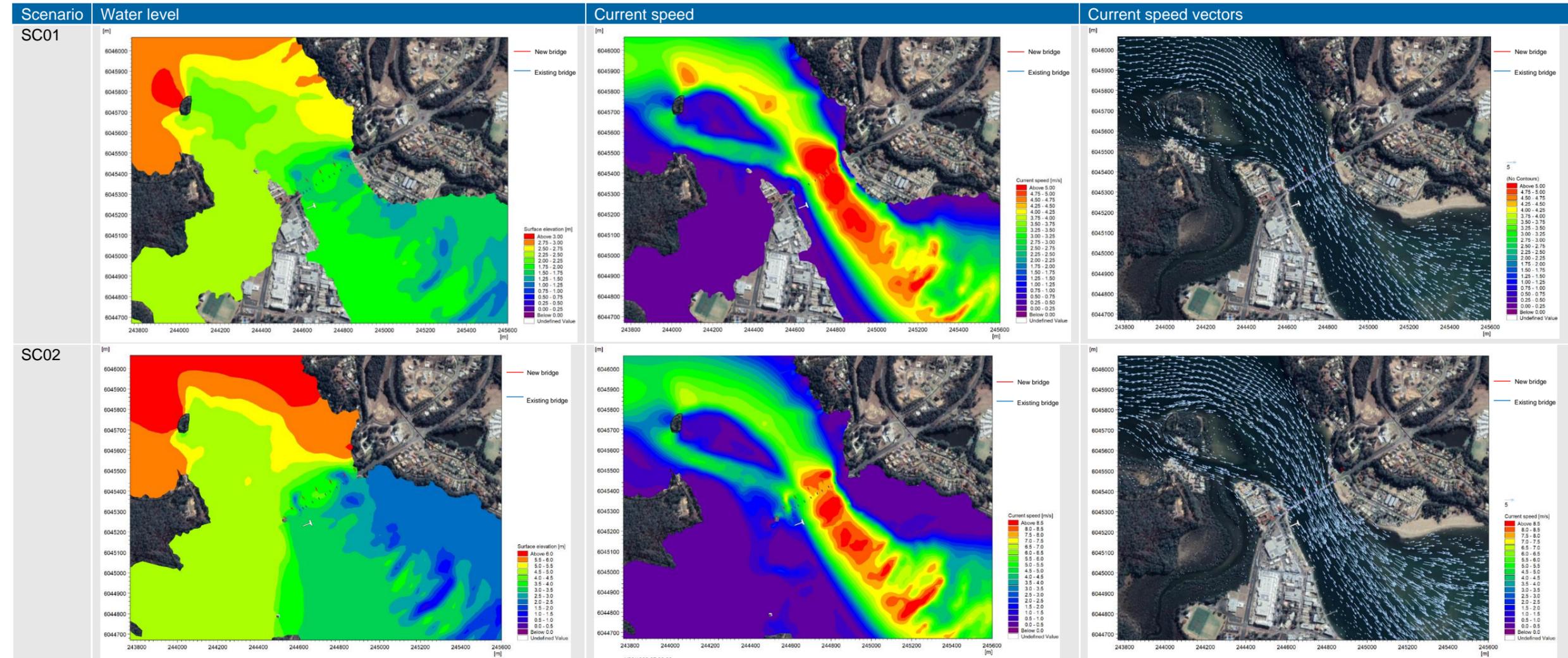
3. Model results

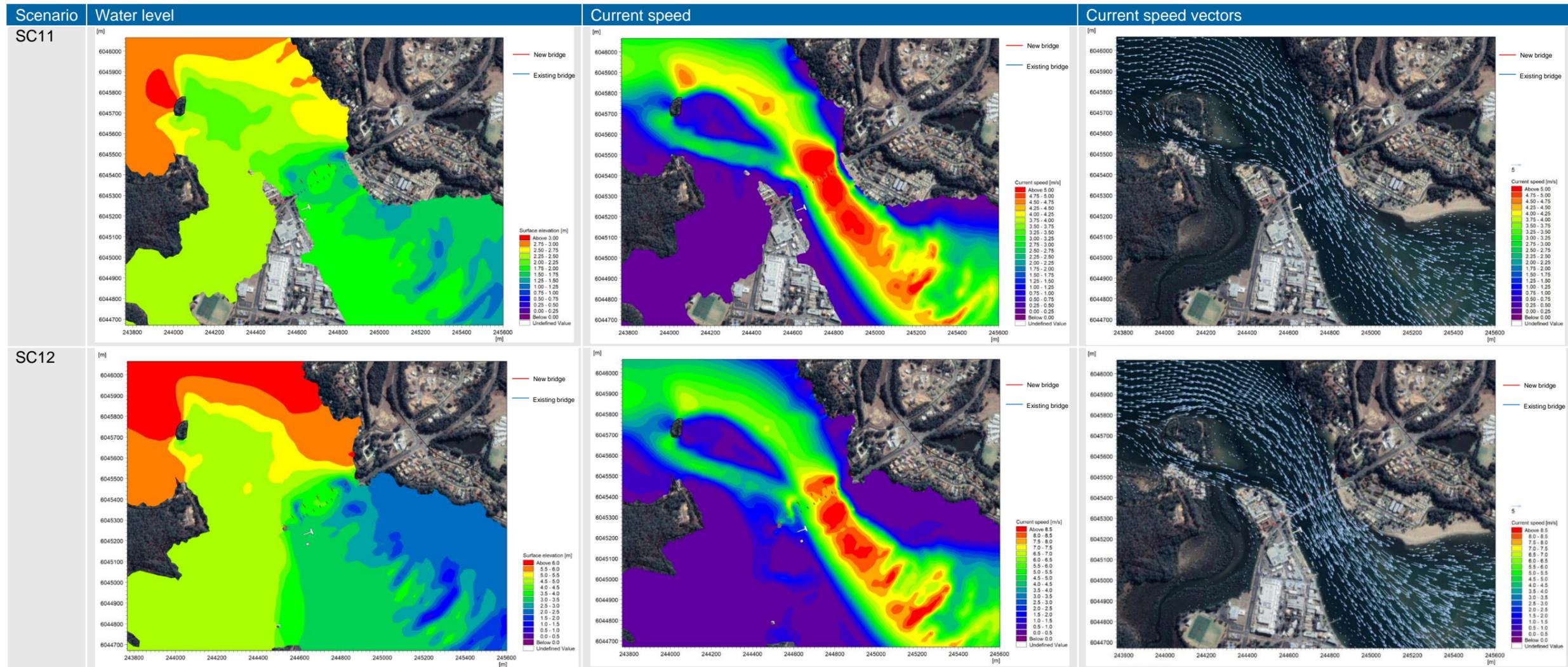
In this section, direct output plots for water level, current speed, and vectors from the model are summarised.

3.1 Construction period

The table below summarises the figures plotted directly from the model output for water level, current speed, and current speed vectors for the construction period.

Scenarios noted at the beginning of each row of figures refer back to that given in Table 3 and are shown here for ease of reference.





3.2 Operation period

The table below summarises the figures plotted directly from the model output for water level, current speed, and current speed vectors for the operation period.

Scenarios noted at the beginning of each row of figures refer back to that given in Table 3 and are shown here for ease of reference.

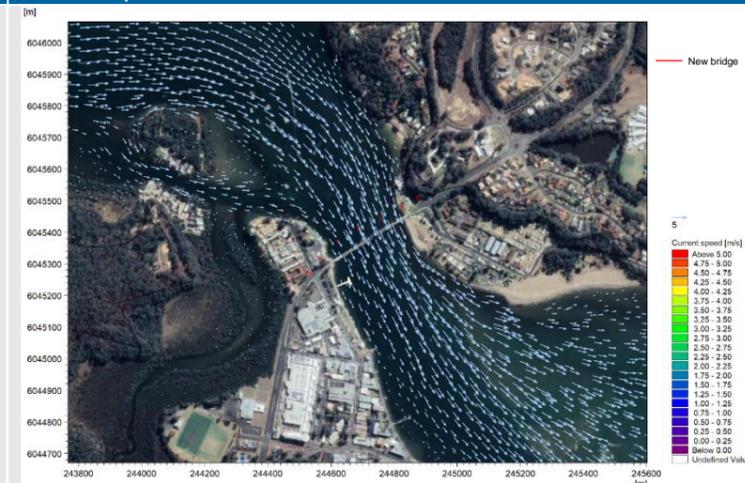
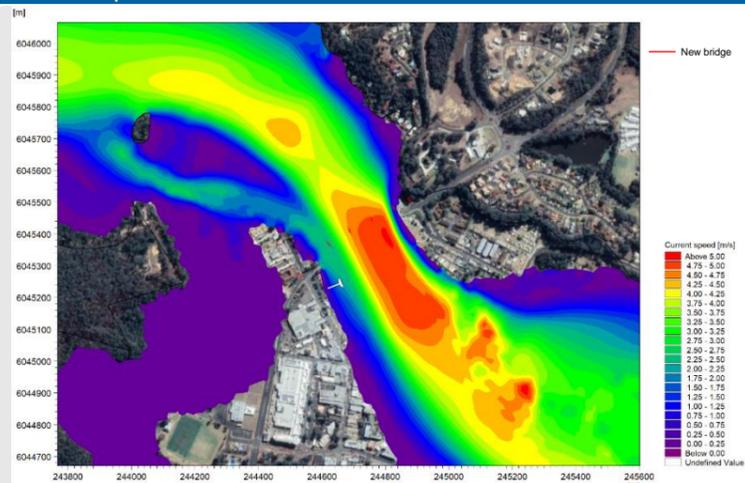
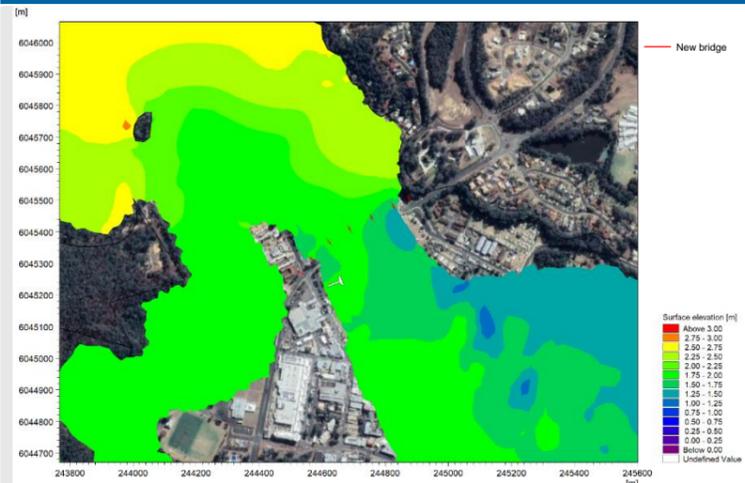
Scenario

Water level

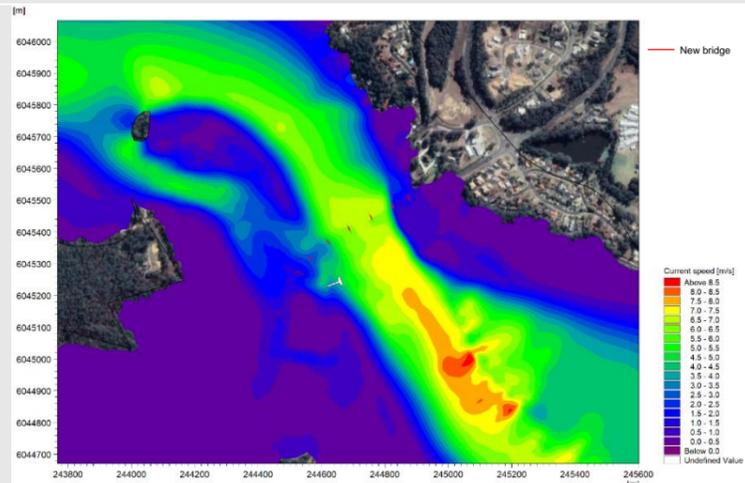
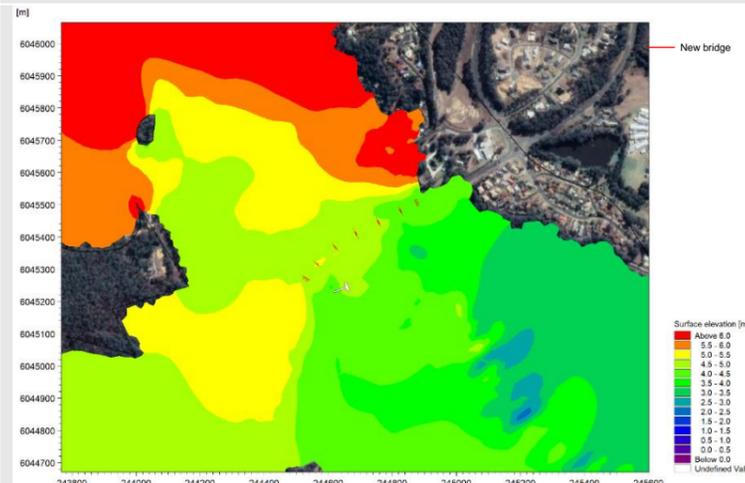
Current speed

Current speed vectors

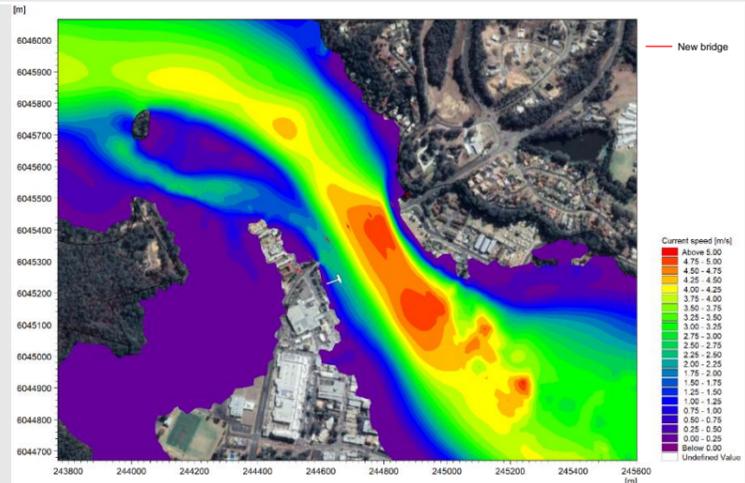
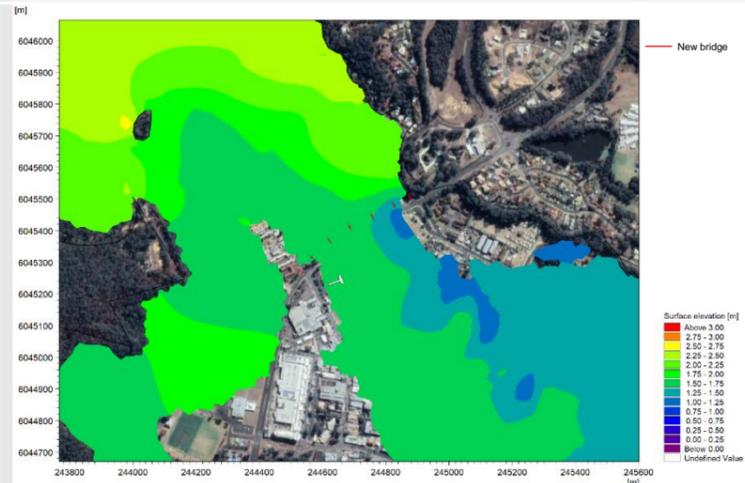
SC05



SC06



SC07



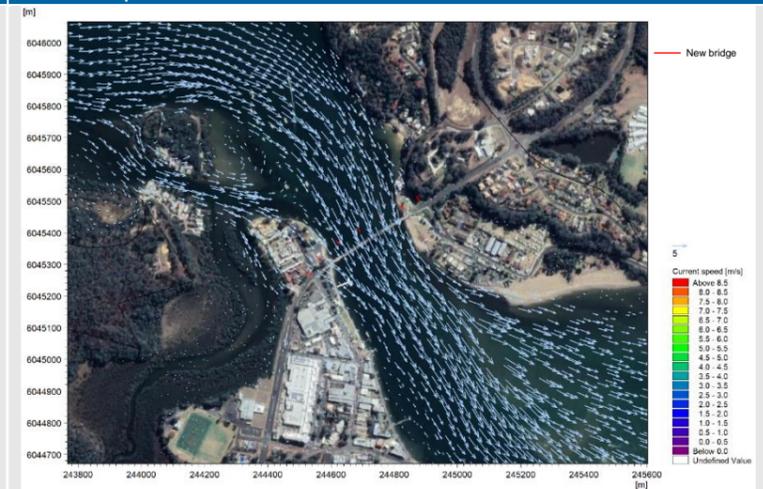
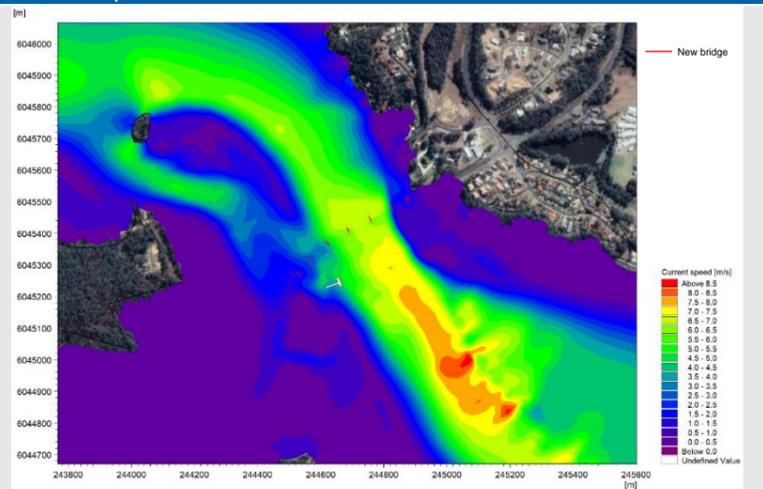
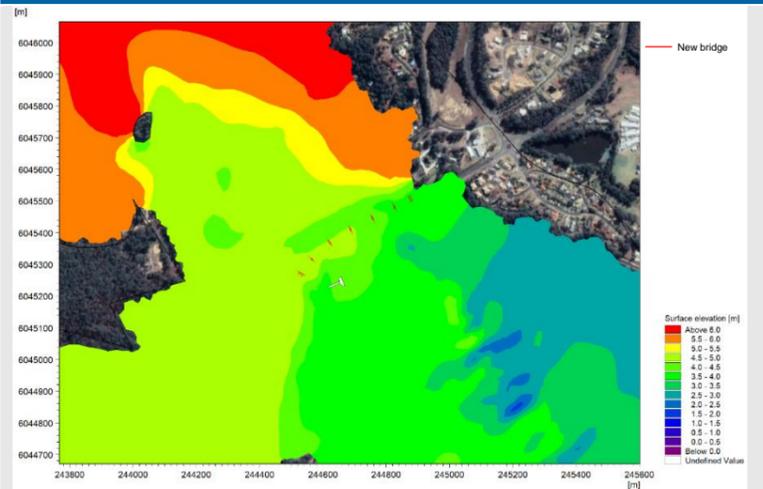
Scenario

Water level

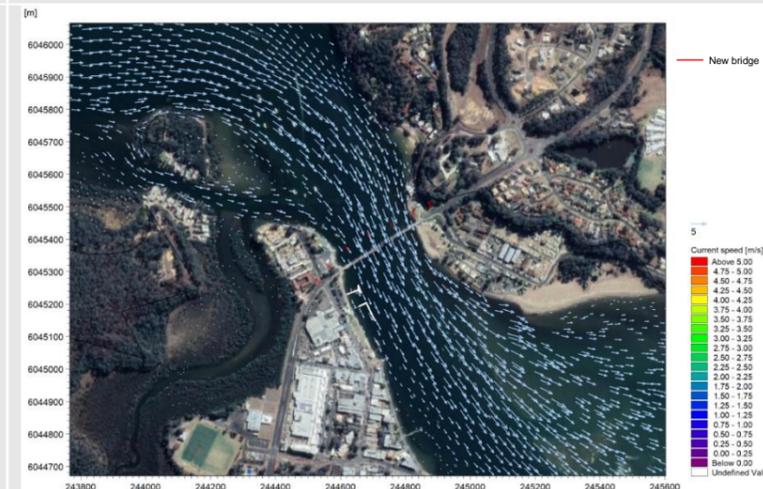
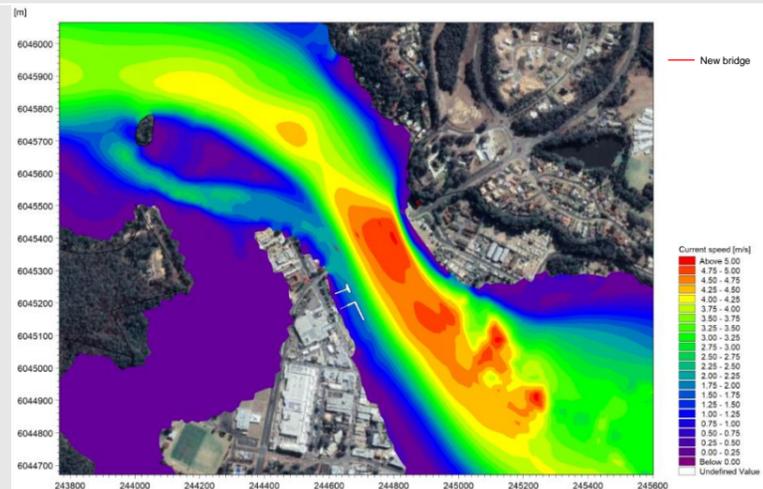
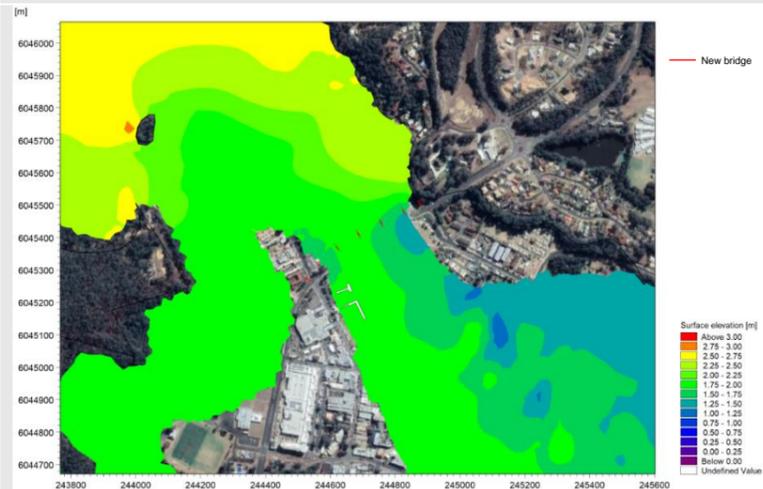
Current speed

Current speed vectors

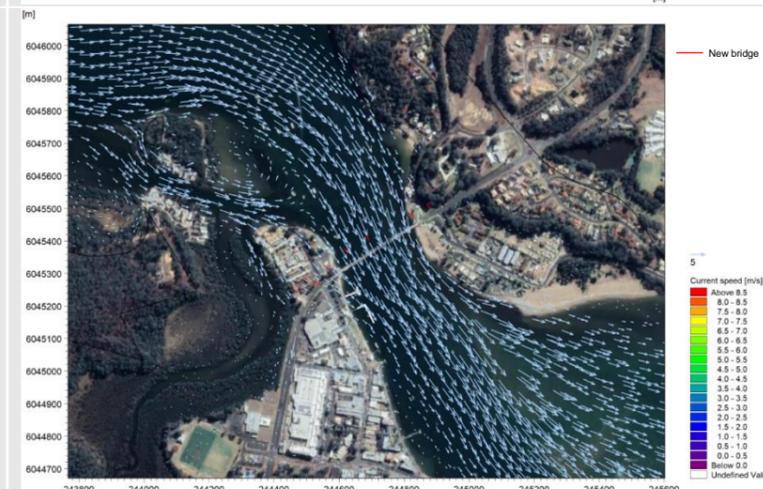
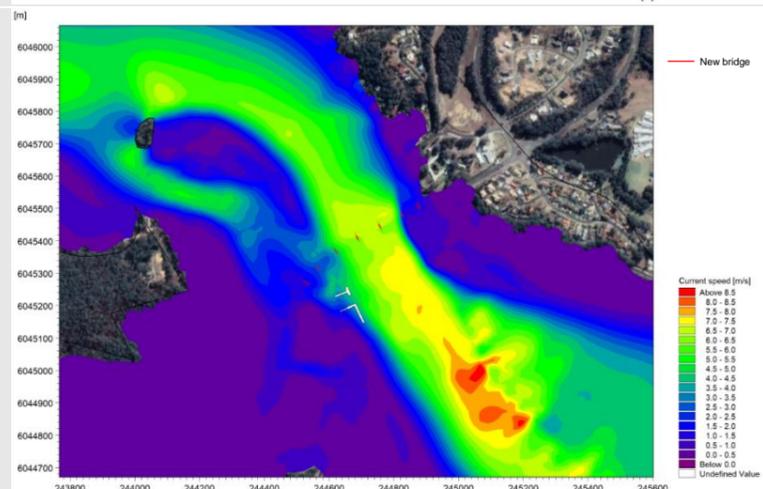
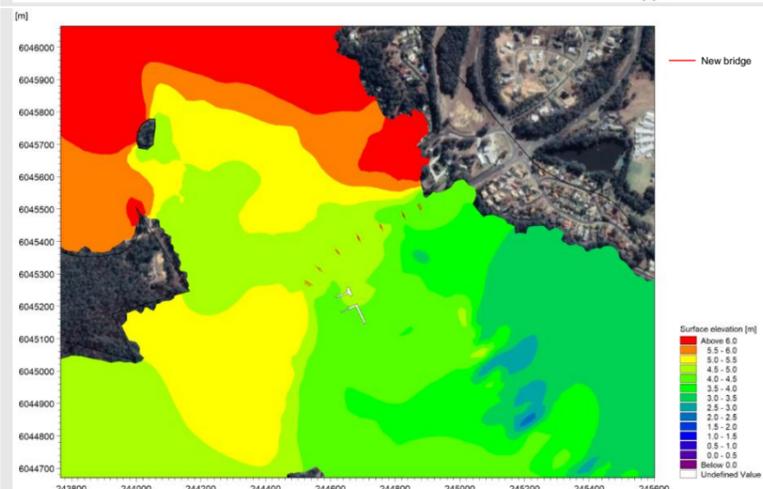
SC08



SC15



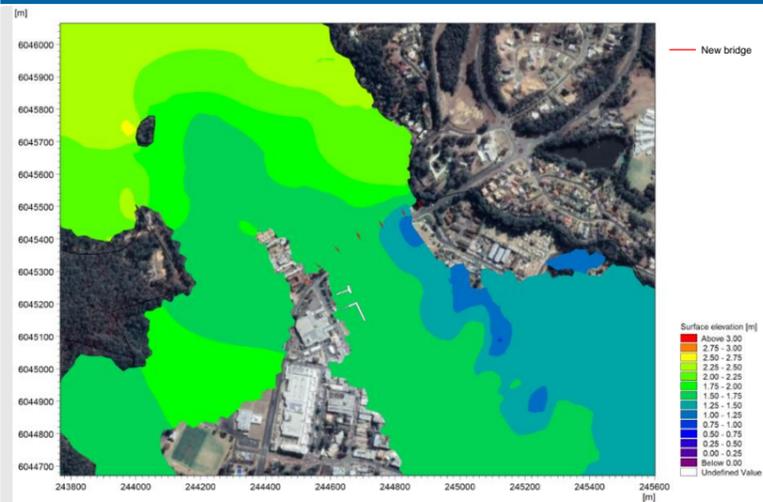
SC16



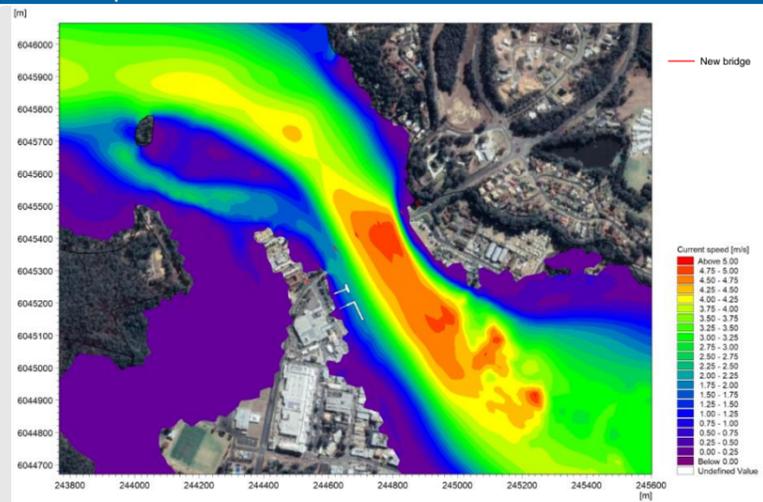
Scenario

Water level

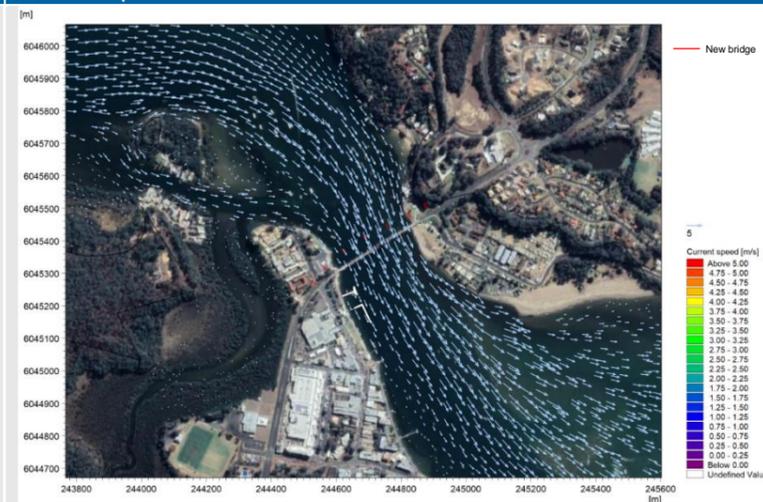
SC17



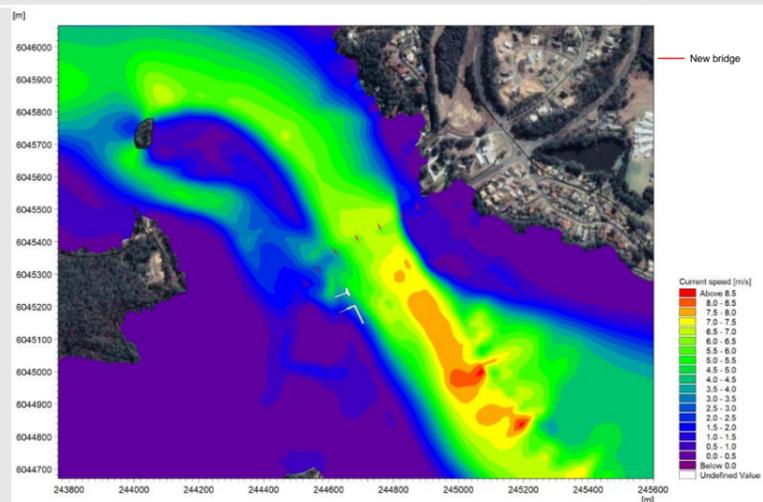
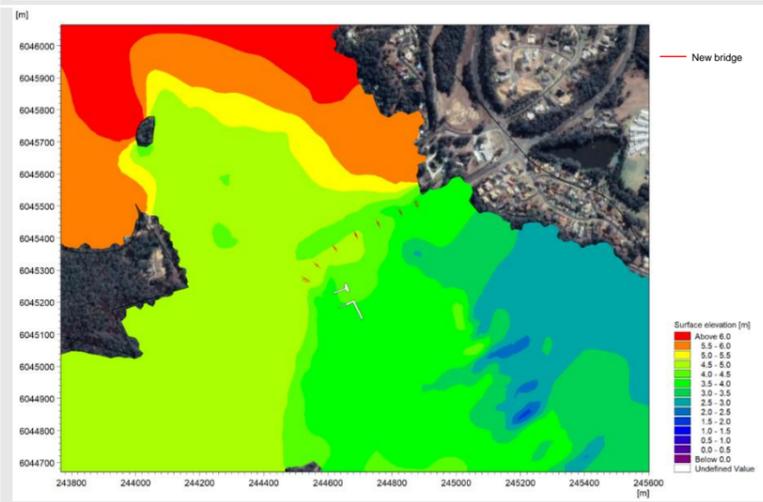
Current speed



Current speed vectors



SC18



3.3 Spot impacts and impact extent – water level

SC11 – SC01 (1% AEP design flood + Tide + storm surge. Difference in layout = inclusion of the working platform)



SC12 – SC02 (PMF check flood + Tide + storm surge. Difference in layout = inclusion of the working platform)



SC15 – SC05 (1% AEP design flood + Tide + storm surge. Difference in layout = inclusion of the pontoon)



SC16 – SC06 (PMF check flood + Tide + storm surge. Difference in layout = inclusion of the pontoon)

[m]



SC17 – SC07 (1% AEP design flood + Tide + storm surge + SLR. Difference in layout = inclusion of the pontoon)



SC18 – SC08 (PMF check flood + Tide + storm surge + SLR. Difference in layout = inclusion of the pontoon)



3.4 Spot impacts and impact extent – flow velocity

SC11 – SC01 (1% AEP design flood + Tide + storm surge. Difference in layout = inclusion of the working platform)



SC12 – SC02 (PMF check flood + Tide + storm surge. Difference in layout = inclusion of the working platform)



SC15 – SC05 (1% AEP design flood + Tide + storm surge. Difference in layout = inclusion of the pontoon)



SC16 – SC06 (PMF check flood + Tide + storm surge. Difference in layout = inclusion of the pontoon)



SC17 – SC07 (1% AEP design flood + Tide + storm surge + SLR. Difference in layout = inclusion of the pontoon)



SC18 – SC08 (PMF check flood + Tide + storm surge + SLR. Difference in layout = inclusion of the pontoon)



3.5 Spot impacts and impact extent – riverbed elevation

SC11 – SC01 (1% AEP design flood + Tide + storm surge. Difference in layout = inclusion of the working platform)



SC12 – SC02 (PMF check flood + Tide + storm surge. Difference in layout = inclusion of the working platform)

[m]



SC15 – SC05 (1% AEP design flood + Tide + storm surge. Difference in layout = inclusion of the pontoon)



SC16 – SC06 (PMF check flood + Tide + storm surge. Difference in layout = inclusion of the pontoon)



SC17 – SC07 (1% AEP design flood + Tide + storm surge + SLR. Difference in layout = inclusion of the pontoon)



SC18 – SC08 (PMF check flood + Tide + storm surge + SLR. Difference in layout = inclusion of the pontoon)



4. Discussion

4.1 Water levels and river flow

Table 4 below summarises the specific observed effects of the modification during the construction and operation period.

Table 4 Summary of impacts

Base Layout	Modified Layout	Scenario	Observed impacts from the modification
SC01	SC11	1% AEP design flood + Tide + storm surge	Construction <ul style="list-style-type: none"> Water level: The temporary working platform is not simulated to cause water level fluctuation more than ± 0.05 m. River flow: A reduction in flow velocity up to 0.4 m/s is simulated around the platform. The impact zone is measured approximately 25 m in length and 6 m in width and is limited to the immediate downstream of the platform.
SC02	SC12	PMF check flood + Tide + storm surge	Construction <ul style="list-style-type: none"> Water level: The working platform is simulated to cause an increase in water level up to 0.25 m. The size of the impact zone is approximately 30 m upstream and downstream the platform. River flow: The platform caused an increase in flow velocity up to 0.2 m/s immediate around its location. The impact zone is approximately in a 9 m radius area.
SC05	SC15	1% AEP design flood + Tide + storm surge	Operation <ul style="list-style-type: none"> Water level: The floating pontoon (and its piles) is not simulated to cause water level fluctuation more than ± 0.05 m. River flow: The pontoon is simulated to cause a reduction in flow velocity up to 0.2 m/s. The impact zone is measured approximately 130 m in length and 6 m in width downstream the pontoon.
SC06	SC16	PMF check flood + Tide + storm surge	Operation <ul style="list-style-type: none"> Water level: The floating pontoon (and its piles) is not simulated to cause water level fluctuation more than ± 0.05 m. River flow: The pontoon is simulated to cause a reduction in flow velocity up to 0.3 m/s. The impact zone is measured approximately 80 m in length and 25 m in width downstream the pontoon.

Base Layout	Modified Layout	Scenario	Observed impacts from the modification
SC07	SC17	1% AEP design flood + Tide + storm surge + SLR	Operation <ul style="list-style-type: none"> Water level: The floating pontoon (and its piles) is not simulated to cause water level fluctuation more than ± 0.05 m. River flow: The pontoon is not simulated to cause impact.
SC08	SC18	PMF check flood + Tide + storm surge + SLR	Operation <ul style="list-style-type: none"> Water level: The floating pontoon (and its piles) is not simulated to cause water level fluctuation more than ± 0.05 m. River flow: A reduction in flow velocity in the order of less than 0.2 m/s is simulated in the immediate vicinity of the pontoon. The impact zone measured approximately 80 m in length downstream of the pontoon.

As can be seen in Table 4, the extent of the impact zone associated with the proposed modification infrastructure could be up to 130 m in length downstream the structure (in the case of flow velocity). Nevertheless, the magnitude of impacts is rather limited, where the following should be noted:

- The accuracy of the predicted impacts is limited to the resolution and accuracy of the input data at model boundaries as well as the bathymetry/topography surveys. For example, the accuracy of a typical multi-beam echo sounder hydrographic survey is ± 0.15 m, and ± 0.15 – 0.20 m for a LiDAR survey (which is the basis of the topography in the model). Consequently, the values of impacts noted in this report should be taken qualitatively rather than quantitatively.
- From a “real-world” perspective, water level fluctuation and velocity variance of this magnitude are not expected to result in any adverse impacts to social and environmental values of the adjacent area. Moreover, such increases would be imperceptible given the natural variations associated with wind, waves, and tides during the design and check flood events considered.

4.2 Shoreline erosion and morphology

With regard to the impact of the modification on the shoreline, the following is noted:

- Accumulation of sediment on the riverbed is noted immediately around the temporary working platform for both the design and check flood events. For the 1% AEP design flood, the impact zone is approximately in a 15 m radius from the platform, where for the PMF check flood the impact zone is approximately in a 20 m radius from the working platform.
- The southern shoreline of Clyde River is protected with an existing rock revetment, therefore the turbulence and eddies generated behind the pontoon piles would have limited impact, compared to the direct impact of flood water. The eddies would typically dissipate within 30–70 m downstream the piles.
- Notwithstanding the above, GHD suspects the riverbed is not protected with erosion protection and the bed material is exposed as it would be under natural conditions. The horseshoe eddies developed behind the piles near the riverbed is therefore likely to cause localised erosion. The magnitude and extent of this localised erosion would depend on the

intensity of the flood event and the soil stratification of the riverbed but in general, these erosions could be expected within 10~30 m radius from the piles.

- Given the close proximity of the first two pontoon piles to the revetment toe, the scour on the riverbed has the possibility to expose the toe of the revetment.

4.3 Changes in pontoon location

As the modelling exercise is undertaken based on the concept design of the pontoon, GHD notes that the location of the pontoon along the foreshore within the property lot is only indicative and will be investigated further (by others) during detailed design.

Based on the outcomes observed in this study and assuming the arrangement of gangway and pontoon remains the same, it is expected that moving the pontoon up to 20 metres either upstream or downstream of its currently-proposed location would have negligible additional impacts on the hydrodynamic and sediment transport of the Clyde River.

5. Conclusions and recommendations

5.1 Conclusions

Overall, the following points can be concluded:

- The hydrodynamic and sediment transport impact zone associated with the temporary working platform under the two flood events examined is up to 30 m up- and downstream of the platform.
- The flow velocity impact zone caused by the pontoon under the two flood events examined is up to 130 m downstream of the pontoon. Impacts on water levels and on sediment transport due to the pontoon were not observed in the model.
- Due to the resolution and accuracy of the boundary input data and bathymetry/topography surveys, combined with limitations in a numerical model, the magnitude of water level and flow velocity differences should be regarded as indicative only.
- In reality, the impacts simulated in the model would be imperceptible given the natural variations associated with wind, waves and tides; particularly under the design flood event.
- The impact from the modification on shoreline morphology is considered to be minimal, due to the fact that the southern shoreline of Clyde River is armoured with rock revetment (i.e. resistant to shoreline erosion).
- Scouring on the riverbed resulted from the modification would be limited to the immediate vicinity of the modification. Depending on the design of the existing revetment i.e. extent and burial depth of toe, there exists a possibility that the revetment toe may be exposed as a result of riverbed scouring
- Based on the model outcomes, it can be concluded that the modification (both the temporary working platform (if required) and the floating pontoon) will have limited effects on the hydrodynamics and coastal erosion in the broader Batemans Bay area, and is not expected to exacerbate the flood levels compared to the pre-construction scenario.
- On the basis that the arrangement of gangway and pontoon remains the same as that examined in this report, it is expected that moving the pontoon up to 20 metres either upstream or downstream of its currently-proposed location would have negligible additional impacts on the hydrodynamic and sediment transport of the Clyde River.

5.2 Recommendations

Based on the modelled outcomes and subject to further design investigation by others, GHD would recommend the following measures.

Design phase

- The hydraulic stability of the armour rocks on the temporary working platform (if required to be built) under the flood events should be reviewed and checked.
- The pontoon piles should be adequately designed to minimise scouring on the riverbed whilst allow for scour depth. Mitigation measures may include additional pile length, implementation of scour protection, or a combination of multiple measures.
- Scour depth around the pontoon piles should be calculated and determined as part of the pontoon pile design process.

- To minimise the disturbance to the flow condition, the number of piles to secure the pontoon should be reduced as much as possible. Alternative fixing methods such as elastic mooring and anchoring may be considered.
- Consideration could be given to design of the temporary working platform with smooth transitions up- and downstream of the platform from the shoreline (in plan view), to guide the river flow and to minimise the disturbance to riverbed and benthic habitat (where available). Unless necessary to facilitate the construction, the platform may be designed as a 'low-crest' structure, meaning the freeboard from the platform surface to the water level is minimal.

Construction phase

- In order to minimise the impact from the temporary working platform, it is recommended that a risk assessment be undertaken during detailed design to review the relevant risks of a flood event occurring during the planned construction period and to consider alternative construction methods/plant that would eliminate the requirement for a temporary working platform.
- If a working platform is still deemed necessary to facilitate the construction, prior to constructing the working platform the following is suggested to be undertaken:
 - Review the as-constructed drawings of the existing revetment, if available
 - Undertake a dilapidation survey and condition assessment of the existing revetment
- During the period where the temporary working platform is in place, a continuous monitoring effort should be made to observe the stability of the existing revetment. After a high-discharge flow event, an assessment should be undertaken to confirm the integrity of the existing revetment at least 100 m up- and downstream the platform location.

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