

# Maitland Bay Drive / Picnic Parade, Ettalong Beach – Intersection Upgrade

Review of Environmental Factors

Roads and Maritime Services | October 2019





# Maitland Bay Drive / Picnic Parade, Ettalong Beach – Intersection Upgrade

Review of Environmental Factors

Roads and Maritime Services | October 2019

Prepared by Beca Pty Ltd and Roads and Maritime Services



ISBN: 978-1-922338-01-3

Roads and Maritime publication number: 19.1414

Copyright: The concepts and information contained in this document are the property of NSW Roads and Maritime Services. Use or copying of this document in whole or in part without the written permission of NSW Roads and Maritime Services constitutes an infringement of copyright.

# Executive summary

## The proposal

Roads and Maritime Services NSW (Roads and Maritime) proposes to upgrade the intersection of Maitland Bay Drive and Picnic Parade, Ettalong Beach. Key features of the proposal include:

- Installing a raised concrete roundabout and raised concrete medians
- A new right and left turn into the Kitchener Park carpark from Maitland Bay Drive, but left turn out only
- Replacement of the existing guardrail on the northern side of Maitland Bay Drive
- On-road lanes for cyclists where practical
- New shared pathway to connect the Kitchener Park carpark to the existing footpath on Picnic Parade
- New shared pathway to connect to the carpark adjacent to the Scout Hall and the cycleway on the Maitland Bay Drive westbound carriageway
- New pedestrian refuge on Picnic Parade to improve pedestrian safety
- Associated line marking and signage
- Adjustments to public utilities including the relocation of affected street lighting, water and sewer mains
- Adjustments to drainage pits and pipes
- Improvements to the Kitchener Park carpark and the car park adjacent to the Scout Hall
- Relocation of existing 'Welcome to Ettalong Beach' sign and advertisement banners
- Landscape planting and urban design treatments.

Subject to approval, construction is anticipated to commence in mid-2020 and take about 12 months to complete, weather permitting.

## Need for the proposal

The proposal is needed to reduce delays at the Maitland Bay Drive / Picnic Parade intersection, allowing it to operate efficiently well into the future, even with projected traffic growth. There is also an opportunity at the site to improve safety and deliver better connections for pedestrians and cyclists.

By proposing to support growth, reduce delays and improve safety, the proposal is consistent with NSW Government policy, strategies and plans, including:

- Future Transport 2056
- Central Coast Regional Plan 2036
- Central Coast Regional Transport Plan 2013
- Road Safety Plan 2021.

On 31 March 2017, the NSW Government announced additional funding for Central Coast roads. The projects to be funded include \$7 million spending over three years to upgrade the intersection at Maitland Bay Drive and Picnic Parade.

## Proposal objectives

The objectives of the proposal are to:

- Reduce projected delays on Picnic Parade at the intersection in peak periods so as to address future mobility around the road network
- Enhance movement into the Ettalong business precinct and tourist/leisure destinations

- Improve pedestrian safety on Picnic Parade
- Reduce excessive speed on Maitland Bay Drive.

## Options considered

Roads and Maritime considered several options for the Maitland Bay Drive/Picnic Parade intersection as described below.

### ***Option 1 – Standard roundabout***

This option proposes a roundabout designed for rigid trucks and buses up to 12.5 metres long. Under this option access to the carpark would be via a dedicated right turn lane and widening for left in/left out turns.

Pedestrian access would be east/west via a proposed shared path along south-west and south-east corners. Cycle lanes would remain in similar position to existing beyond the extent of the roundabout.

### ***Option 2 – Roundabout with a slip lane***

This option proposes a similar roundabout to that of Option 1 with the addition of a free flow slip lane for eastbound vehicles on Maitland Bay Drive. Access to the carpark, pedestrian access and cyclist access are proposed as per Option 1.

### ***Option 3 – Reduced scope roundabout***

This option proposes an elliptical roundabout which is non-compliant with Austroads standards and generates no impacts on adjacent properties. The roundabout would have a radius of six metres and be fully mountable to allow for use by semi-trailers. Access to the carpark, pedestrian access and cyclist access are proposed as per Option 1.

### ***Option 4 – Traffic lights***

This option proposes the installation of traffic lights and associated road widening to two lanes in each direction to reduce queuing and accommodate turning movements. Single lane approaches were not considered viable due to the resulting long queue lengths on Maitland Bay Drive.

### ***Option 5 – ‘Do nothing’***

The ‘do nothing’ option would result in the Maitland Bay Drive/Picnic Parade intersection remaining in its current state without any augmentation. Normal road maintenance would continue to be carried out.

Roads and Maritime has identified Option 1 (standard roundabout) as the preferred option. Option 1 is considered the most suitable option for the following reasons:

- Capable of full compliance with the Austroads Standards allowing for a higher level of safe operation than other options
- Provides for a smaller footprint than Options 2 and 4, and in turn, reduces the amount of property acquisition and environmental impact associated with the proposal
- Generates appropriate network capacity to minimise congestion on the road into the future and ensure that the intersection operates at an acceptable level of service
- While designed for 12.5-metre-long rigid trucks and buses, allows the intersection to be used by all vehicles which are permitted to use Maitland Bay Drive and Picnic Parade, including semi-trailers and emergency vehicles
- Is compatible with the idea of a slower approach speed and the opportunity for urban landscaping to encourage turning into Picnic Parade from tourist traffic outside the peak travel times.

## Statutory and planning framework

The proposal is categorised as development for a road and is being carried out by or on behalf of a public authority. Under clause 94 of State Environmental Planning Policy (Infrastructure) 2007, the proposal is permissible without consent. The proposal is not State significant infrastructure or State significant development. The proposal can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and development consent from Council is not required.

Roads and Maritime is the determining authority for the proposal. This REF fulfils Roads and Maritime's obligation under Section 5.5 of the EP&A Act including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

## Community and stakeholder consultation

Roads and Maritime invited community feedback on the proposal in November 2018. A total of 42 submissions were received from the community focusing on issues such as the cost, improvements to other roads outside the scope of the project and Roads and Maritime responsibilities, the proposed design and why traffic lights were not proposed. Submissions were considered in the development of the proposal and the selection of the preferred option.

Consultation has also occurred with Central Coast Council and utility providers during the development of the proposal.

The REF will be publicly displayed for comment from Monday 28 October 2019 to Monday 18 November 2019. Following the public display of the REF, all comments received would be recorded and addressed in a Submissions Report detailing how each issue raised would be considered in finalising the proposal design. The Submissions Report would be made available to the public on the project webpage on the Roads and Maritime website.

## Environmental impacts

Detailed technical investigations have been carried out to identify, assess, manage and minimise the proposal's potential impacts. The following outlines the proposal's main impacts on the environment and surrounding community. The safeguards and mitigation measures identified in this REF would help minimise the expected adverse impact.

### **Traffic and transport**

During construction, there is the potential for temporary delays, including an increase to queuing for traffic on Picnic Parade waiting to turn right to Maitland Bay Drive. This would be managed through a traffic management plan with potential use of a traffic controller to minimise delays and ensure clear access for emergency vehicles, and detours for any short-term closures of Picnic Parade.

During construction, there could be a loss of up to about 20 parking spaces in the car park on the south-east corner of the intersection. Further spaces could be temporarily blocked for periods on the eastern and western side of Picnic Parade between Maitland Bay Drive and Flathead Road. A review of parking supply and demand suggests that this temporary loss of parking would not significantly affect people's ability to find parking in the locality, including for activities at Ettalong Oval and Kitchener Park and parking will be reinstated in all areas with existing parking opportunities following construction. Parking would also be improved with safer access, resurfacing and line marking at the Kitchener Park carpark.

Once operational, the proposal is expected to improve traffic flow and reduce average delays at the intersection. While there would be benefits at opening, the most significant improvement for the overall intersection is in the AM peak and PM peak periods in 2029 and 2039. There would be reduced delays and queuing for traffic (including buses) entering the intersection from Picnic Parade, with some corresponding

increase in queue lengths for traffic on Maitland Bay Drive however, the resulting delays in Maitland Bay Drive are not significant (less than 10 seconds).

The new shared path connections and a pedestrian refuge on the southern leg of the intersection would improve connectivity and safety for pedestrians and cyclists.

### ***Landscape character and visual impacts***

The proposal would result in a temporary visual impact on the road corridor as a result of construction activities.

The proposal would have a moderate impact on the landscape character of Maitland Bay Drive. This impact would be the result of an increased gap in the southern tree line, reducing the canopy enclosure around the intersection.

The visual impact for views towards and along Maitland Bay Drive was assessed as moderate. Impacts would include removal of some southern street trees opening up the view, increases to hard surfacing, formalising the southern road edge contrasting with the natural views to the north and reducing low-level green areas.

Landscape character and visual impacts would be reduced through the implementation of landscape treatments. This would include:

- Replacement screening vegetation between Maitland Bay Drive and adjacent park areas.
- Replacement plantings to match existing species provided at a rate of two trees for every one tree removed
- Planting of low height and low maintenance native grasses and groundcovers on the roadside verge within the clear zone to create a soft green edge, while maintaining clear sight lines.

### ***Noise and vibration***

During construction, noise levels may exceed relevant noise management levels on occasion at the following receivers near the proposal:

- Residential receivers on Picnic Parade and Flathead Road to the south-east of the proposal site
- Residential receivers on Regatta Drive and Mountain View Circuit to the west of the proposal site
- Ettalong Oval (active recreation)
- Kitchener Park (active recreation).

In addition to this, residential receivers on Mountain View Circuit and the south-east corner of the intersection may also exceed the 'highly noise affected' criteria when some noisy construction activities are occurring, such as vegetation removal and milling of pavements.

Where possible, following site set up, work would be carried out during standard working hours (Monday to Friday 7am to 6pm and Saturdays 8am to 1pm). To minimise disruption to traffic and reduce construction timeframes, some work would take place outside of these hours over short periods, including:

- Disconnection and connection of the re-aligned 450-millimetre water main and the crossing under Maitland Bay Road
- Stormwater pipe connections crossing under Picnic Parade
- Decommissioning of the 600-millimetre stormwater pipe along Picnic Parade and the 450-millimetre water main under Maitland Bay Drive
- Installation of temporary traffic control measures, such as traffic barriers changed line marking, for each stage of construction

- Final asphalt re-surfacing of traffic lanes throughout the proposal and excavation of existing and construction of new pavement layers in the traffic lanes of Picnic Parade.

Mitigation measures would be detailed in a construction noise and vibration management plan and would include limiting noise intensive work to standard construction hours or early evenings wherever possible, scheduling respite periods and pre-work notifications.

During operation, the change in road traffic noise levels due to the proposal is predicted to be minor (less than 2 dB) at all receivers, and therefore no road traffic noise treatments are required.

### ***Biodiversity***

Direct impacts of the proposal would include removal of about 0.13 hectares of highly disturbed urban vegetation (managed landscape).

The construction of the proposal would require minimal disturbance of native vegetation to the north of Maitland Bay Drive. The proposed replacement of the guardrail on the northern side of Maitland Bay Drive could affect two threatened Magenta Lilly Pilly (*Syzygium paniculatum*) individuals located to the north of the guardrail. If affected, impacts on this species would not be significant.

Potential impacts on other threatened species and communities were also assessed as not significant.

### ***Acid sulfate soils and contamination***

Testing of soil materials indicated potential acid sulfate soil materials are likely to be encountered in natural sand materials occurring 0.9 metres and more below ground level throughout the proposal site. Without appropriate management via an acid sulfate soil management plan, if disturbed or dewatered and exposed to air, the sulphides in these materials may oxidise leading to acid generation and resulting impacts on fish and other aquatic life. Controls would include neutralisation of soils with lime before backfilling or disposal, and testing/treatment of groundwater within excavations.

All potential sources of contamination were assessed as a low risk in terms of interaction with the proposal but, if encountered, will be managed carefully, treated and disposed of off-site.

## **Justification and conclusion**

The proposal would reduce delays at the Maitland Bay Drive / Picnic Parade intersection, allowing it to operate efficiently well into the future, even with projected traffic growth. It would also improve safety and deliver better connections for pedestrians and cyclists.

There would be some short-term disruption while the proposal is being built, for example, due to noise, traffic and amenity-based impact. These potential impacts are consistent with similar road-development proposals and would be addressed through standard safeguards and mitigation measures.

The proposal would also result in some permanent visual change which would be addressed through the design process and the provision of suitable landscaping. There would also be some impacts to local biodiversity with the loss of a small amount of highly disturbed urban vegetation including some trees, although significant impacts on threatened species and communities are not expected, including the bushland along the southern side of Blackwall Mountain.

Overall, the proposal is considered to be justified. It has been developed through an options assessment and refinement process to identify a preferred option that best meets the proposal objectives while minimising the construction and operational impact.

## Display of the review of environmental factors

This REF is on display for comment between Monday 28 October 2019 to Monday 18 November 2019. You can access the documents in the following ways:

### **Internet**

The documents are available as pdf files on the Roads and Maritime website at [www.rms.work/MaitlandBayDrive](http://www.rms.work/MaitlandBayDrive)

### **Printed copies**

The documents can be viewed at the following locations:

- Woy Woy Library, corner Blackwall Road and Oval Avenue, Woy Woy
- Umina Library, West Street, Umina Beach – ask Library staff for a copy of the document to view in the library and then return.

### **Copies by request**

Printed and electronic copies are available by contacting Vicky Lee (Tel: 02 4394 6210), noting that there may be a charge for hard copies, CD or USB.

## How can I make a submission?

To make a submission about this proposal, please send your written comments to:

- Mail: Roads and Maritime Services, Maitland Bay Drive & Picnic Parade intersection upgrade, Central Coast Office, Locked Bag 2030, Newcastle 2300
- Email: [Central.Coast.Office@rms.nsw.gov.au](mailto:Central.Coast.Office@rms.nsw.gov.au)

Submissions must be received by 5pm on Monday 18 November 2019.

All information included in submissions is collected for the sole purpose of assisting in the assessment of this proposal. The information may be used during the environmental impact assessment process by relevant Roads and Maritime Services staff and contractors.

Where the respondent indicates at the time of supply of information their submission should be kept confidential, Roads and Maritime Services will attempt to keep it confidential. However, there may be legislative or legal justification for the release of the information, for example under the *Government Information (Public Access) Act 2009* or under subpoena or statutory instrument.

The supply of this information is voluntary. Each respondent has free access at all times to the information provided by the respondent but not to any identifying information provided by other respondents if a respondent has indicated the representation should be kept confidential. Any respondent may make a correction to the information they have provided by writing to the same address the submission was sent.

The information will be held by Roads and Maritime Services, Level 2, 1 Bryant Drive, Tuggerah NSW 2259.

## What happens next?

Roads and Maritime will collate and consider the submissions received during the public display of the REF.

After this consideration, Roads and Maritime will determine whether or not the proposal should proceed as proposed and will inform the community and stakeholders of this decision.

If the proposal is determined to proceed, Roads and Maritime will continue to consult with the community and stakeholders before and during construction.

# Contents

<b>Executive summary</b> .....	<b>i</b>
<b>Contents</b> .....	<b>viii</b>
<b>1. Introduction</b> .....	<b>1</b>
1.1 Proposal identification .....	1
1.2 Purpose of the report .....	4
<b>2. Need and options considered</b> .....	<b>5</b>
2.1 Strategic need for the proposal .....	5
2.2 Existing infrastructure .....	6
2.3 Proposal objectives and development criteria .....	7
2.4 Alternatives and options considered .....	9
2.5 Preferred option .....	11
<b>3. Description of the proposal</b> .....	<b>12</b>
3.1 The proposal .....	12
3.2 Design .....	14
3.3 Construction activities .....	16
3.4 Ancillary facilities .....	21
3.5 Public utility adjustment .....	21
3.6 Property acquisition .....	22
<b>4. Statutory and planning framework</b> .....	<b>24</b>
4.1 Environmental Planning and Assessment Act 1979 .....	24
4.2 Other relevant NSW legislation .....	26
4.3 Commonwealth legislation .....	28
4.4 Confirmation of statutory position .....	28
<b>5. Consultation</b> .....	<b>29</b>
5.1 Consultation strategy .....	29
5.2 Community involvement .....	29
5.3 Aboriginal community involvement .....	29
5.4 ISEPP consultation .....	30
5.5 Government agency and stakeholder involvement .....	30
5.6 Ongoing or future consultation .....	30
<b>6. Environmental assessment</b> .....	<b>31</b>
6.1 Traffic and Transport .....	31
6.2 Landscape character and visual impacts .....	38
6.3 Noise and vibration .....	45
6.4 Hydrology and flooding .....	57
6.5 Biodiversity .....	61
6.6 Soil, contamination and water quality .....	66
6.7 Aboriginal cultural heritage .....	72
6.8 Other impacts .....	74
6.9 Cumulative impacts .....	80

**7. Environmental management..... 81**  
7.1 Environmental management plan ..... 81  
7.2 Summary of safeguards and management measures ..... 82  
7.3 Licensing and approvals ..... 94

**8. Conclusion ..... 95**  
8.1 Justification ..... 95  
8.2 Objects of the EP&A Act ..... 95  
8.3 Conclusion ..... 98

**9. Certification ..... 99**

**10. References ..... 100**

**Terms and acronyms used in this REF ..... 101**

## Tables

Table 2-1: Urban design principles .....	8
Table 2-2: Analysis of Option 1 .....	10
Table 2-3: Analysis of Option 2 .....	10
Table 2-4: Analysis of Option 3 .....	10
Table 2-5: Analysis of Option 4 .....	11
Table 3-1: Key design criteria .....	14
Table 3-2: Approximate earthworks and pavement quantities .....	20
Table 3-3: Public utility adjustments .....	22
Table 3-4: Proposed property acquisition .....	22
Table 4-1: Consistency with relevant Gosford LEP zone objectives .....	25
Table 4-2: Water Management Act 2000 approvals .....	27
Table 5-1: Summary of Procedure for Aboriginal Cultural Heritage Consultation and Investigation .....	29
Table 6-1: Operational traffic modelling scenarios .....	31
Table 6-2: Level of Service rankings .....	32
Table 6-3: Summary of crash data – 2013 to 2017 .....	34
Table 6-4: Future 2029 and 2039 do nothing scenario modelling results .....	35
Table 6-5: Future 2029 and 2039 proposal scenario modelling results .....	35
Table 6-6: Traffic and transport environmental management measures .....	36
Table 6-7: Visual and landscape environmental management measures .....	43
Table 6-8: Background noise monitoring results .....	47
Table 6-9: Project specific noise management levels .....	47
Table 6-10: Recommended safe working distances for vibration intensive plant .....	48
Table 6-11 NSW Road Noise Policy residential land use criteria .....	48
Table 6-12: Construction noise assessment – NML exceedances .....	49
Table 6-13: Construction noise assessment – noise predictions standard hours (dBA) – with mitigation .....	50
Table 6-14: Construction noise assessment – noise predictions night period (dBA) – with mitigation .....	52
Table 6-15: Operational road traffic noise predictions .....	54
Table 6-16: Noise and vibration environmental management measures .....	55
Table 6-17: Hydrology and flooding environmental management measures .....	59
Table 6-18: Biodiversity environmental management measures .....	64
Table 6-19: Soil landscapes within the investigation area .....	66
Table 6-20: Contamination risk assessment – outcomes .....	68
Table 6-21: Soil contamination and water environmental management measures .....	70
Table 6-22: Aboriginal heritage environmental management measures .....	72
Table 6-23: Review of other environmental issues .....	74
Table 6-24: Other issues environmental management measures .....	77
Table 7-1: Summary of safeguards and management measures .....	82
Table 7-2: Summary of licensing and approvals required .....	94
Table 8-1: Objects of the EP&A Act review .....	95

## Figures

Figure 1-1: Location of the proposal .....	2
Figure 1-2: The proposal .....	3
Figure 3-1: Key features of the proposal – urban design concept plan overview .....	13
Figure 3-2: Typical cross section A – Maitland Bay Drive .....	15
Figure 3-3: Typical cross section B – Picnic Parade .....	15
Figure 3-4: Concept construction stage 1 .....	18
Figure 3-5: Concept construction stage 2 .....	18
Figure 3-6: Concept construction stage 3 .....	19
Figure 3-7: Proposed acquisition of portion of Ettalong Oval. ....	23
Figure 6-1: Landscape character and visual impact assessment matrix .....	38
Figure 6-2: Landscape character zones .....	40
Figure 6-3: Visual envelop map including viewpoints .....	41
Figure 6-4: Noise sensitive receivers.....	46
Figure 6-5: Overland flow paths (blue) and associated sub-catchments (white borders).....	58
Figure 6-6: <i>Syzgium paniculatum</i> (Magenta Lilly Pilly) locations.....	62

## Appendices

Appendix A	Consideration of clause 228(2) factors and matters of national environmental significance and Commonwealth land
Appendix B	Statutory consultation checklists
Appendix C	Traffic and Transport Assessment
Appendix D	Urban Design Vision, Objectives and Principles Report
Appendix E	Construction Noise and Vibration Assessment
Appendix F	Biodiversity Assessment
Appendix G	Drawings

# 1. Introduction

## 1.1 Proposal identification

Roads and Maritime Services NSW (hereafter referred to as 'Roads and Maritime') propose to upgrade the intersection of Maitland Bay Drive and Picnic Parade, Ettalong Beach (the Proposal) within the Central Coast Local Government Area.

The proposal is needed to future proof the subject intersection with traffic modelling showing that the existing seagull intersection treatment is likely to operate at a Level of Service<sup>1</sup> D in the AM Peak in 2039. The improvement works would allow the intersection to operate more safely and reduce average delays, particularly for drivers turning right from Picnic Parade. Key features of the proposal would include:

- Installing a raised concrete roundabout and raised concrete medians
- A new right and left turn into the Kitchener Park carpark from Maitland Bay Drive, but left turn out only
- Replacement of the existing guardrail on the northern side of Maitland Bay Drive
- On-road lanes for cyclists where practical
- New shared pathway to connect the Kitchener Park carpark to the existing footpath on Picnic Parade
- New shared pathway to connect to the carpark adjacent to the Scout Hall and the cycleway on the Maitland Bay Drive westbound carriageway
- New pedestrian refuge on Picnic Parade to improve pedestrian safety
- Associated line marking and signage
- Adjustments to public utilities including the relocation of affected street lighting, water and sewer mains
- Adjustments to drainage pits and pipes
- Improvements to the Kitchener Park carpark and the car park adjacent to the Scout Hall
- Relocation of existing 'Welcome to Ettalong Beach' sign and advertisement banners
- Landscape planting and urban design treatments.

The proposed alignment is similar to that of the existing arrangement however a portion of the property to the south of Maitland Bay Drive owned by Central Coast Council would need to be acquired by the Roads and Maritime.

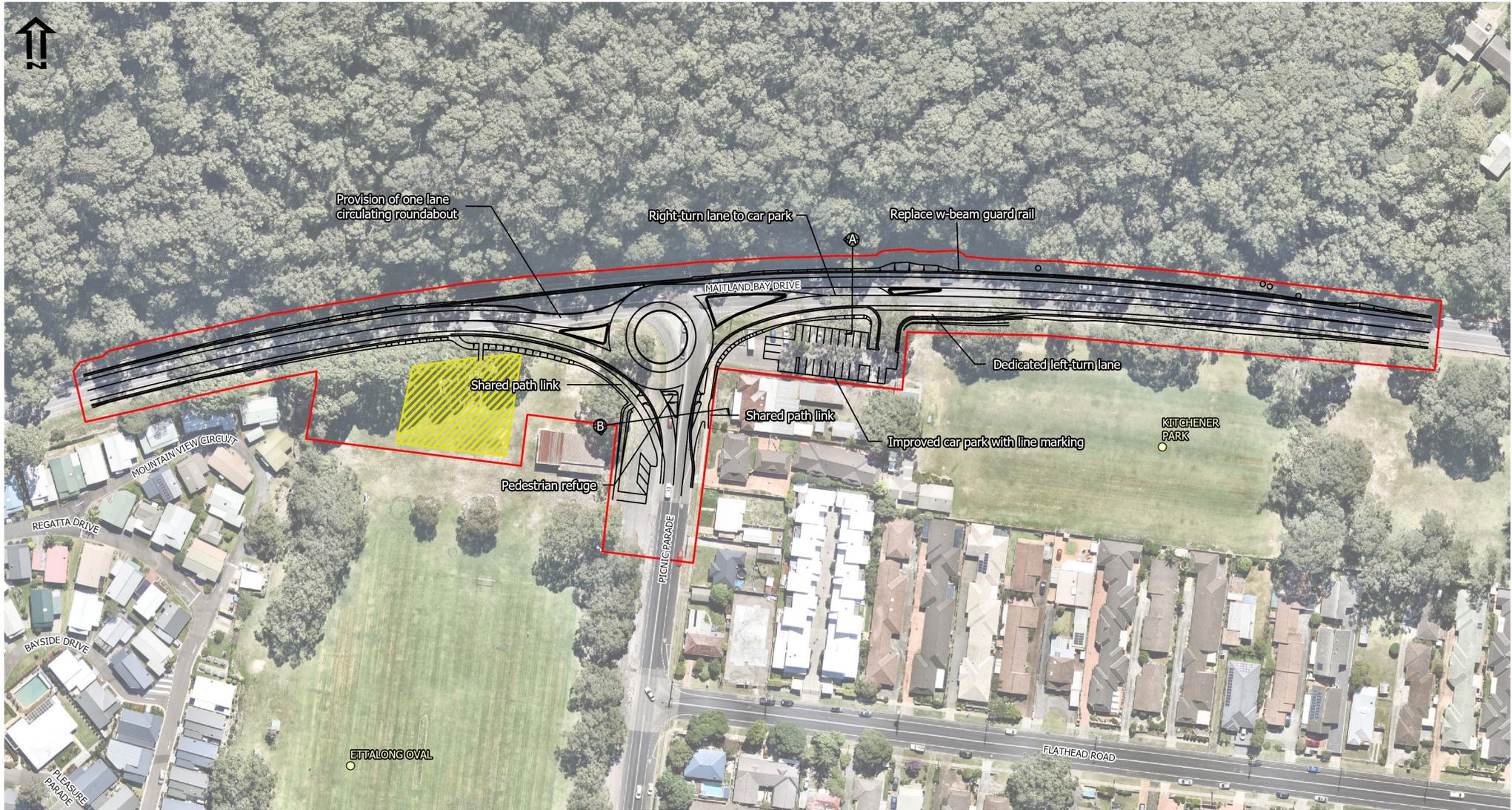
The location of the proposal and the proposal itself are shown in Figure 1-1 and Figure 1-2. Chapter 3 describes the proposal in more detail.

---

<sup>1</sup> Level of service is a qualitative measure describing operational conditions within a traffic stream and the perception by drivers and/or passengers of the conditions. Six levels of service, designated A (best) to F (worst), are used to define the range of traffic conditions that can occur, each level representing a range of operating conditions.



Figure 1-1: Location of the proposal



- Construction boundary
- Construction compound

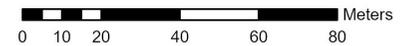


Figure 1-2: The proposal

## 1.2 Purpose of the report

This Review of Environmental Factors (REF) has been prepared by Beca Pty Ltd on behalf of Roads and Maritime, Greater Sydney Project Office. For the purposes of these works, Roads and Maritime is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the REF is to describe the proposal, to document the likely impacts of the proposal on the environment, and to detail mitigation and management measures to be implemented.

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

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

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

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have 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 proposal to significantly impact any other matters of national environmental significance or Commonwealth land and the need, subject to the EPBC Act strategic assessment approval, to make a referral to the Australian Government Department of the Environment and Energy for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

## 2. Need and options considered

This chapter describes the need for the proposal in terms of its strategic setting and operational need. It identifies the various options considered and the selection of the preferred option for the proposal.

### 2.1 Strategic need for the proposal

#### 2.1.1 Future Transport Strategy 2056

The NSW Future Transport Strategy 2056 (Transport for NSW, 2018) outlines a clear framework to address transport challenges in NSW over the next 40 years and is an update of the NSW Long Term Transport Master Plan released in 2012. It integrates planning for roads, freight and all other modes of transport and sets out initiatives, solutions and actions to meet NSW transport challenges.

By improving the safety and efficiency of the intersection, and enhancing access to Ettalong Beach, the proposal would support the following transport customer outcomes:

- Efficient, reliable and easy-to-understand journeys for customers, enabled by a simple hierarchy of services
- A safe transport system for every customer with the aim for zero deaths or serious injuries on the network by 2056
- Transport services and infrastructure are delivered, operated and maintained in a way that is affordable for customers and the community
- Sustaining and enhancing the liveability of our places.

#### 2.1.2 Central Coast Regional Plan 2036

The Central Coast Regional Plan 2036 (NSW Department of Planning and Environment, 2016) (NSW Department of Planning and Environment, 2016) provides the strategic policy, planning and decision-making framework to guide the ongoing development of the Central Coast for the next 20 years. The Woy Woy Peninsula has been identified within the Plan as an important growth centre for which timely delivery of infrastructure will support housing and jobs growth in the region.

The proposal would complement the other regional transport route upgrades presently being carried out on the Central Coast including improvements to Brisbane Water Drive and Empire Bay Drive. Intersection upgrades to key local and sub arterial roads such as those presently proposed are essential to promote safe and reliable commuter networks and ultimately ensure the aims and objectives of the Central Coast Regional Plan 2036 are met. This includes Goal 3 – Well-connected communities and attractive lifestyles.

#### 2.1.3 Central Coast Regional Transport Plan 2013

The Central Coast Regional Transport Plan 2013 (Transport for NSW, 2013) outlines specific actions to support the NSW Long Term Master Plan for Transport (now superseded by Future Transport Strategy 2056) in the Central Coast Region.

The Woy Woy Peninsula is identified as a main population centre under the plan with the Woy Woy to Gosford corridor considered a critical transport corridor. The plan suggests that the highly concentrated population centres on the Central Coast are leading to traffic congestion and a clustering of pedestrian casualty crashes. To improve the situation, the plan calls for immediate action addressing the pinch points

on the road network, providing safer roads and providing better transport linkages. The current proposal seeks to future proof the intersection providing for a reduction in traffic congestion at the pinch point between Picnic Parade and Maitland Bay Drive. This, in turn, would ensure greater safety for the road network.

## 2.1.4 Roads and Maritime Services Corporate Plan 2018-2021

The Roads and Maritime Services Corporate Plan 2018-2021 (Roads and Maritime Services, 2018) highlights and demonstrates the need for improvements to the safety and maintenance of all the state's roads. The proposal represents a significant road upgrade to ensure the efficiency and safety of the road network is maintained. The proposal, therefore, aligns with the following strategic priorities set out in the Corporate Plan:

- Increase customer value
- Get more out of the network
- Keep safety at the heart.

## 2.1.5 NSW Road Safety Strategy

The NSW Road Safety Strategy 2012-2021 sets the direction of road safety in NSW. NSW is committed to reducing fatalities to at least 4.3 per 100,000 population by 2016 together with at least a 30 per cent reduction in fatalities and serious injuries between 2012 and 2021. This proposal would help in meeting this goal by improving road safety at the intersection of Maitland Bay Drive and Picnic Parade.

## 2.1.6 Road Safety Plan 2021

The Road Safety Plan 2021 (Transport for NSW, 2018) outlines how the NSW Government will work towards the State Priority Target of reducing fatalities by 30 per cent by 2021 (compared to average annual fatalities over 2008–2010). It also aligns the Towards Zero vision with Future Transport 2056, which aims to have a NSW transport network with zero trauma by 2056.

The proposal is consistent with the directions set out in Road Safety Plan 2021 because it would provide and intersection configuration that would reduce the risk and severity of crashes.

## 2.1.7 Road development funding

On 31 March 2017, the NSW Government announced additional funding for Central Coast roads. The projects to be funded include \$7 million spending over three years to upgrade the intersection between Maitland Bay Drive and Picnic Parade.

## 2.2 Existing infrastructure

Maitland Bay Drive is a two-lane arterial road linking the Woy Woy Peninsula to the suburbs on the eastern side of Brisbane Water via the Rip Bridge. Picnic Parade is a two-lane road linking Maitland Bay Drive to Ettalong Beach and the main commercial area of Ettalong Beach. The intersection of Maitland Bay Drive and Picnic Parade is on the western side of the Rip Bridge. Picnic Parade is the main route from the town of Ettalong Beach to Maitland Bay Drive. The road represents the link between Ettalong and Blackwall.

The eastbound lane of Maitland Bay Drive allows for a single lane of traffic with a right-hand turn to access Picnic Parade. Westbound traffic is allowed a single lane of traffic with no turning lane. Northbound traffic on Picnic Parade is afforded a separated left-hand and right-hand turn lane entering Maitland Bay Drive.

Crash barriers are located along the northern edge of Maitland Bay Drive with street lights located along both the northern and southern portion of the site. No crash barriers are located along Picnic Parade with street lights only located along the eastern side of Picnic Parade.

Maitland Bay Drive has a posted speed limit of 70 kilometres per hour at the intersection. Picnic Parade has a posted speed limit of 50 kilometres per hour at the intersection.

## 2.3 Proposal objectives and development criteria

### 2.3.1 Proposal objectives

The objectives of the proposal are:

- Reduce projected delays on Picnic Parade at the intersection in peak periods so as to address future mobility around the road network
- Enhance movement into the Ettalong business precinct and tourist/leisure destinations
- Improve pedestrian safety on Picnic Parade
- Reduce excessive speed on Maitland Bay Drive.

### 2.3.2 Development criteria

The development criteria for the proposal include:

- Designing the proposal in a manner that is informed by environmental investigations to minimise any adverse impact while maximising environmental benefits
- Satisfying the technical and procedural requirements of Roads and Maritime and other stakeholders with respect to the design of the proposal
- Optimising the design to ensure that the proposal can be practically and efficiently constructed and maintained while meeting all other proposal objectives
- Applying appropriate urban design, landscape and visual principles in the concept design of the proposal elements
- Designing all connections, modifications and improvements necessary to link the proposed work to the existing road system
- Planning temporary arrangements that minimise disruption to local and through traffic and that maintain access to adjacent properties during construction
- Developing, implementing and maintaining effective management systems for quality, work health and safety, environmental, proposal reporting, risk management, value management and value engineering, constructability assessment, safety audits and community participation.

### 2.3.3 Urban design objectives

Several project specific urban design principles have been adopted for the proposal based on the broader urban design principles set out in Beyond the Pavement, Urban Design Policy Procedures and Design Principles (Roads and Maritime Services, 2014). These principles are provided in Table 2-1.

Table 2-1: Urban design principles

Relevant Beyond the Pavement principle	Project specific urban design principle
Principle one – Contributing to the urban structure and revitalisation	<ul style="list-style-type: none"> <li>• Improve the connection to Picnic Parade and Ettalong Beach’s town centre and wharf</li> </ul>
Principle two - Fitting into the built fabric	<ul style="list-style-type: none"> <li>• Keep road footprint to a minimum</li> <li>• Minimise impacts on existing car parking areas</li> <li>• Maintain residential driveway accesses</li> <li>• Minimise impact on existing residential views</li> </ul>
Principle three – Connecting modes and communities	<ul style="list-style-type: none"> <li>• New intersection to integrate seamlessly with the existing network</li> <li>• Provide footpaths that link into existing or future networks</li> <li>• Provide cycle paths that connect into the existing network</li> </ul>
Principle four – Fitting with the landform	<ul style="list-style-type: none"> <li>• Road design not to impact on Blackwall Mountain</li> </ul>
Principle five – Responding to natural pattern	<ul style="list-style-type: none"> <li>• Retain existing trees where possible, and replace trees that require removal in line with council requirements</li> <li>• Maintain existing drainage strategy and flow directions</li> </ul>
Principle seven – Designing an experience in movement	<ul style="list-style-type: none"> <li>• Create an attractive and clear gateway to Ettalong Beach</li> </ul>
Principle eight – Creating self-explaining road environments	<ul style="list-style-type: none"> <li>• Visually distinguishing between the different functions of Picnic Parade and Maitland Bay Drive</li> <li>• Ensure clear and open sightlines</li> <li>• Reduce visual clutter</li> <li>• Carpark entry onto Maitland Bay Road to be clear and legible</li> <li>• Provide safe and desirable pedestrian crossing locations</li> <li>• Use materials and plantings that are consistent with the surrounding urban and landscape context</li> </ul>
Principle nine – Achieving integrated and minimal maintenance design	<ul style="list-style-type: none"> <li>• Maintenance should be minimised without compromising the overall design</li> <li>• Use robust materials fit for purpose and place</li> <li>• Provide a self-reliant and minimal maintenance natural landscape</li> <li>• Avoid opportunities for vandalism</li> <li>• Declutter and integrate required elements to reduce visual clutter</li> </ul>

## 2.4 Alternatives and options considered

### 2.4.1 Methodology for selection of preferred option

Several options for the Maitland Bay Drive/Picnic Parade intersection have been considered by Roads and Maritime including a 'do nothing' option. Each of the identified options was considered against the objectives stated in Section 2.3.1 and the development criteria listed in Section 2.3.2.

### 2.4.2 Identified options

#### ***Option 1 – Standard roundabout***

This option proposes a roundabout designed for rigid trucks and buses up to 12.5 metres long. Under this option access to the carpark would be via a dedicated right turn lane and widening for left in/left out turns.

Pedestrian access would be east/west via a proposed shared path along south-west and south-east corners. Cycle lanes would remain in similar position to existing beyond the extent of the roundabout.

#### ***Option 2 – Roundabout with a slip lane***

This option proposes a similar roundabout to that of Option 1 with the addition of a free flow slip lane for eastbound vehicles on Maitland Bay Drive. Access to the carpark, pedestrian access and cyclist access are proposed as per Option 1.

#### ***Option 3 – Reduced scope roundabout***

This option proposes an elliptical roundabout which is non-compliant with Austroads standards and generates no impacts on adjacent properties. The roundabout would have a radius of six metres and be fully mountable for allow for use by semi-trailers. Access to the carpark, pedestrian access and cyclist access are proposed as per Option 1.

#### ***Option 4 – Traffic lights***

This option proposes the installation of traffic lights and associated road widening to two lanes in each direction to reduce queuing and accommodate turning movements. Single lane approaches were not considered viable due the resulting long queue lengths on Maitland Bay Drive.

#### ***Option 5 – 'Do nothing'***

The 'do nothing' option would result in the Maitland Bay Drive/Picnic Parade intersection remaining in its current state without any augmentation. Normal road maintenance would continue to be carried out.

## 2.4.3 Analysis of options

Tables 2-1, 2-2 and 2-3 outline the advantages and disadvantages of the remaining options.

Table 2-2: Analysis of Option 1

Benefits	Disadvantages/Implications
<ul style="list-style-type: none"> <li>• Austroads standards compliant design</li> <li>• Safest design of all options considered</li> <li>• Smaller design footprint than Option 2</li> <li>• Greatest potential for traffic calming devices to be installed</li> </ul>	<ul style="list-style-type: none"> <li>• Requires property acquisition to the south of Maitland Bay Drive (Ettalong Oval)</li> </ul>

Table 2-3: Analysis of Option 2

Benefits	Disadvantages/Implications
<ul style="list-style-type: none"> <li>• Provision of free-flow slip lane for eastbound vehicles along Maitland Bay Drive which reduces delay for this movement</li> <li>• No adjustment to eastbound cycle lane and no interruption for eastbound cyclists along Maitland Bay Drive</li> </ul>	<ul style="list-style-type: none"> <li>• Requires the largest design footprint of all considered options</li> <li>• Requires largest property acquisition of all considered options</li> <li>• Greater pavement area and more tree removal required for access to the carpark (due to additional pavement width required for slip lane and median and therefore reduced sight distance at carpark access)</li> <li>• Greatest impact on carpark extent of all considered options</li> <li>• Recreates merging collision risk which is present in the existing layout</li> <li>• Greater risk than other options for cyclist turning right onto Picnic Parade – recreates existing layout (cyclist must cross eastbound through lane)</li> <li>• Greatest impact on utilities</li> </ul>

Table 2-4: Analysis of Option 3

Benefits	Disadvantages/Implications
<ul style="list-style-type: none"> <li>• Smallest design footprint of all options</li> <li>• No property acquisition required</li> <li>• No adjustment to eastbound cycle lane and no interruption for eastbound cyclists along Maitland Bay Drive</li> <li>• No impact on parking on the western side of Picnic Parade (adjacent existing Scout Hall)</li> <li>• Least impact on utilities</li> </ul>	<ul style="list-style-type: none"> <li>• Non-compliant design and therefore greater operational/safety risk than other design options</li> <li>• Minimal opportunities for traffic calming devices</li> <li>• Less consistent with a slower approach speed and the opportunity for urban landscaping to encourage turning into Picnic Parade from tourist traffic outside the peak travel times</li> </ul>

Table 2-5: Analysis of Option 4

Benefits	Disadvantages/Implications
<ul style="list-style-type: none"> <li>• Would reduce delays traffic turning from Picnic Parade to Maitland Bay Drive</li> <li>• Would improve safety for all movements over the existing situation</li> </ul>	<ul style="list-style-type: none"> <li>• Requires more property acquisition to the south of Maitland Bay Drive than other options</li> <li>• Larger construction footprint than other options due to the necessary dual-lane approaches</li> <li>• Greater maintenance costs than other options</li> </ul>

## 2.5 Preferred option

Option 1 (standard roundabout) has been identified by Roads and Maritime as the preferred option. Option 1 is considered the most suitable option for the following reasons:

- Capable of full compliance with the Austroads Standards allowing for a higher level of safe operation than other options
- Provides for a smaller footprint than Options 2 and 4 and in turn reduces the amount of property acquisition and environmental impact associated with the proposal
- Generates appropriate network capacity to minimise congestion on the road into the future and ensures that the intersection operates at an acceptable level of service
- While designed for 12.5-metre-long rigid trucks and buses, allows the intersection to be used by all vehicles which are permitted to use Maitland Bay Drive and Picnic Parade, including semi-trailers and emergency vehicles
- Is compatible with a slower approach speed and the opportunity for urban landscaping to encourage turning into Picnic Parade from tourist traffic outside the peak travel times

While there would be some short-term impacts associated with the proposal such as construction-related disruption, noise, visual impacts and loss of trees, measures would be implemented to minimise and mitigate these impacts.

The objects of the EP&A Act encourage ecologically sustainable development. The principles of ecologically sustainable development encourage the integration of economic, social development and environmental considerations into the decision-making process for all developments. The development of the proposal is consistent with these principles as demonstrated by the proposal objectives and development criteria (which include environmental and social considerations) and the alignment of the preferred option with those objectives.

On balance, the benefits derived from proceeding with the proposal are considered to outweigh the potential short-term impacts.

## 3. Description of the proposal

### 3.1 The proposal

Roads and Maritime proposes to upgrade the intersection of Maitland Bay Drive and Picnic Parade, Ettalong Beach. The proposal is shown in Figure 1-2 and Figure 3-1 with more detailed drawings included in Appendix G.

Key features of the proposal would include:

- Installing a raised concrete roundabout and raised concrete medians
- A new right and left turn into the Kitchener Park carpark from Maitland Bay Drive, but left turn out only
- Replacement of the existing guardrail on the northern side of Maitland Bay Drive
- On-road lanes for cyclists where practical
- New shared pathway to connect the Kitchener Park carpark to the existing footpath on Picnic Parade
- New shared pathway to connect to the carpark adjacent to the Scout Hall and the cycleway on the Maitland Bay Drive westbound carriageway
- New pedestrian refuge on Picnic Parade to improve pedestrian safety
- Associated line marking and signage
- Adjustments to public utilities including the relocation of affected street lighting, water and sewer mains
- Adjustments to existing drainage pits and pipes within the road formation
- Improvements to the Kitchener Park carpark and the car park adjacent to the Scout Hall
- Relocation of existing 'Welcome to Ettalong Beach' sign and advertisement banners
- Landscape planting and urban design treatments.

The proposal boundary is shown by Figure 1-2 and incorporates an area of about 2.6 hectares, extending over an east-west distance of about 500 metres. The width of the proposal boundary ranges between about 20 metres and 110 metres (including ancillary facility sites). It has been assumed that construction work can occur anywhere within the proposal boundary.

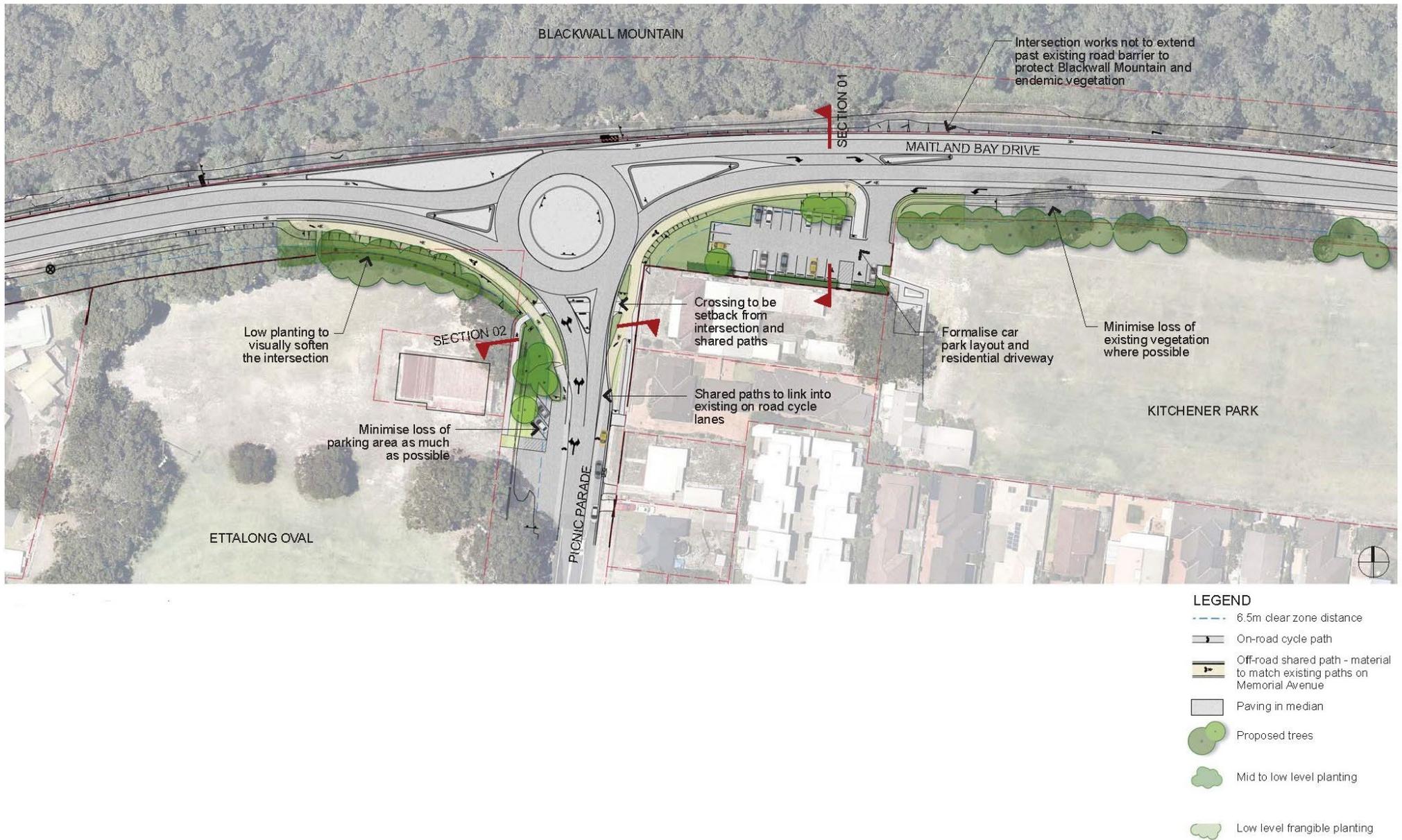


Figure 3-1: Key features of the proposal – urban design concept plan overview

## 3.2 Design

### 3.2.1 Design criteria

The key design criteria for the proposal are provided in Figure 3-1, while Figure 3-2, Figure 3-3, show typical cross-sections for the proposal.

Table 3-1: Key design criteria

Design aspect	Criterion
Posted speed limit	70 km/h on Maitland Bay Drive, 50 km/h on Picnic Parade
Design speed	80 km/h on Maitland Bay Drive, 50 km/h on Picnic Parade 70 km/h for roundabout central island radius 10 km/h car park entry
Reaction time	1.5 seconds
Minimum general lane width	3.5 metres (Maitland Bay Drive) 3.0 metres (Picnic Parade)
Shoulder width	1.5 metres (cycle lane)
Design and checking vehicles	Design vehicle 12.5-metre single unit truck Checking vehicle 19-metre semi-trailer
Hydraulics and hydrology	The carriageways shall not be inundated for a flood event less than the current Average Recurrence Interval (ARI)

### 3.2.2 Engineering constraints

The proposal has the following identified constraints:

- A need to minimise acquisitions of public and private land and to utilise the Existing road boundaries along the Maitland Bay Drive and Picnic Parade as much as possible
- The proximity to Blackwall Mountain and adjacent swale, including associated biodiversity and cultural values
- Requirement to maintain through traffic and turning movements during construction to maintain access to Ettalong business district
- Requirement to maintain access to adjacent properties during construction
- A need to minimise the impact on existing utilities and the existing network of stormwater drainage pipes and pits
- Time constraints affecting the utility relocation, stormwater drainage works and construction activities

### 3.2.3 Cross sections

The typical cross-sections for the proposal are shown in Figure 3-2 and Figure 3-3 (refer to Figure 1-2 for cross-section locations) and include:

- Single lane circulating roundabout including an 18.4-metre circular island, with a 2.8-metre concrete apron to accommodate larger vehicles
- Maitland Bay Drive – minimum 3.5 metres through lanes with adjacent on-road cycle lanes
- Picnic Parade – minimum 3.0 metre through lanes with a 1.2-metre cycle lane
- Shared path connections – 3.0 metres wide on the south-east and south-west corners of the intersection.



Figure 3-2: Typical cross-section A – Maitland Bay Drive

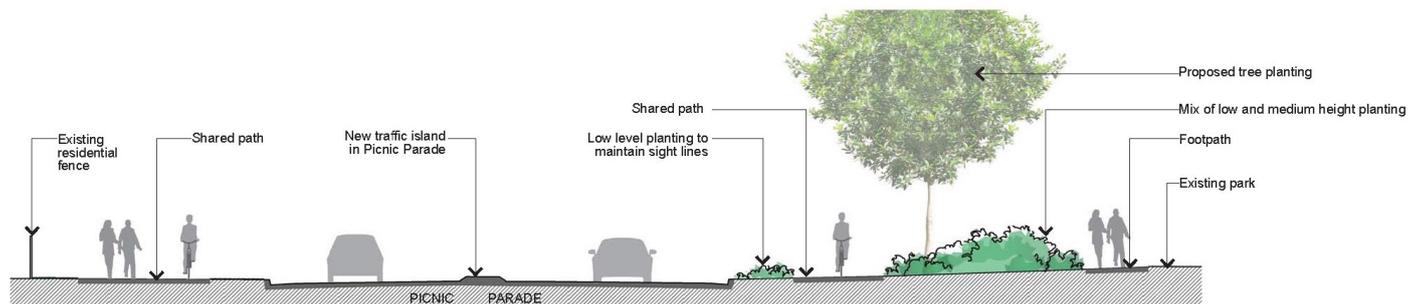


Figure 3-3: Typical cross-section B – Picnic Parade

### 3.2.4 Pedestrian and cyclist provision

The proposal would maintain the existing on-road cycle lanes along the road shoulders of Maitland Bay Drive. Eastbound cyclists on Maitland Bay Drive would need to safely merge with traffic slowing on the approach to the roundabout. For westbound cyclists, the on-road cycle lane would connect to the new shared path on the southern side of Maitland Bay Drive.

On the south-east and south-west corners of the intersection, shared paths are proposed connecting the existing paths on Picnic Parade with the parking area to the east of Picnic Parade. These shared path sections also connect to existing on-road cycle lanes on the southern side of Maitland Bay Drive about 50 metres to the east and west of the intersection.

## 3.2.5 Drainage design

The proposed road drainage has aimed to fit within the existing drainage network where possible, although some additional inlet pits and pipes on the proposed roundabout are needed to cater for sheet flows from new hard road surfaces. These additional inlets and pipes are connected to the existing underground and surface stormwater drainage network and existing discharge points outside the proposal area.

The main stormwater drainage in the area is through an existing 1.35-metre diameter pipe traversing Maitland Bay Drive from south-west to north-west and through the intersection with Picnic Parade, and this will be extended but not relocated.

Two 450-millimetre pipe outlets (with concrete headwalls) to the drainage swale on the northern side of Maitland Bay Drive are also to be required.

## 3.3 Construction activities

### 3.3.1 Work methodology

#### ***General sequence of works***

The general sequence of construction activities is identified below. The sequence is indicative and may need to be modified following the appointment of a construction contractor.

Site establishment activities and early work would include:

- Survey and further utility investigations
- Establishing the site compound (refer to Section 3.4) and erecting worksite fencing where required
- Implementing traffic management measures
- Installing environmental controls, including tree protection measures
- Relocation of water and sewer mains affected light poles and low voltage power related to street lighting.

Drainage work would include:

- Reconstruction of existing pits (where needed)
- Excavation for new pits and pipe connections
- Compact subgrade
- Place and compact bedding material
- Install pipes and pits
- Fill and compact material around new pipes and pits
- Place erosion protection and headwalls at new pipe outlets (where required).

Water and sewer main relocation work would include:

- Excavation for new water and sewer mains
- Compact subgrade
- Place and compact bedding material
- Place new water and sewer main pipes
- Connection of new water and sewer mains

- Testing and disinfection of the new water main using chlorinated water (as specified by Central Coast Council)
- Dewatering of redundant water/sewer mains
- Remove the redundant section of water and sewer main pipes with disposal by licensed contractor
- Fill and compact material around the new water and sewer mains
- Protection of new water and sewer mains from damage during construction of pavement work, where required.

Road and pavement work would include:

- Subgrade preparation
- Lay gravel base / sub-base layers for new pavements (where required)
- Construct road pavements
- Construct roundabout (and apron) and refuges
- Construct shared path connections.
- Re-surface carpark pavements.

Final work would include:

- Installation of line markings, signs and guide posts
- Decommission temporary facilities (such as site compounds)
- Clean up the site and dispose of all surplus waste materials
- Removal of construction traffic management and opening of the proposal to traffic.

### ***Construction staging***

Concept level construction staging has been developed to confirm the feasibility of the proposal. There will likely be further refinements and minor changes to this staging during later detailed design and construction planning. The concept level construction stages identified are as follows (refer also to Figure 3-4, Figure 3-5 and Figure 3-6):

- Stage 1 – Realign intersection as simple T-junction located to the east with traffic at the northern extremes of existing traffic lanes, complete off-line works on southern side of Maitland Bay Drive, including southern portion of roundabout, site clearance, formation and temporary pavement.
- Stage 2 – Shift traffic to southern side of Maitland Bay Drive and realign intersection to the west and use portion of roundabout constructed. Construct works for northern portion of roundabout.
- Stage 3 – Shift traffic onto roundabout and complete missing portions, links and tie-ins under temporary lane closures.

Temporary partial and short-term closures of Picnic Parade and associated detours for water and sewer relocation may be required. If needed these would be implemented in consultation with Central Coast Council and appropriate advance notice would be given to local road users, emergency services, community facilities and residents.



Figure 3-4: Concept construction stage 1



Figure 3-5: Concept construction stage 2



Figure 3-6: Concept construction stage 3

### 3.3.2 Construction hours and duration

Subject to approval, construction is anticipated to commence in mid-2020 and take about 12 months to complete, weather permitting.

Construction work would be carried out primarily during standard hours, where possible:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sunday: No work
- Public holidays: No work

To minimise disruption to traffic and to reduce the duration of construction, some work may need to be carried out outside these hours. These works would include relocating some existing utilities and services and some pavement work. For work required outside standard hours, the target noise levels are generally set at 5 dBA or less above background noise levels and where this is higher, reasonable and feasible work practices to minimise this noise nuisance and traffic disruption would be planned and implemented through a construction noise management plan and a traffic management plan, respectively. The construction noise management plan would be consistent with the Roads and Maritime Construction Noise and Vibration Guidelines (Roads and Maritime Services, 2016) and would cover measures including at-source noise controls, respite periods and notifying affected residents.

### 3.3.3 Plant and equipment

Plant and equipment to be used for construction would be confirmed during the construction planning process, but an indicative list of equipment expected to be used on site during construction of the proposal includes:

- Asphalt pavers
- Asphalt profiling machines
- Concrete agitator

- Concrete saws
- Extrusion machine
- Generators
- Grader
- Water pumps
- Hand tools including welding equipment
- Lighting units
- Line marking equipment
- Loader, backhoe, excavator and/or bobcat
- Mulcher and chainsaw
- Scissor lift
- Trucks and light utilities.

### 3.3.4 Earthworks

Most construction work would be confined to existing road pavements and, therefore, earthworks would be generally confined to the stripping of topsoil in the small section of Ettalong Oval to be acquired, placement of subgrade material for small sections of new pavements and excavation / trenching for utility adjustments, signage and light pole footings.

Table 3-2: Approximate earthworks and pavement quantities

Proposal element	Approximate quantity
Cut volume (excluding topsoil stripping)	66 cubic metres
Fill (excluding topsoil)	1394 cubic metres
Topsoil	560 cubic metres
Asphalt overlay, corrective course and 'milling and re-sheeting'	768 cubic metres
New pavements	1300 cubic metres
Earthworks associated with re-alignment of the 450-millimetre water main and the 250-millimetre sewer main	450 cubic metres

### 3.3.5 Source and quantity of materials

The proposal would require small quantities of materials, primarily steel pipes, concrete and select materials. The quantities of material required would not result in a regional or local supply shortage, and none are likely to be in short supply in the foreseeable future. Materials would be sourced from local commercial suppliers where available.

Non-renewable resources such as petroleum fuels would not be used in large quantities.

### 3.3.6 Traffic management and access

The proposal is expected to generate up to 30 construction vehicle movements per day at the peak of construction activity, especially during earthworks. Access to the proposal site would be directly from Maitland Bay Drive.

All existing traffic movements would be maintained during construction; however, some temporary lane closures and minor temporary pedestrian diversions may be required during some types of works (for example utility/drainage works within the road formation and removal of larger overhanging trees). These would occur in accordance with a Traffic Management Plan and, where necessary, a Road Occupancy Licence. The proposed traffic switches are described in Section 3.3.1.

Periodic short-term (overnight) closures of Picnic Parade and implementation of a detour may be required. Indicative alternative routes are identified below:

- Northbound traffic from Picnic Parade heading west onto Maitland Bay Drive westbound – would potentially use Fassifern Street, Memorial Avenue and Lurline Street
- Northbound traffic from Picnic Parade heading east onto Maitland Bay Drive eastbound – would potentially use Ocean View Road, Memorial Avenue, Bourke Road and Barrenjoey Road
- Westbound traffic from Maitland Bay Drive heading south to join Picnic Parade – would potentially use Lurline Street, Memorial Avenue and Fassifern Street
- Eastbound traffic from Maitland Bay Drive heading south to join Picnic Parade – would potentially use Barrenjoey Road, Bourke Road, Memorial Avenue and Ocean View Road.

Any temporary closure of Picnic Parade and associated detours would be implemented in consultation with Central Coast Council, and potentially affected people would be notified in advance (for example by letterbox drop for residences and variable message sign for road users). An adequate traffic management plan would be in place.

Access to bus stops 2257186 and 2257258 on Picnic Parade near Flathead Road would be retained.

## 3.4 Ancillary facilities

A construction compound (with an area about 1300 square metres) would be established within the northern part of Ettalong Oval (refer to Figure 1-2). The subject area would be used for the following during construction:

- Site office
- Worker amenities
- Equipment and materials storage
- Temporary stockpiling.

The compound would be accessed either from Maitland Bay Drive, with left in left out movements only, or from Picnic Parade.

## 3.5 Public utility adjustment

Several public utility adjustments would be implemented in consultation with the relevant asset owner as described in Table 3-3. Consultation with asset owners is occurring as part of the design development process.

Table 3-3: Public utility adjustments

Design aspect	Asset owner	Proposed works
450-millimetre water main	Central Coast Council	Relocate 450-millimetre water main out of carriageway, avoiding roundabout to follow the south-eastern road kerb before crossing Picnic Parade further to the south and then following the south-western kerb before connecting to the existing pipe.
100-millimetre water main	Central Coast Council	Protect 100-millimetre water main in Picnic Parade during construction.
250-millimetre rising sewer main	Central Coast Council	Relocate 250-millimetre sewer rising main next to the realigned 450-millimetre water main running along the south-western road kerb line, with a minimum offset of one metre between the water and sewer mains.
150-millimetre sewer main	Central Coast Council	Protect and ensure adequate cover of 150-millimetre gravity sewer main crossing Picnic Parade.
Telstra and NBN	Telstra / NBN	Protect and ensure adequate cover of assets crossing Picnic Parade.
Street lights	Ausgrid	Remove and replace two existing street light/power poles out of the proposed roadway to southern corners of the intersection. Provide three additional street lights.

## 3.6 Property acquisition

Property acquisition would be required for a portion of the north-east corner of Ettalong Oval as described in Table 3-4 and as shown by Figure 3-7.

Table 3-4: Proposed property acquisition

Area ID	Description	Total area	Acquisition type	Current owner	Lot and DP	Land use zone (LEP)
1	Ettalong Oval (part)	About 230 square metres	Partial	Central Coast Council	Part Lot 6 DP831210	RE1 – public recreation



- Construction boundary
- Proposed acquisition

0 5 10 20 30 40 Meters

Figure 3-7: Proposed acquisition of portion of Ettalong Oval.

## 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 proposal is for a road and is to be carried out by Roads and Maritime, it can be assessed under Division 5.1 of the EP&A Act 1979. Development consent from Council is not required.

The proposal 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, 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 chapter 5 of this REF.

##### ***State Environmental Planning Policy 19 – Bushland in Urban Areas***

State Environmental Planning Policy 19 – Bushland in Urban Areas (SEPP 19) aims to protect and preserve bushland within certain urban areas as part of the natural heritage or for recreational, educational and scientific purposes.

SEPP 19 applies to the Central Coast local government area and requires development consent for the disturbance of bushland zoned or reserved for public open space purposes. While the proposal would affect a small portion of Ettalong Oval, which is zoned RE1 Public Recreation under the Gosford Local Environmental Plan 2014, no bushland would be affected within that zone. Development consent under SEPP 19 is therefore not required.

##### ***State Environmental Planning Policy 44 – Koala Habitat Protection***

State Environmental Planning Policy 19 – Koala Habitat Protection (SEPP 44) aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline. SEPP 44 applies to a range of local government areas including Central Coast.

Part 2 of SEPP 44 regulates impact on koala habitats. While it strictly only applies to proposals being assessed under Part 4 of the EP&A Act, as a matter of practice Roads and Maritime considers SEPP 44 as part of the Division 5.1 assessment process.

The biodiversity assessment (included in Appendix F) identified one Koala feed tree species listed by Schedule 2 of SEPP 44 at the proposal site (Tallowwood – *Eucalyptus microcorys*). However, as feed trees do not constitute at least 15 per cent of the total number of trees in the upper or lower strata of the tree

component, vegetation at the site does not constitute potential Koala habitat within the meaning of SEPP 44.

## 4.1.2 Local Environmental Plans

### **Gosford Local Environmental Plan 2014**

Land use and development within this part of the Central Coast local government area is primarily regulated by the Gosford Local Environmental Plan 2014 (Gosford LEP).

The proposal site is zoned as follows under the Gosford LEP:

- SP2 Infrastructure (covers Maitland Bay Drive)
- RE1 Public Recreation (covers Ettalong Oval and the Blackwall Mountain area to the north)
- R1 General Residential (covers Picnic Parade and the residential area to the south-east).

Development for the purpose of roads is permitted with development consent in all the affected zones under the Gosford LEP. As noted in Section 4.1.1, the ISEPP operates to remove consent requirements and/or prohibitions that would otherwise apply.

The consistency of the proposal with the objectives of the affected zones is considered in Table 4-1.

Table 4-1: Consistency with relevant Gosford LEP zone objectives

<b>Zone</b>	<b>Objectives</b>	<b>Comment</b>
SP2	<ul style="list-style-type: none"> <li>• To provide for infrastructure and related uses.</li> <li>• To prevent development that is not compatible with or that may detract from the provision of infrastructure.</li> <li>• To ensure that development is compatible with the desired future character of the zone.</li> </ul>	The proposal involves improvements to the safety and efficiency of public roads and therefore directly supports the first SP2 zone objective.
RE1	<ul style="list-style-type: none"> <li>• To enable land to be used for public open space or recreational purposes.</li> <li>• To provide a range of recreational settings and activities and compatible land uses.</li> <li>• To protect and enhance the natural environment for recreational purposes.</li> <li>• To identify areas suitable for development for recreation, leisure and cultural purposes.</li> <li>• To ensure that development is compatible with the desired future character of the zone.</li> </ul>	The proposal would involve the acquisition of about 230 square metres of RE1 zoned land. The acquisition is small relative to the area of Ettalong Oval overall (about 0.81 per cent of the total area of 28,800 square metres) and would not compromise recreational uses. Landscape treatment along the new boundary would maintain or enhance visual amenity.
R1	<ul style="list-style-type: none"> <li>• To provide for the housing needs of the community.</li> <li>• To provide for a variety of housing types and densities.</li> </ul>	Picnic Parade is currently within the R1 zone. Given its limited scope and confinement to the existing public road reserve, the proposal

Zone	Objectives	Comment
	<ul style="list-style-type: none"> <li>• To enable other land uses that provide facilities or services to meet the day to day needs of residents.</li> <li>• To ensure that development is compatible with the desired future character of the zone.</li> <li>• To promote best practice in the design of multi dwelling housing and other similar types of development.</li> <li>• To ensure that non-residential uses do not adversely affect residential amenity or place demands on services beyond the level reasonably required for multi dwelling housing or other similar types of development.</li> </ul>	<p>would not compromise the achievement of the R1 zone objectives in the broader area.</p>

## 4.2 Other relevant NSW legislation

### 4.2.1 Protection of the Environment Operations Act 1997

Part 3.2 of the POEO Act requires an environmental protection licence for scheduled development work and the carrying out of scheduled activities (as set out in Schedule 1 of the POEO Act), which includes road construction. The proposal does not trigger these requirements.

Section 148 of the POEO Act requires immediate notification of pollution incidents causing or threatening material harm to the environment to each relevant authority. An Incident Management Plan would be included in the environmental management documentation for the proposal, to be prepared during the detailed design phase.

### 4.2.2 Heritage Act 1977

An excavation permit is required to disturb or excavate any land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed. A permit is also required to disturb or excavate any land on which the person has discovered or exposed a relic. Relics are not expected to be affected by the proposal (refer to Section 6.8) and an unexpected find procedure would be documented in the Construction Environmental Management Plan (written at detailed design phase) and implemented during construction.

### 4.2.3 National Parks and Wildlife Act 1974

The harming or desecrating of Aboriginal objects or places is an offence under Section 86 of the *National Parks and Wildlife Act 1979*. Under Section 90, an Aboriginal heritage impact permit may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons. Aboriginal objects and/or places are not expected to be affected by the proposal (refer to Section 6.7) and an unexpected find procedure

would be documented in the Construction Environmental Management Plan (written at detailed design phase) and implemented during construction.

#### 4.2.4 Biodiversity Conservation Act 2016

The Biodiversity Conservation Act 2016 (BC Act) seeks to conserve biological diversity and promote ecologically sustainable development; to prevent extinction and promote recovery of threatened species, populations and ecological communities; and to protect areas of outstanding biodiversity value.

The BC Act provides a listing of threatened species, populations and ecological communities, areas of outstanding biodiversity value, and key threatening processes.

Part 7 of the BC Act requires that the significance of the impact on threatened species, populations and endangered ecological communities listed under the BC Act or Fisheries Management Act 1994 (FM Act), are assessed using a five-part test. Where a significant impact is likely to occur, a Species Impact Statement or Biodiversity Development Assessment Report must be prepared in accordance with the Office of Environment and Heritage requirements.

An assessment of the potential impact on biodiversity is provided in Section 6.5.

#### 4.2.5 Water Management Act 2000

Potentially relevant *Water Management Act 2000* approval requirements are reviewed in Table 4-2.

Table 4-2: Water Management Act 2000 approvals

Provision	Application
Water access licences (s.56 & s.60A)	Exemption for roads authorities in relation to in water required for road construction and road maintenance under clause 21 and Schedule 4 of the Water Management (General) Regulation 2018.
Water use approval (s.89 & s.91A)	Exemption for roads authorities in relation to in water required for road construction and road maintenance under clause 34 and Schedule 5 of the Water Management (General) Regulation 2018.
Water supply work approval	Water supply work approval required (for dewatering of excavations)
Controlled activity approval Required for carrying out controlled activities including works on waterfront land (s.91 and s.91E)	Exemption in clause 41 of the Water Management (General) Regulation 2018.

#### 4.2.6 Roads Act 1993

Section 138 of the *Roads Act 1993* requires consent from the relevant roads authority for the erection of a structure, or the carrying out of work in, on or over a public road, or the digging up or disturbance of the surface of a road. Under this provision, a road occupancy licence would be needed for lane closures on Maitland Bay Drive / Picnic Parade.

## 4.3 Commonwealth legislation

### 4.3.1 Environment Protection and Biodiversity Conservation Act 1999

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

A referral is not required for proposed road activities 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 Chapter 6 of the REF and Appendix A.

#### ***Findings – matters of national environmental significance***

The assessment of the proposal's impact on matters of national environmental significance and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant matters of national environmental significance or on Commonwealth land. Accordingly, the proposal has not been referred to the Australian Government Department of the Environment and Energy under the EPBC Act.

#### ***Findings – nationally listed biodiversity matters (where the strategic assessment applies)***

The assessment of the proposal's impact on nationally listed threatened species, endangered ecological communities and migratory species found that there is unlikely to be a significant impact on relevant matters of national environmental significance. Chapter 6 of the REF describes the safeguards and management measures to be applied.

## 4.4 Confirmation of statutory position

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

Roads and Maritime is the determining authority for the proposal. This REF fulfils Roads and Maritime's obligation under Section 5.5 of the EP&A Act including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

## 5. Consultation

### 5.1 Consultation strategy

The consultation strategy for the proposal involves several engagement tools which would be used to consult with the community and identified stakeholders. These include:

- Project notifications and project updates for nearby residents, businesses and stakeholders
- Door-knocking nearby residents and businesses
- Meetings and briefings for stakeholders, businesses and residents (as required)
- Letters, emails, social media posts and targeted correspondence
- Updates on the Roads and Maritime website: [www.rms.nsw.gov.au/projects](http://www.rms.nsw.gov.au/projects)

The REF will be displayed on the Roads and Maritime website. A community update will be letterbox dropped to residents and businesses, and additional stakeholders will receive the community update with a covering email/letter.

### 5.2 Community involvement

Roads and Maritime invited community feedback on the proposal in November 2018. A total of 42 submissions were received from the community focusing on issues such as the cost, improvements to other roads outside the scope of the project and Roads and Maritime responsibilities, the proposed design and why traffic lights are not proposed.

The Community Consultation Summary available on the Roads and Maritime website provides a summary of the issues raised and the Roads and Maritime response to those issues.

### 5.3 Aboriginal community involvement

The proposal has been considered against the requirements of the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) (Roads and Maritime Services, 2011). This procedure is generally consistent with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (Department of Environment, Climate Change and Water, 2010). An outline of the procedure is presented in Table 5-1.

Table 5-1: Summary of Procedure for Aboriginal Cultural Heritage Consultation and Investigation

Stage	Description
Stage 1	Initial Roads and Maritime assessment
Stage 2	Site survey and further assessment
Stage 3	Formal consultation and preparation of a cultural heritage assessment report
Stage 4	Implement environmental impact assessment recommendations

Roads and Maritime has determined that it is not necessary to proceed beyond Stage 1 of the PACHCI. A site walkover with representatives from Darkinjung Local Aboriginal Land Council occurred on 21 August 2019 (see Section 6.7 for further details).

## 5.4 ISEPP consultation

Central Coast Council and the NSW State Emergency Service have been consulted about the proposal as per the requirements of clauses 13 (council infrastructure and services), 15 (flood liable land – council) and 15AA (flood liable land – State Emergency Services) of the ISEPP. Appendix B contains an ISEPP consultation checklist that documents how ISEPP consultation requirements have been considered.

Central Coast Council responded on 3 May 2019 raising no objections to the proposal and indicating that the current design approach is appropriate. Council acknowledged that they had been (and will continue to be) consulted as part of the planning process for the proposal.

The response from the NSW State Emergency Service raised no concerns regarding the proposal.

## 5.5 Government agency and stakeholder involvement

Specific consultation with government agencies in addition to that described in Section 5.4 has not occurred during the preparation of the concept design and environmental assessment. Consultation with identified agencies and stakeholders would occur as needed during the detailed design and delivery of the proposal.

The following consultation with utility providers has occurred as part of and has informed the design development process:

- Ausgrid – correspondence regarding street lighting design
- Central Coast Council – site meeting and correspondence regarding water and sewer relocations, including as well as minimum cover requirements
- NBN Co – correspondence regarding impacts on underground assets
- Telstra – site meeting and correspondence regarding impacts on underground assets
- Optus – correspondence regarding impacts on underground assets (housed in Telstra conduits).

## 5.6 Ongoing or future consultation

This REF will be placed on public exhibition for stakeholder and community comment. All comments received will be considered when finalising the proposal design. The community would be kept informed of any further changes to the proposal resulting from this and any future consultation process.

Following the public display of the REF, all comments received would be recorded and addressed in a submissions report detailing how each issue raised would be considered in finalising the proposal design. The Submissions Report would be made available to the public on the project webpage on the Roads and Maritime website.

If the proposal is approved, ongoing consultation activities would occur with the affected community including nearby landholders, businesses and road users during construction. Ongoing communications and notifications may include:

- Community/construction updates
- Media announcements
- NSW LiveTraffic updates and social media updates
- Stakeholder meetings as required
- Web page updates
- Work notification letters (as required).

## 6. Environmental assessment

This section of the REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposal. All aspects of the environment potentially impacted by the proposal are considered. This includes consideration of:

- Potential impacts on matters of national environmental significance under the EPBC Act
- The factors specified in the guidelines ‘Is an EIS required?’ (Department of Planning, 1995) as required under clause 228(1) of the Environmental Planning and Assessment Regulation 2000 and the Roads and Related Facilities EIS Guideline (Department of Urban Affairs and Planning, 1996). The factors specified in clause 228(2) of the Environmental Planning and Assessment Regulation 2000 are also considered in Appendix A.

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

### 6.1 Traffic and Transport

This chapter describes the existing traffic and transport conditions on the Maitland Bay Drive and the local road network, and identifies the potential impact to those conditions as a result of the construction and operation of the proposal and assesses the impact. The Traffic and Transport Assessment (Appendix C) has been used to inform this chapter.

#### 6.1.1 Methodology

The traffic and transport assessment has used traffic modelling (with SIDRA 8 software) to develop a comprehensive assessment of both the ‘do nothing’ and upgrade scenarios during both construction and operation. For construction, modelling was carried out for the AM and PM peak periods. The operational traffic scenarios assessed are identified in Table 6-1.

Table 6-1: Operational traffic modelling scenarios

Year	Base			Upgrade		
	Weekday		Saturday	Weekday		Saturday
	AM	PM	Midday	AM	PM	Midday
2019	Yes	Yes	Yes	No	No	No
2029	Yes	Yes	Yes	Yes	Yes	Yes
2039	Yes	Yes	Yes	Yes	Yes	Yes

The performance of the base case (without proposal) and the proposal under each scenario was assessed by reference to Level of Service. The Level of Service is the standard measure used to assess the operational performance of the network and intersections. Level of Service is ranked from A to F, with Level of Service A representing the best performance and Level of Service F the worst. Table 6-2 describes the Level of Service rankings.

Table 6-2: Level of Service rankings

Level of Service	Average delay per vehicle (seconds)	Traffic signals, roundabouts	Give way, stop sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; incidents would cause excessive delays at signals. Roundabouts require other control modes.	At capacity, requires other control mode
F	Greater than 70	Over capacity; unstable operation	Over capacity; unstable operation

Potential impacts on public transport (buses), pedestrians and cyclists were also considered as part of the traffic and transport assessment.

## 6.1.2 Existing environment

### **Existing intersection configuration and road hierarchy**

The current intersection configuration is generally known as a 'seagull intersection'. This includes a right turn slip lane (which vehicles use from Maitland Bay Drive west turning south onto Picnic Parade), and the right turn acceleration lane (which vehicles use from Picnic Parade turning eastbound onto Maitland Bay Drive).

Maitland Bay Drive near Picnic Parade is signposted with a 70 kilometre per hour speed limit, while Picnic Parade has a 50 kilometre per hour speed limit, which is the default speed limit for a built-up urban area.

Maitland Bay Drive is classified under the *Roads Act 1993* as Main Road 349 and runs over the Rip Bridge towards the northern suburbs of the Central Coast. Picnic Parade is an unclassified local road.

Maitland Bay Drive and Picnic Parade are not designated routes for restricted access vehicles (any vehicle which exceeds the overall dimensions of vehicles as defined in the Heavy Vehicle National Law).

### **Existing traffic volumes and patterns**

Traffic counts and an intersection survey were carried out in May 2019. The detailed results of the counts and the survey are included in Appendix C.

Overall, the traffic counts and survey show that the proposal site typically experiences a standard AM and PM peak on weekdays of about 1,600 vehicles per hour. Saturday has only one peak hour around midday, but it is busier than the weekday peaks. The intersection count surveys show up to 180 vehicles per hour turn right from Picnic Parade into Maitland Bay Drive, which is a potentially hazardous movement given the

requirement to give way to westbound through traffic (700 vehicles per hour) and right turn from Maitland Bay southbound into Picnic Parade (116 movements per hour).

### ***Parking***

There is no parking available on Maitland Bay Drive near the proposal site. Parallel kerbside parking is permitted on the eastern side of Picnic Parade, and an informal unsealed parking area exists on the western side of Picnic Parade, which provides parking for Ettalong Oval. There is also parking on the south-east leg of the study intersection which provides parking for Kitchener Park. In total, there are about 100 unrestricted parking spaces immediately surrounding the proposal site.

Periodic observations of parking demand between May 2014 and March 2019 shows that overall, parking supply far exceeds demand with a median occupancy of 12 vehicles across 17 observation days. There was one day (13 November 2016) where parking was close to full occupancy (approximately 86 per cent); otherwise, the next highest parking demand was approximately 24 per cent (11 October 2014).

### ***Cycling and pedestrian infrastructure***

There are no footpaths on Maitland Bay Drive and the most northern part of Picnic Parade, while footpaths are generally provided south of Flathead Road.

Maitland Bay Drive has sealed road shoulders about 1.2 to 1.5 metres wide in each direction. In an eastbound direction, at Memorial Avenue, the shoulder is signed as a bicycle lane.

Maitland Bay Road and Picnic Parade are designated as having a 'moderate' level of difficulty by the Roads and Maritime Cycleway Finder site.

### ***Public transport***

The local bus network provides three options through the proposal site; these are:

- Route 59 – Woy Woy – Wagstaffe via Ettalong Beach and Booker Bay
- Route 64 – Gosford – Kincumber – Woy Woy via Empire Bay and Booker Bay
- Route 5364 – Woy Woy – Kincumber via Ettalong and Empire Bay.

All routes run from the Woy Woy town centre south along Blackwall Road, looping around Booker Bay Road, Ettalong Beach and then heading north along Picnic Parade. When they get to the subject intersection, they turn onto Maitland Bay Drive and head east over The Rip Bridge and on to Empire Bay. Route 64 travels north to Gosford CBD via Kincumber and Greens Point.

There are two stops next to the study intersection for north and south services next to Ettalong Oval on Picnic Parade, and two more southbound towards Ettalong Beach, near the local centre. Woy Woy station can be reached via the westbound services.

Route 59 only operates five services per weekday (outbound from Woy Woy) (with three of these services truncated in some way), and two services on Saturday, and no services on Sunday. Route 64 is a relatively more frequent service, with 23 services per weekday (outbound from Woy Woy), generally with an hourly service, increasing to a half hourly service during peak periods, 18 services on Saturday with an hourly frequency and eight services on Sunday with a 2-hour frequency. Route 5364 only operates one service per day on weekdays departing Woy Woy at 21:40 hours and arriving in Kincumber at 10:23 hours.

### ***Crash analysis***

Roads and Maritime crash data for the five years between 2013 and 2017, five crashes were recorded at the intersection. Table 6-3 provides a summary of the crash data.

Table 6-3: Summary of crash data – 2013 to 2017

Year	Type of crash	Injuries	Time of day
2013	Right near	Minor/other Injury	Day
2014	Rear-end	Non casualty	Day
2014	Pedestrian on far side	Moderate injury	Day
2015	Right near	Minor/other Injury	Day
2016	Other, same direction	Moderate injury	Day

### 6.1.3 Potential impacts

#### **Construction**

##### Traffic efficiency

There is the potential for some delays to traffic on both Maitland Bay Drive and Picnic Parade. Construction staging would be refined to minimise delays and traffic control under a traffic management plan would be required. Short-term (overnight) closures of Picnic Parade and associated detour arrangements (see Section 3.3.6), should they be required, may also result in minor increases in travel time.

##### Pedestrians and cyclists

Pedestrians and cyclist access through the proposal site would be maintained during construction. Pedestrians and cyclists may experience some small delays resulting from minor diversions or directives from traffic controllers.

##### Public transport

During peak periods buses are likely to be affected similarly to general traffic. At other times, buses generally run at a frequency no greater than two per hour, and it is expected that construction would have a negligible impact on the operation of these services.

Traffic management arrangements during construction would be designed to ensure buses can satisfactorily make the right turn from Picnic Parade to Maitland Bay Drive.

##### Emergency vehicles

An ambulance facility is located on Ocean View Road near Picnic Parade while emergency vehicles from Umina Fire and Rescue could also use Maitland Bay Drive.

Impacts on emergency service vehicles are expected to be minor provided ongoing consultation occurs, and a traffic management plan is implemented. Traffic management arrangements during construction would be designed to ensure larger NSW Fire and Rescue vehicles can negotiate the intersection during construction.

##### Parking

During construction, there would be loss of up to about 20 parking spaces in the car park on the south-east corner of the intersection. Further spaces would be lost on the eastern and western side of Picnic Parade between Maitland Bay Drive and Flathead Road. The analysis of parking supply and demand in Section 6.1.2 suggests that this temporary loss of parking will not significantly affect people's ability to find parking in the locality, including for activities at Ettalong Oval and Kitchener Park.

## Operation

### Intersection performance

The proposal is expected to improve traffic flow and reduce average delays at the intersection. Table 6-4 shows the modelling results for 2029 and 2039 without the proposal, while Table 6-5 shows the results with the proposal (excluding the operation of the car park).

Table 6-4: Future 2029 and 2039 do nothing scenario modelling results

Parameter	2019 existing			2029 do nothing			2039 do nothing		
	AM	PM	Sat	AM	PM	Sat	AM	PM	Sat
Level of service	C	B	B	C	B	B	D	C	D
Avg delay (sec)	31	22	19	39	27	24	46	43	47

Table 6-5: Future 2029 and 2039 proposal scenario modelling results

Parameter	2019 existing			2029 proposal			2039 proposal		
	AM	PM	Sat	AM	PM	Sat	AM	PM	Sat
Level of service	C	B	B	A	A	A	A	A	B
Avg delay (sec)	31	22	19	12	13	13	12	14	15

The above tables show that most significant improvement for the overall intersection is in the AM peak and PM peak periods in 2029 and 2039. With the proposal, there would be some increase in queue lengths for traffic on Maitland Bay Drive.

Traffic modelling was also conducted to assess the performance of the intersection with the proposed new car park access in operation. The modelling identified minimal impact on the overall performance of the roundabout and that the turning lanes for the car park can accommodate expected traffic demand.

### Pedestrians and cyclists

The new shared path connections and pedestrian refuge on the southern leg of the intersection would improve connectivity and safety for pedestrians and cyclists. The design does require on-road cyclists to merge with traffic before entering the roundabout; however, lane widths are sufficient to allow this to occur safely.

### Public transport

Customers using outbound buses are expected to benefit from improved reliability due to reduced delays for right turn movements from Picnic Parade to Maitland Bay Drive.

### Parking

With the formalisation of parking (by marking of spaces) in the car park on the south-east corner of the intersection and reinstatement of parking on Picnic Parade, there is not expected to be a net loss of parking following the completion of works.

## 6.1.4 Safeguards and management measures

Table 6-6: Traffic and transport environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	<p>A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Roads and Maritime <i>Traffic Control at Work Sites Manual</i> (RTA, 2010) and <i>QA Specification G10 Control of Traffic</i> (Roads and Maritime, 2008). The TMP will include:</p> <ul style="list-style-type: none"> <li>• confirmation of haulage routes</li> <li>• measures to maintain access to local roads and properties</li> <li>• site-specific traffic control measures (including signage) to manage and regulate traffic movement</li> <li>• measures to maintain pedestrian and cyclist access</li> <li>• requirements and methods to consult and inform the local community of impacts on the local road network</li> <li>• access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads.</li> <li>• a response plan for any construction traffic incident</li> <li>• consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic monitoring, review and amendment mechanisms</li> <li>• detour routes for any short-term closures of Picnic Parade.</li> </ul>	Contractor	Pre-construction	Section 4.8 of QA G36 Environment Protection
Emergency services vehicles and buses	Traffic management measures will be implemented to ensure emergency services vehicles and buses can negotiate the intersection during construction.	Contractor	Construction	Additional measure
Emergency services vehicles	Brisbane Water Ambulance and Umina Fire and Rescue will be kept informed of construction activities and any relevant changes to traffic management arrangements.	Contractor	Construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
Temporary loss of parking	Alternative parking arrangements, particularly during events at Ettalong Oval / Kitchener Park, will be communicated to affected people in consultation with Central Coast Council.	Roads and Maritime project manager	Construction	Additional measure

## 6.2 Landscape character and visual impacts

This chapter describes the existing visual environment and considers landscape character and visual impacts during construction and operation of the proposal. The Urban Design Vision, Objectives and Principles Report (Appendix D) has been used to inform this chapter.

The urban design objectives for the proposal are identified in Section 2.3.3.

### 6.2.1 Methodology

The landscape character and visual impact assessment for the proposal was prepared in accordance with the environmental impact assessment practice note EIA-N04: Guidelines for landscape character and visual impact assessment (Roads and Maritime Services, 2018).

The guidelines establish an assessment process with reference to the sensitivity of an area and magnitude of the proposal in that area. This rating matrix is shown in Figure 6-1.

		MAGNITUDE			
		HIGH	MODERATE	LOW	NEGLIGIBLE
SENSITIVITY	HIGH	HIGH	HIGH - MODERATE	MODERATE	NEGLIGIBLE
	MODERATE	HIGH - MODERATE	MODERATE	MODERATE - LOW	NEGLIGIBLE
	LOW	MODERATE	MODERATE - LOW	LOW	NEGLIGIBLE
	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE

Figure 6-1: Landscape character and visual impact assessment matrix

#### **Landscape character assessment**

The landscape character assessment determines the impact of the proposal on the areas character and sense of place by:

- Identifying the sites landscape character zones
- Assessing how sensitive the landscape character zones are to the proposed changes and the capacity to absorb change
- Assessing the magnitude of change
- Providing an overall assessment based on the measures of sensitivity and magnitude, as shown in Figure 6-1.

A set of criteria was applied to ensure a consistent rating and is detailed in Appendix D.

#### **Visual impact assessment**

The visual impact assessment determines the impact of the proposal on key existing views by:

- Selecting the key views within the visual catchment
- Assessing how sensitive the views are considering the capacity to absorb change, type and number of viewers and length of exposure to that view
- Identifying changes to each view as a result of the proposal
- Assessing the magnitude of change
- Providing an overall assessment based on the measures of sensitivity and magnitude, as shown in Figure 6-1.

## 6.2.2 Existing environment

### ***Landscape character zones***

Two landscape character zones were identified as applying to the proposal site. These zones are shown on Figure 6-2.

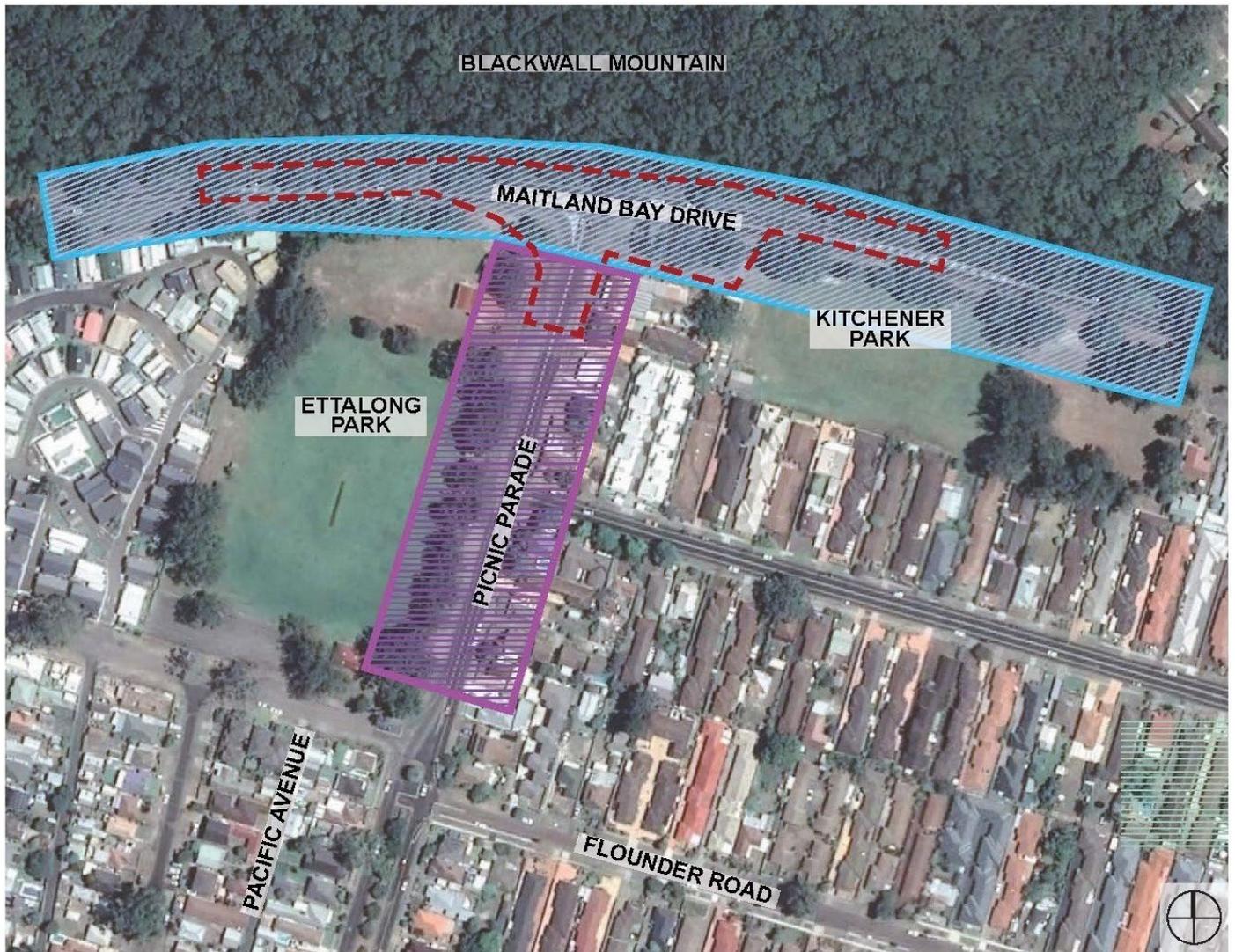
Landscape character zone 1 is located along Maitland Bay Drive. This zone is enclosed by vegetation and dominated by the steep and densely vegetated Blackwall Mountain to the north of Maitland Bay Drive. The landscape to the north has a high level of sensitivity that is reduced by the transition to the carriageway of Maitland Bay Drive, the road barrier and the drainage swale.

The landscape to the north contrasts with the flat and open landscape to the south. The landscape of the southern verge is degraded and cluttered with a mix of elements.

The overall sensitivity of landscape character zone 1 is low.

Landscape character zone 2 is located along Picnic Parade. This zone is very open and flat with housing located to the east of Picnic Parade and a wide gravel verge to the west separated from the adjacent park by a single row of mature trees.

The sensitivity of landscape character zone 2 is low due to its lack of cohesiveness, large amount of space and degraded state.



#### LEGEND

- - - Site boundary
- ▨ Landscape Character Zone 1 - Maitland Bay Drive
- ▨ Landscape Character Zone 2 - Picnic Parade

Figure 6-2: Landscape character zones

### Views

Views of the proposal would be available from within the road corridor, on the private property immediately adjacent to the proposal and from surrounding parks.

Three key views were selected within the visual catchment (also refer to Figure 6-3):

- View 1 – Kitchener Park Car Park looking west along Maitland Bay Drive. Viewers include motorists and cyclists. This view has a total sensitivity of moderate.
- View 2 – Picnic Parade private houses looking towards the intersection. Viewers include pedestrians and residents/visitors. This view has a total sensitivity of moderate
- View 3 – Off the leash dog area within Ettalong Oval looking toward Picnic Parade. Viewers include pedestrians. This view has a total sensitivity of moderate.



Figure 6-3: Visual envelop map including viewpoints

## 6.2.3 Potential impacts

### Construction

The proposal would result in a temporary visual impact on the road corridor as a result of construction activities. The viewpoints for road users, residential properties adjoining the site and users of nearby parks would be impacted by:

- Compound facilities and stockpile/material storage
- Construction plant and equipment
- Temporary safety barriers and traffic control equipment including signage

- Temporary construction lighting.

The temporary impacts on visual amenity as a result of the construction activities would be confined to the road corridor and immediately adjacent areas. Following the completion of construction, the impacts associated with construction equipment and facilities would be removed and disturbed areas restored in accordance with the urban design principle of the proposal (refer Appendix D).

### **Operation**

Without appropriate mitigation, the proposal would result in long-term impacts on the landscape character and viewpoints of the proposal site following completion.

The proposal would have a moderate impact on landscape character zone 1 – Maitland Bay Drive. This would be the result of an increased gap in the southern tree line, reducing the canopy enclosure around the intersection. The proposal would maintain the wide open verges on the south side of the road, and there would be minimal change to the footprint of the adjacent car park or the northern verge of the road beyond the existing barrier.

The proposal would have a low impact on landscape character zone 2 – Picnic Parade. The proposal would result in negligible impacts from the removal of some vegetation at the intersection with Maitland Bay Drive and widening of the intersection. The changes would mainly be at or below eye level in a small area. The proposal would enhance the open nature of this zone.

The visual impact on views 1 and 2 was assessed as moderate. Impacts would include removal of the southern street trees which would open up the view to and from the road, increases to hard surfacing and formalising of the southern road edge which would contrast more with the natural views to the north.

The visual impact on view 3 was also assessed as moderate due to removal of the verge side planting and increased visibility of the road and intersection and the reduction in green space. The changes to the view consist of cutting back the corner of the park, removing existing trees and the inclusion of a new shared path.

Landscape character and visual impacts would be mitigated through the implementation of an Urban Design Plan, which will build on the urban design concept (see 6.2.4) and will include replacement plantings.

## **6.2.4 Urban design concept**

The urban design concept for the proposal responds to identified site constraints/issues and seeks to implement the urban design principles identified in Section 2.3.3. The urban design concept is illustrated by and includes:

- Improved pedestrian connections through the provision of shared paths that connect to the adjacent parks and car parks, a formal crossing point with an island refuge on Picnic Parade and a link path to the Scout Hall.
- Use of robust, low maintenance material that match the existing site and surrounding conditions, including:
  - Dog park fence – chain link fence to match the existing fence
  - Paths – Grey broom finished concrete
  - Shared paths – Buff coloured concrete to match the existing shared paths in the area
  - Medians – median and roundabout infill concrete to match the existing coloured stencilled concrete roundabouts near the proposal site
  - Car park – existing asphalt with new line marking and wheel stops

- Replacement plantings to match existing species provided at a rate of two trees for every one tree removed
- Planting of low height and low maintenance native grasses and groundcovers on the roadside verge within the clear zone to create a soft green edge, while maintaining clear sight lines.

## 6.2.5 Safeguards and management measures

Table 6-7: Visual and landscape environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Landscape character and visual impact	<p>An Urban Design Plan (including detailed urban design drawings and landscape plans) will be prepared to support the final detailed project design.</p> <p>The Urban Design Plan will present an integrated urban design for the project, providing further practical detail on the application of design principles and objectives identified in this REF. The Plan will build on the urban design concept described in this chapter and confirm design treatments for:</p> <ul style="list-style-type: none"> <li>• location and identification of existing vegetation and proposed landscaped areas, including species to be used</li> <li>• pedestrian and cyclist elements including footpath location, paving types and pedestrian crossings</li> <li>• details of the staging of landscape works taking account of related environmental controls such as erosion and sedimentation controls and drainage</li> <li>• procedures for monitoring and maintaining landscaped or rehabilitated areas.</li> </ul> <p>The Urban Design Plan will be prepared in accordance with relevant guidelines, including:</p> <ul style="list-style-type: none"> <li>• Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014)</li> <li>• Landscape Guideline (Roads and Maritime Services, 2019).</li> </ul>	Roads and Maritime	Detailed design	Standard measure
Visual impact during construction	An Ancillary Facilities Plan will be prepared and will include a layout of compound/storage areas to maximise screening and minimise visual impact. Routine inspections will be conducted to ensure that sites are maintained in a clean state.	Contractor	Construction	Additional measure
Visual impact	Following the completion of construction works, plant/equipment will be removed, and disturbed	Contractor	Construction	Additional measure

<b>Impact</b>	<b>Environmental safeguards</b>	<b>Responsibility</b>	<b>Timing</b>	<b>Reference</b>
during construction	areas will be revegetated, turfed or otherwise restored as appropriate.			
Visual impact during construction	Replacement plantings will be provided at a 2:1 ratio and opportunities for early plantings outside the road corridor would be reviewed in consultation with Central Coast Council.	Contractor Roads and Maritime	Construction	Additional measure
Impact from lighting	Temporary site lighting will be installed and operated in accordance with AS4282:1997 Control of the Obtrusive Effect of Outdoor Lighting, and an approved Traffic Management Plan.	Contractor	Construction	Additional measure

## 6.3 Noise and vibration

This chapter describes the existing noise environment, identifies noise sensitive receivers and assesses the potential construction and operation noise and vibration impacts of the proposal. The Operational, Construction Noise and Vibration Assessment (Appendix E) has been used to inform this chapter.

### 6.3.1 Methodology

The assessment methodology for the noise and vibration impact involved:

- Identifying and classifying sensitive receivers. Receivers were classified using a combination of recent aerial and ground photography, web-based information sources and cadastral data, site inspection.
- Carrying out background noise monitoring to identify existing noise levels. Background noise was measured at 2A Picnic Parade, Ettalong, using a calibrated, industry standard, Type 1 noise logger.
- Validation of noise models using noise logger
- Establishing proposal specific construction noise management levels in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009).
- Modelling of construction noise using construction sound power levels as per the Roads and Maritime Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) and construction scenarios which assume worst-case scenarios for construction activities, such as sources operating concurrently, minimum offset distances between source and receiver and no mitigation measures
- Modelling of operational road traffic noise using the Calculation of Road Traffic Noise (CoRTN) method, which is widely accepted in Australia.
- Assessment of construction and operational noise predictions against applicable criteria
- Identification of feasible and reasonable environmental management measures.

### 6.3.2 Existing environment

Noise sensitive receivers near the proposal site are primarily residential with several active and passive recreational areas located to the south of the proposal site. Figure 6-4 shows the receivers considered as part of the noise assessment while the main receiver groups are identified below:

- Ettalong Oval (active recreation)
- Kitchener Park (active recreation).
- Residential receivers on Mullbong Road to the north-east of the proposal site
- Residential receivers on Regatta Drive and Mountain View Circuit to the west of the proposal site (the 'Ingenia Lifestyle' retirement community)
- Residential receivers Picnic Parade and Flathead Road to the south east of the proposal site



Figure 6-4: Noise sensitive receivers

Observations at the proposal site identified the surrounding locality to typical of a suburban environment, with traffic noise the dominant audible noise source. Noise monitoring was conducted at 2A Picnic Parade from Friday 10 May 2019 to Tuesday 21 May 2019. The results are provided in Table 6-8.

Table 6-8: Background noise monitoring results

Location	Rating Background Level, dBA			LAeq, dBA		
	Day	Evening	Night	Day	Evening	Night
2A Picnic Parade	57	44	34	68	63	60

Note: Day 7am to 6pm, Evening 6pm to 10pm, Night 10pm to 7am

The monitored noise levels at 2A Picnic Parade are representative of the ambient noise environment of any property along an arterial or major road. The noise levels are controlled throughout the day and evening period due to passing road traffic. The noise levels are lower during the night period with levels representative of occasional traffic and general suburban hum.

### 6.3.3 Criteria

#### **Construction noise criteria**

Noise management levels (NMLs) for the proposal were established in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009). The guideline prescribes noise management goals for receivers. As a guide, construction noise for residential receivers should not exceed the background noise levels by more than 10 dB(A) during standard hours, and by more than 5 dB(A) out-of-hours (that is, for night-time work). The level of 75 dB(A) is identified as the point above which there may be a strong community reaction to construction noise.

The project specific NMLs for the sensitive receivers identified for the proposal are provided in Table 6-9.

Table 6-9: Project specific noise management levels

Period		NML (dBA)
Day	Monday to Friday (7am to 6pm), Saturday (8am to 1pm)	67
Evening (out of hours work period 1)	6pm to 10pm	49
Night (out of hours work period 2)	10pm to 7am	39
Sleep disturbance	NA	65

Noise management goals are also prescribed for non-residential receivers. Those relevant to the proposal are identified below:

- Active recreational areas (external) 65 dB(A) L<sub>Aeq</sub>(15min)
- Passive recreational areas (external) 60 dB(A) L<sub>Aeq</sub>(15min)

#### **Construction traffic noise criteria**

When construction related traffic moves onto the public road network, vehicle movements are regarded as additional road traffic and are assessed under the Road Noise Policy (RNP) (Department of Environment Climate Change and Water, 2011). An initial screening test is applied by evaluating if noise levels would

increase by more than 2 dB (an increase in the number vehicles of approximately 60 per cent) due to construction traffic or a temporary detour due to a road closure.

### Construction vibration criteria

As a guide, safe working distances for the proposed items of vibration intensive plant are provided in the Roads and Maritime Construction Noise and Vibration Guideline and Table 6-10.

Table 6-10: Recommended safe working distances for vibration intensive plant

Plant item	Rating / description	Safe working distances (metres)	
		Cosmetic damage	Human response
Vibratory roller	< 50 kN (Typically 1-2t)	5	15 to 20
	< 100 kN (Typically 2-4t)	6	20
	< 200 kN (Typically 4-6t)	12	4
	< 300 kN (Typically 7-13t)	15	100
	> 300 kN (Typically 13-18t)	20	100
	> 300 kN (Typically > 18t)	25	100
Small hydraulic hammer	300 kg - 5 to 12t excavator	2	7
Medium hydraulic hammer	900 kg - 12 to 18t excavator	7	23
Large hydraulic hammer	1600 kg - 18 to 34t excavator	22	73
Vibratory pile driver	Sheet piles	2 to 20	20
Pile boring	≤ 800 mm	2 (nominal)	4
Jackhammer	Hand held	1 (nominal)	Avoid contact with structure

### Operational road traffic noise criteria

The NSW Road Noise Policy (Department of Environment, Climate Change and Water, 2011) sets out road traffic noise criteria for residential land uses. These criteria are listed in Table 6-11.

Table 6-11 NSW Road Noise Policy residential land use criteria

Road type	Type of project/land use	Assessment criteria - dBA
Freeway / arterial / sub-arterial road	Existing residences affected by noise from redevelopment of existing freeway / arterial / sub-arterial roads	Day (7 am to 10 pm): 60 dB(A) $L_{Aeq}$ 15 hour
	Existing residences affected by additional traffic on existing freeways / arterial / sub-arterial roads generated by land use developments	Night (10 pm to 7 am): 55 dB(A) $L_{Aeq}$ 9 hour

Under the Noise Criteria Guideline (Roads and Maritime Services, 2015), the proposal is classified as minor work. The Noise Criteria Guideline states that the existing road criteria may be applied where minor work increases noise levels by more than 2.0 dB(A) relative to existing noise levels at the worst affected receiver. Where the total noise level for the 'build' year exceeds the criterion, and there is an increase of more than 2.0 dB(A) (i.e. 2.1 dB(A)), relative to the 'no-build' year, then the receiver qualifies for consideration of noise mitigation.

## 6.3.4 Potential impacts

### Construction noise

The results of the noise assessment show that noise levels during standard construction hours may exceed relevant NMLs on occasion at receivers near the proposal. Exceedances would also be expected for any works outside standard hours (evening or night periods). The results are summarised below in Table 6-12.

Table 6-12: Construction noise assessment – NML exceedances

Activity	Sound Power Levels, $L_{Aeq(15min)}$ , dBA	Receivers exceeding daytime NML	Receivers exceeding highly noise affected level	No. receivers exceeding night period* NML
1. Establishment of site compound	113	AR01 (scout hall), AR02 (Ettalong Oval)	-	37 (most work during day)
2. Vegetation removal	119	R06, R07, R08, R17, R18, R19, R21, R22, R23. AR01, AR02, AR03 and PR01	AR01, R17	54 (very short periods)
3. Utility relocation	115	AR01, PR01, R17 and R19	-	2
4. Milling of existing road surface	124	R01, R02, R03, R04, R05, R06, R07, R17, R18, R19, R22, R23, R24, AR1, AR2, AR03 and PR01	R01, R02, R03, R04, R05, R06, R17, R19, R22, R23, R24 and R19	All
5. Kerbing and roundabout construction	114	R01, R02, R03, R04, R05, R06, R17, R19, R22, R23 and R24	R02	All
6. Construction of new asphalt layers	120	R01, R02, R03, R04, R05, R06, R07, R17, R18, R19, R22, R23, R24, AR01, AR02, AR03 and PR01	R01, R02, R04, R05, R17 and R19	All
7. Line marking and installation of road furniture	1010	R02 (short periods only)	-	All except R27 (very short periods)

\* Monday to Friday – 10pm to 7am, Saturdays/Sundays – 6pm to 7am (8am on Sunday mornings)

The implementation of reasonable and feasible mitigation measures is expected to reduce the level of impact at receivers. Noise predictions taking into account mitigation are provided for standard hours and night time in Table 6-13 and Table 6-14 respectively. These are worst-case predictions and receivers would not experience these levels on an ongoing basis during construction.

Table 6-13: Construction noise assessment – noise predictions standard hours (dBA) – with mitigation

Receiver	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Activity 6	Activity 7
R01	27	34	38	70	61	66	56
R02	29	34	39	72	66	67	58
R03	30	37	40	70	61	65	56
R04	32	38	38	71	64	67	57
R05	45	55	52	71	61	66	57
R06	55	58	55	69	60	64	55
R07	56	57	54	63	52	58	48
R08	56	57	52	58	48	54	44
R09	54	55	51	57	47	53	43
R10	56	55	51	57	46	53	43
R11	55	55	50	58	47	54	44
R12	50	49	46	54	44	50	40
R13	49	49	45	53	43	49	39
R14	48	48	45	52	43	48	38
R15	49	49	45	52	42	48	38
R16	48	49	44	52	42	48	38
R17	54	65	64	70	61	66	56
R18	35	64	56	63	53	59	49
R19	54	64	63	70	62	66	56
R20	37	50	47	52	42	48	38
R21	42	57	50	55	45	50	41
R22	40	60	58	69	59	64	55
R23	39	57	55	69	59	64	54
R24	49	55	52	68	60	64	54
R25	38	41	36	53	35	49	39
R26	35	51	42	54	44	49	40
R27	23	39	32	41	30	36	26
R28	26	36	42	52	41	47	38
R29	28	35	43	53	43	48	39

Receiver	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Activity 6	Activity 7
R30	31	49	44	53	43	49	39
R31	26	49	45	53	43	49	39
R32	24	47	40	48	38	43	34
R33	27	47	42	53	43	49	39
R34	26	28	28	52	42	48	38
R35	23	36	34	49	38	44	34
R36	31	42	39	52	42	47	38
R37	21	41	38	52	42	48	38
R38	21	34	30	48	38	44	34
R39	21	34	33	50	40	45	36
R40	33	41	39	52	42	47	38
R41	13	25	33	51	40	46	36
R42	29	40	37	53	43	49	39
R43	25	41	36	59	49	55	45
R44	32	41	37	55	45	50	40
R45	33	42	38	56	46	52	42
R46	34	43	39	58	47	53	44
R47	34	43	39	58	48	54	44
R48	30	39	34	57	46	52	43
R49	31	40	35	56	45	51	42
R50	28	35	30	55	45	50	40
R51	24	34	27	52	43	47	37
AR01	64	66	60	67	56	62	53
AR02	57	56	52	62	51	57	47
AR03	38	56	53	62	52	58	48
PR01	24	51	53	61	51	57	47
Noticeable							
Clearly audible							
Moderately intrusive							
Highly intrusive							

Table 6-14: Construction noise assessment – noise predictions night period (dBA) – with mitigation

Receiver	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Activity 6	Activity 7
R01	27	34	38	70	61	66	56
R02	29	34	39	72	66	67	58
R03	30	37	40	70	61	65	56
R04	32	38	38	71	64	67	57
R05	45	55	52	71	61	66	57
R06	55	58	55	69	60	64	55
R07	56	57	54	63	52	58	48
R08	56	57	52	58	48	54	44
R09	54	55	51	57	47	53	43
R10	56	55	51	57	46	53	43
R11	55	55	50	58	47	54	44
R12	50	49	46	54	44	50	40
R13	49	49	45	53	43	49	39
R14	48	48	45	52	43	48	38
R15	49	49	45	52	42	48	38
R16	48	49	44	52	42	48	38
R17	54	65	64	70	61	66	56
R18	35	64	56	63	53	59	49
R19	54	64	63	70	62	66	56
R20	37	50	47	52	42	48	38
R21	42	57	50	55	45	50	41
R22	40	60	58	69	59	64	55
R23	39	57	55	69	59	64	54
R24	49	55	52	68	60	64	54
R25	38	41	36	53	35	49	39
R26	35	51	42	54	44	49	40
R27	23	39	32	41	30	36	26
R28	26	36	42	52	41	47	38
R29	28	35	43	53	43	48	39

Receiver	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Activity 6	Activity 7
R30	31	49	44	53	43	49	39
R31	26	49	45	53	43	49	39
R32	24	47	40	48	38	43	34
R33	27	47	42	53	43	49	39
R34	26	28	28	52	42	48	38
R35	23	36	34	49	38	44	34
R36	31	42	39	52	42	47	38
R37	21	41	38	52	42	48	38
R38	21	34	30	48	38	44	34
R39	21	34	33	50	40	45	36
R40	33	41	39	52	42	47	38
R41	13	25	33	51	40	46	36
R42	29	40	37	53	43	49	39
R43	25	41	36	59	49	55	45
R44	32	41	37	55	45	50	40
R45	33	42	38	56	46	52	42
R46	34	43	39	58	47	53	44
R47	34	43	39	58	48	54	44
R48	30	39	34	57	46	52	43
R49	31	40	355	56	45	51	42
R50	28	35	30	55	45	50	40
R51	24	34	27	52	43	47	37
AR01	64	66	60	67	56	62	53
AR02	57	56	52	62	51	57	47
AR03	38	56	53	62	52	58	48
PR01	24	51	53	61	51	57	47
Noticeable							
Clearly audible							
Moderately intrusive							
Highly intrusive							

Out-of-hours works would be managed in accordance with the Roads and Maritime Construction Noise and Vibration Guidelines (Roads and Maritime Services, 2016) with potential measures to address impacts including source noise controls, respite periods and notifying affected residents.

### Construction traffic noise

The proposal would involve (as a worst-case) up to 40 construction personnel on average per shift using the designated car park at the site compound. Given the relatively high existing traffic volumes and the small contribution from the proposal, the noise assessment found that the increase in noise as a result of construction related vehicles would not be more than 2dB.

There may be some impacts associated with short-term (overnight) closures of Picnic Parade and associated detours if they are required. This would be managed through communication with potentially affected people along the detour route.

### Construction vibration

The main potential source of construction vibration would be vibratory rollers. Equipment and plant have the potential to operate at a minimum distance of ten metres from the nearest residential receivers when work occurs at the proposal site.

Construction plant would be selected to ensure minimum safe working distances set by the Roads, and Maritime Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) are complied with where possible, both in relation to cosmetic damage and human response to vibration. This would mean 2-4 tonne or smaller vibratory rollers would be selected where possible. If minimum safe working distances cannot be complied with, additional measures including vibration monitoring would be implemented.

### Operation

Noise levels for existing and future traffic were quantified for three potentially most affected receivers near the proposal site. Other receivers are not expected to have a change in road traffic noise levels from the proposal. The results of the operational road traffic noise assessment are provided in Table 6-15.

Table 6-15: Operational road traffic noise predictions

Location	Day Predicted level, $L_{Aeq(15hr)}$ , dBA			Night (after 10pm) Predicted level, $L_{Aeq(9hr)}$ , dBA		
	Existing	Future (with proposal)	Change, dB	Existing	Future (with proposal)	Change, dB
AR01 scout hall	63.3	65.2	1.9	Not in use		
R06	66.4	67.6	1.2	58.9	60.2	1.3
R17 2A Picnic Parade	65.6	66.5	0.9	57.9	59.2	1.3

Table 6-15 shows that the change in road traffic noise levels due to the proposal is predicted to be less than 2 dB at all receivers. No mitigation for operational road traffic noise is therefore required under the Noise Mitigation Guideline (Roads and Maritime Services, 2015).

In terms of the potential for sleep disturbance, the Environmental Noise Management Manual (Roads and Traffic Authority, 2001) states that maximum internal noise levels below 50-55 dBA are unlikely to cause awakening reactions.

For the proposal, the near point of vehicle pass-by on Picnic Parade at the nearest receiver (R17) is not changing with pass-by speeds also expected to remain unchanged. A maximum pass-by sound power of 104 dBA for heavy vehicles would result in a received noise level at the façade of R17 of 74 dBA. Taking into account a 20-dBA loss for buildings and windows, the predicted maximum internal noise level from traffic is 54 dBA, which meets the maximum allowable internal level outlined in the Environmental Noise Management Manual.

### 6.3.5 Safeguards and management measures

Table 6-16: Noise and vibration environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP.	Contactors	Pre-construction	Section 4.6 of QA G36 <i>Environment Protection</i>
Noise and vibration	<p>The NVMP will generally follow the approach in the Interim Construction Noise Guideline (ICNG) (DECC, 2009) and the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) and identify:</p> <ul style="list-style-type: none"> <li>• all potential significant noise and vibration generating activities associated with the activity</li> <li>• feasible and reasonable mitigation measures to be implemented</li> <li>• a monitoring program to assess performance against relevant noise and vibration criteria</li> <li>• a review process scheduling and assessing out-of-hours activities including consideration of alternatives to out-of-hours work, plant selection, work locations and screening to minimise impacts</li> <li>• a working schedule which records respite periods for extended out-of-hours works</li> <li>• arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures</li> <li>• contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.</li> </ul>	Contactors	Pre-construction	Section 4.6 of QA G36 <i>Environment Protection</i>

Impact	Environmental safeguards	Responsibility	Timing	Reference
Construction vibration	<p>Where vibration intensive plant such as vibratory rollers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures. This includes adhering to the recommended minimum working distances for vibration intensive plant identified in Section 7.1 of the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016).</p> <p>If recommended minimum working distances cannot be met by selecting smaller plant vibration monitoring will occur to quantify and help manage vibration emissions. If necessary, trial vibration measurements will be conducted before activities to further assess any possible impacts and buffer distances that may be required.</p>	Contractor	Construction	Additional measure
Noise and vibration	<p>All sensitive receivers likely to be affected will be notified at least five working days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of:</p> <ul style="list-style-type: none"> <li>• the project</li> <li>• the construction period and construction hours</li> <li>• contact information for project management staff</li> <li>• complaint and incident reporting</li> <li>• how to obtain further information.</li> </ul>	Contractor	Detailed design / pre-construction	Standard measure

## 6.4 Hydrology and flooding

This chapter describes existing flooding and hydrology issues relevant to the proposal and provides an assessment of potential impacts associated with the proposal.

### 6.4.1 Methodology

The assessment of potential hydrology and flooding impacts was carried out with reference to the following:

- Overland flow paths passing through the proposal site, based on 2011 LiDAR
- Rational Method runoff calculations
- Review of available flood modelling (DHI, 2010)
- Review of available groundwater levels
- Changes to impervious surfaces due to the proposal

Increases in flow were predicted and compared to total catchment runoff while potential changes to flood levels and extents were also assessed. The potential for intercepting groundwater during construction was also identified.

### 6.4.2 Existing environment

The proposal site is about 800 metres to the west of Booker Bay which is part of the larger Brisbane Water system. Existing stormwater runoff flow paths from the proposal site are shown by Figure 6-5 and include flow paths that:

- Travel west along both the northern side of Maitland Bay Drive in an open drain at the base of Blackwall Mountain
- Travel in another open drain along the southern side of Maitland Bay Drive east of the road junction
- Cross through a pipe beneath Picnic Parade south of the intersection
- Cross beneath Maitland Bay Drive in a culvert just beyond the eastern extent of the proposal site.



Figure 6-5: Overland flow paths (blue) and associated sub-catchments (white borders)

Central Coast Council flood mapping indicates that parts of the proposal site (mainly east and south of the proposed roundabout) are affected by the 100-year Average Recurrence Interval (ARI) flood.

Groundwater is understood to be at variable depth at the proposal site. Recent geotechnical investigations either side of Picnic Parade noted groundwater to be at 2.1 metres and 2.15 metres below existing ground surface (at the time of the investigation).

### 6.4.3 Potential impacts

#### **Construction**

There is potential for a broader flood event to affect the proposal site during construction. The impact of a large flood would depend on the stage of construction at the time of the event, and the intensity of the rainfall event.

Flooding during construction could potentially impact areas within and near the construction area (including the construction compound) and/or cause damage to construction plant and equipment. Construction sites could also increase potential runoff to the catchments during heavy rainfall due to an increase of impermeable surface; however this increase would be relatively small in terms of the overall catchment area, and unlikely to significantly increase the severity of any flood events.

Construction compounds and materials stockpiles may also increase potential runoff to the catchments. The potential impact would be localised and most likely to occur as a result of poorly located stockpiles or compound sites, for example, locating compounds or stockpiles in drainage paths (see Figure 6-5).

During construction, there is also the potential for existing drainage infrastructure to be partially blocked or temporarily diverted due to earthwork and other construction activities. Blocking or diverting local drainage lines may result in local flooding upstream of the construction areas. Diverting drainage lines may also create local areas of flooding and scour.

Given that groundwater is likely to be close to the surface at some locations, there is potential for groundwater to be intercepted during excavations for utility relocations with groundwater ingress likely to be variable across the site. Excavations may, therefore, require dewatering. If required, mitigation measures such as controlled pumping and temporary retention would be considered.

The temporary potential impacts referred to above expected to be minor if they occur and would be managed through the implementation of the safeguards identified in Section 6.4.4.

## Operation

### Runoff

The proposal would lead to a net 1,150 square metre increase in impervious area. While this increase would lead to increased runoff and decreased ground infiltration, this still only represents a small (1.8 per cent) change in total impervious area within the existing catchment.

Using the 100-year peak runoff for the full catchment (refer to Figure 6-5) it is estimated that the proposal would cause a net 0.057 m<sup>3</sup>/s increase in flow compared to existing conditions; representing only a very small (0.9 per cent) increase in total catchment runoff.

Previous flood modelling (DHI, 2010) demonstrates that this expected increase in flow would equate to a water level increase of less than five millimetres across this area. This water level increase is minor and is not expected to cause any discernible increase in the extent of inundation or flooding of any further properties. Water level increases would also lessen further downstream where overland flows become wider.

## 6.4.4 Safeguards and management measures

Table 6-17: Hydrology and flooding environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Flooding and hydrology	Staging for the construction of the proposal will consider adequate stormwater flow paths (including diversions and temporary connections as required) to be implemented and maintained during construction to minimise the potential on-site or upstream flooding.	Contractor	Construction	Additional measure
Flooding and hydrology	A flood management procedure will be prepared to detail procedures to be implemented where extreme weather is predicted and where there is a risk of flooding affecting the work site and compound, including removal and storage of plant and equipment and securing of site.	Contractor	Construction	Additional measure
Flooding and hydrology	Locations where dewatering may be needed and requirements for the temporary storage of extracted water will be identified during pre-construction planning. Dewatering of construction excavations will occur in accordance with the Technical Guideline - Environmental Management of Construction	Contractor	Pre-construction / construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Site Dewatering (Roads and Traffic Authority, 2011).			

## 6.5 Biodiversity

This chapter describes the existing biodiversity values of the proposal site and assesses potential biodiversity impacts, including potential impacts on threatened species and communities. The Biodiversity Assessment (Appendix F) has been used to inform this chapter.

### 6.5.1 Methodology

The approach to assessing potential biodiversity impacts has included:

- A review of existing relevant information related to the proposal site
- A review of databases including the Bionet Atlas of NSW Wildlife and EPBC Protected Matters Search tool to identify listed threatened species, populations and ecological communities that may be present within a ten-kilometre buffer of the proposal site
- A field survey on 6 June 2019 to identify vegetation communities present in the study area and carry out targeted searches for threatened flora and fauna species identified through the database searches
- Assessment of potential direct and indirect impacts having regard to the proposed scope of works.

### 6.5.2 Existing environment

#### ***Vegetation communities***

To the north of Maitland Bay Drive and adjacent to the proposal site is a large area of bushland. This vegetation is separated from the road pavement by a disturbed drainage swale, bank and guardrail. The field survey determined this to be an area of good quality, diverse and fully structured native vegetation.

The plant community type in this area was identified using the Bionet Vegetation Classification Tool, confirming through ground-truthing. The applicable PCT was identified as PCT 64 – Blackbutt – White Mahogany shrubby tall open forest of coastal ranges, northern Sydney Basin Bioregion. This community is not a threatened ecological community listed in the BC Act or EPBC Act.

To the south of Maitland Bay Drive and the proposal site is a residential area with cleared recreation facilities associated with Ettalong Oval and Kitchener Park. Vegetation in this area is urban vegetation consisting of remnant or planted trees. There is a sparse shrub layer of mixed natives and exotic species and a ground cover dominated by exotic grasses, herbs and forbs. This vegetation community was identified as Urban Vegetation (managed landscape). This community is highly disturbed and appears to have lost many key native species.

#### ***Threatened flora species and populations***

State and nationally listed species with suitable habitat present are identified in the Biodiversity Assessment in Appendix F.

One state and nationally listed threatened flora species was observed in the study area. Five individuals of this species, *Syzygium paniculatum* (Magenta Lilly Pilly), were observed about 100 metres east of the intersection to the north of Maitland Bay Drive (refer to Figure 6-6).

No endangered flora populations or state or nationally listed TECs were observed in the study area. No endangered wetland communities, groundwater-dependent ecosystems or areas subject to the Coastal Management SEPP are located in the study area.



Figure 6-6: *Syzgium paniculatum* (Magenta Lilly Pilly) locations

### **Threatened fauna and fauna habitat**

State and nationally listed species with suitable habitat present are identified in the Biodiversity Assessment in Appendix F.

Two state listed fauna species were recorded within the subject site during the site survey, the Eastern Bentwing-bat (*Miniopterus orianae oceanesis*) and Little Bentwing-bat (*Miniopterus australis*). The proposal site includes foraging habitat (but not roosting habitat) for these species. No nationally listed threatened fauna species were recorded within the proposal site.

No hollow-bearing trees were observed during the survey. One single, low trunk split was observed in a tree, but it was concluded that it is unlikely to provide habitat for native species. No other notable or likely important habitat features for threatened fauna species are present.

No habitats suitable for aquatic species were observed within the subject area, and there are no endangered fauna populations within the Central Coast local government area.

Consideration of potential koala habitat identified two koala food tree species in the study area. These trees occur in two fragmented areas to the south of Maitland Bay Drive. They are not part of a naturally occurring vegetation community. The study area does not support potential koala habitat, and assessment consistent with the intent of the State Environmental Planning Policy 44 Koala Habitat Protection is not necessary.

No nationally protected migratory bird species were recorded during the site survey.

## 6.5.3 Potential impacts

### Construction

#### Removal of native vegetation and fauna habitat

Direct impacts of the proposal would include removal of about 0.13 hectares of highly disturbed urban vegetation (managed landscape). This would result in the removal of foraging habitat including seasonal flowing resources for the threatened species – Little Lorikeet, Swift Parrot and Grey-headed Flying-fox. One tree with a low trunk split would be removed. This feature is considered unlikely to provide value to native fauna.

The proposal would affect foraging habitat for the Eastern Bentwing-bat (*Miniopterus orianae oceanesis*) and Little Bentwing-bat (*Miniopterus australis*). However, given the highly mobile nature of both of these species, the absence of any important habitat, their known ability to move across and utilise some urban landscapes and that the proposal would not inhibit local movements and dispersal, neither species would likely be significantly impacted by the proposed habitat clearance.

#### Removal of threatened flora

The proposed replacement of the guardrail on the northern side of Maitland Bay Drive could affect two threatened Magenta Lilly Pilly (*Syzygium paniculatum*) individuals located to the north of the guardrail.

The loss of these plants is not likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction. Impacts were assessed as not significant.

#### Aquatic impacts

There are no watercourses within the proposal site that would be directly impacted by the proposal. A narrow swale on the north side of Maitland Bay Drive would be protected by maintaining a ground cover on the embankment to minimise erosion and sedimentation.

#### Injury and mortality – native fauna

Common skinks and frogs to occur in the roadside gutter on the northern edge of the road while one tree has been identified with a hollow with potential to be used by native fauna, although this is considered unlikely. With appropriate safeguards, construction activities are not expected to increase the likelihood of fauna injury or mortality.

#### Key threatening processes

The following key threatening processes have been identified as relevant to the proposal:

- Likely – Clearing of native vegetation
- Possible – Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae
- Possible – Infection of native plants by *Phytophthora cinnamomic*
- Possible – Invasion and establishment of exotic vines and scramblers
- Possible – Invasion, establishment and spread of *Lantana camara*
- Likely – Invasion of native plant communities by exotic perennial grasses
- Likely – Loss of hollow-bearing trees.

Key threatening processes would be addressed by specific measures included in the Flora and Fauna Management Plan for the proposal.

## Operation

### Wildlife connectivity and habitat fragmentation

The vegetation that would be affected by the proposal is located in urban or parkland areas and is already fragmented along its length, is not fully structured (lack of native shrubs and groundcovers) and provides a very limited vegetated corridor for the movement of flora and fauna species. The removal of these trees and underlying (mostly exotic) understorey would not create any significant fragmentation of notable local natural habitat areas for threatened biodiversity.

### Edge effects on adjacent native vegetation and habitat

Short-term edge effects could be heightened through local soil disturbance. This would be addressed through mitigation measures, including appropriate management of weeds on site.

### Invasion and spread of pathogens and disease

The presence of machinery and construction works is likely to slightly increase the potential for the spread of 'Myrtle Rust', which is a key threatening process. The proposal may also temporarily increase the risk of fungal infection on site, spread via vehicular movement and relocation of soil and vegetation. These risks would be addressed through the implementation of protocols to manage pathogens as part of the Flora and Fauna Management Plan.

### Noise, light and vibration

The proposal area is already affected noise, light and vibration from traffic on the existing road. Fauna habitat near the road is sub-optimal habitat for these reasons. The proposal is unlikely to further increase these effects such that the habitat would be unsuitable for the fauna species that may use these areas.

## Conclusion on significance of impacts

The proposal is not likely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the *Biodiversity Conservation Act 2016* or *Fisheries Management Act 1994* and therefore a Species Impact Statement or Biodiversity Development Assessment Report is not required.

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

## 6.5.4 Safeguards and management measures

Table 6-18: Biodiversity environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity	<p>A Flora and Fauna Management Plan will be prepared in accordance with Roads and Maritime's <i>Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects</i> (RTA, 2011) and implemented as part of the CEMP.</p> <p>The Flora and Fauna Management Plan will include, but not be limited to:</p> <ul style="list-style-type: none"><li>plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas</li></ul>	Contractor	Pre-construction	Section 4.8 of QA G36 <i>Environment Protection</i>

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<ul style="list-style-type: none"> <li>pre-clearing survey requirements</li> <li>procedures for unexpected threatened species finds and fauna handling</li> <li>protocols to manage weeds and pathogens.</li> </ul>			
Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Roads and Maritime	Detailed design /	Additional measure
Biodiversity	An exclusion zone surrounding the area containing the five known specimens of <i>Syzygium paniculatum</i> will be established prior to commencement of work on replacing the guardrail on the north side of Maitland Bay Drive using hi-vis fencing or similar and signage.	Contractor	Construction	Additional measure
Biodiversity	The narrow swale on the north side of Maitland Bay Drive will be protected by maintaining a ground cover on the embankment or other appropriate controls or temporary cover to minimise erosion and sedimentation.	Contractor	Construction	Additional measure
Biodiversity	Mature trees to be retained adjacent to Maitland Bay Drive will be protected in accordance with AS 4970-2009 Protection of trees on development sites. This will include the establishment of tree protection zones.	Contractor	Construction	Additional measure

### 6.5.5 Biodiversity offsets

The proposal would not result in impacts to greater than one hectare of a threatened ecological community or habitat for threatened species which cannot withstand a loss. Therefore, offsets for threatened ecological communities or species would not be necessary, and a Biodiversity Offset Strategy would not be required.

## 6.6 Soil, contamination and water quality

This section outlines the potential impact of the proposal on soils and water quality. Potential impacts associated with contaminated land are also considered.

### 6.6.1 Methodology

The assessment of the impact to soils included a review of available geological maps and *Soil Landscapes of the Sydney 1:100,000 Sheet* (Chapman & Murphy, 1989) to identify soil limitations, including erosion potential.

Assessment of potential contamination impacts involved:

- Desktop review of the proposal site and surrounding area, using various database sources and including a review of historical aerial photography
- Site walkover
- Two boreholes drilled on 17 June 2019 and subsequent laboratory testing of selected soil samples for a suite of potential contaminants and acid sulfate soil potential
- Comparison of contamination data generated from the site investigation against adopted Environmental and Health Investigation / Screening Levels for recreational open space land use. Comparison of acid sulfate soil samples to ASSMAC 1998 assessment guidelines.
- Use of conceptual site models to provide a framework for identifying how a site may be contaminated and how potential receptors may be exposed to contamination either in the present or the future
- Risk assessment in general accordance with AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines.

### 6.6.2 Existing environment

#### **Geology and soils**

Geological mapping (Department of Environment and Planning – Minview) identifies Blackwall Mountain as Buralow Formation and Hawkesbury Sandstone, while the area to the south (including the proposal site) is identified as Coastal deposits (sand).

Soil landscape mapping shows that the proposal site traverses two soil landscapes (refer to Table 6-19).

Table 6-19: Soil landscapes within the investigation area

Soil landscape	Landscape type	Soils	Limitations
Watagan	Colluvial	Loose, stony, brownish-black, loamy sand to loam-fine-sandy topsoil. Hardsetting, brown sandy clay loam subsoil. Strongly pedal, yellowish-brown fine sandy clay deep subsoil.	Mass movement hazard, steep slopes, server soil erosion hazard, occasional rock outcrop.

Soil landscape	Landscape type	Soils	Limitations
Woy Woy	Marine	Siliceous sands and occasional podzols.	Permanently high water tables, localised flooding, periodic waterlogging in depressions, very low to low soil fertility, localised areas of high soil erosion hazard.

### **Acid sulfate soils**

Acid sulfate soils include those where the sulfides in the soils have been exposed to air and acid is being generated (actual acid sulfate soil) and those which may form actual acid sulfate soil when drained or exposed to oxidisation processes (i.e. the exposure of iron sulfate minerals such as pyrite to oxygen). Acid sulfate soil occurs predominantly on coastal lowlands, with elevations generally below five metres.

Testing of soil materials indicated potential acid sulfate soil materials are likely to be encountered in natural sand materials occurring between 0.9 and 2.5 metres below ground level throughout the proposal site.

### **Contamination**

Four on-site and two off-site potential contamination sources were identified following a review of information collected during an initial desktop review and the site walkover. They are:

- Chemical storage areas / above ground storage tanks / underground storage tanks (both on and off-site). These are minor storages and associated with Ettalong Oval, Kitchener Park and residential properties.
- A site registered on the Environment Protection Authority contaminated land register (a Caltex Service Station) located at 66 Memorial Avenue, Woy Woy which is not directly adjacent to the proposal area and about 650 m northwest of the Maitland Bay Drive / Picnic Parade Intersection.
- A low potential for isolated areas of unexpected contamination encountered during excavations from historical on-site land uses or historical placement of untested fill
- Illegal/unreported dumping or the spilling of hazardous wastes or materials (on-site).

### **Water quality**

The quality of the water entering local waterways within the investigation area would be largely a function of the contaminants on roads and activities on adjacent areas discharged via the stormwater system.

Common road runoff pollutants include gross pollutants and litter, sediment and suspended solids, toxic organics, nutrients, heavy metals and hydrocarbons.

Stormwater from the project area discharges into Brisbane Water at Booker Bay which is close to the outlet of the Brisbane Water Estuary; is deep (more than one metre) and experiences tidal movements and a high degree of flushing. As a result, the Booker Bay water quality descriptor was 'Very Good' in the Gosford City Waterways Report 2015 assessment (Central Coast Council, 2016).

Sediment, excess nutrients, litter, weeds and other pollutants have all been noted to impact on the health and resilience of the Brisbane Water catchment and in turn, of Brisbane Water (Central Coast Council, 2018). Water quality in Booker Bay may also be affected by bacteria from sewer overflows or other runoff into stormwater drains.

## 6.6.3 Potential impacts

### Construction

#### Erosion and sedimentation

Construction of the proposal has the potential to cause soil erosion and loss of topsoil. The highest risk of erosion and sedimentation would be associated with a disturbance of the ground surface during site preparation, earthworks, excavation and other construction activities. It is however noted that much of the proposal site is situated on well drained coarse sands with relatively low erodibility.

Unmitigated potential impacts associated with the sedimentation of eroded material include:

- Increased sedimentation and elevated turbidity levels of nearby drainage channels from exposed soil during site disturbance and movement of construction vehicles, particularly following rainfall events
- Increased sedimentation in Booker Bay, which reduces light penetration, smothers aquatic life, alters fluvial geomorphology and affects the ecosystems of downstream sensitive waterways
- Increased levels of nutrients, metals and other pollutants, transported via sediment to Booker Bay.

#### Discharge of highly chlorinated water

Highly chlorinated water (about 24,000 litres) would be used for testing and disinfection of new water main sections, and the discharge of this has the potential to adversely affect aquatic ecosystems in receiving watercourses. Measures have been proposed to address this potential impact (refer to Section 6.6.4), including no direct discharge to drainage lines or inlets.

#### Accidental spills and leaks

Without appropriate safeguards, there would be potential for spills of concrete or grout contaminated water or leaks from construction plant or site chemical/fuel storages. While quantities would be small there is potential for these spills/leaks to result in localised contamination of soil and/or water.

#### Disturbance of acid sulfate soils

The proposal would disturb soils (during deeper excavations for water, sewer and stormwater adjustments) with the potential for acid sulfate soil occurrence. If disturbed or dewatered and exposed to air, the sulphides in these materials may oxidise leading to acid generation and contamination of run-off, pooled water and groundwater being extracted from excavations. This may then result in impacts on fish and other aquatic life.

#### Disturbance of contaminated land

The outcomes of the risk assessment for contamination are provided in Table 6-20.

Table 6-20: Contamination risk assessment – outcomes

Source	Likelihood	Consequence	Risk	Discussion
Historical on-site land uses	Possible	Minor	Low	No test results returned concentrations indicative of significant contamination associated with this potential source. The level of risk this item poses is 'low', and while contamination remains possible, the consequence would be minor and isolated to areas immediately beneath / surrounding the contamination source.

Source	Likelihood	Consequence	Risk	Discussion
Illegal/ unreported dumping or spills	Possible	Minor	Low	No test results returned concentrations indicative of significant contamination associated with this potential source. The level of risk this item poses is 'low', and while contamination remains possible, the consequence would be minor and isolated to areas immediately beneath / surrounding the contamination source.
Chemical storage, storage tanks (risk of presence on- site)	Improbable	Minor	Low	No test results returned concentrations indicative of significant contamination associated with this potential source, with the level of risk this item poses considered 'low'. The likelihood of contamination attributed to this source significantly impacting the site is 'improbable' with the associated consequence minor and isolated to areas immediately beneath / surrounding the contamination source.
Caltex service station	Improbable	Minor	Low	No benzene or petroleum hydrocarbons (C6-C9) concentrations detected in soil materials analysed at or below recorded groundwater levels indicate that this contamination source significantly impacts the proposal site. The likelihood of contaminant levels in groundwater resulting in significant on-site contamination would be improbable with the consequence minor and likely to be restricted to soil materials at or below recorded groundwater levels. The distance to this site and the intervening geology of Blackwall Mountain is a further factor reducing the risk.
Chemical storage, storage tanks (risk of off-site presence)	Improbable	Minor	Low	No test results returned concentrations indicative of significant contamination associated with this potential source, with the level of risk this item poses considered 'low'. The likelihood of contamination attributed to this source significantly impacting the proposal site is 'improbable' with the associated consequence minor and isolated to areas immediately beneath / surrounding the contamination source.
Asbestos cement pipes corresponding to the existing 250-millimetre sewer main	Likely	Serious	Moderate	There is a need to remove the asbestos cement pipes as part of the re-alignment work. The removal is required to be undertaken in a controlled manner by a licensed specialist.

## Operation

While there would be some increase in impervious surfaces associated with the proposal, significant changes in flow volumes/velocities in receiving watercourses are not expected.

During operation, contamination impacts would generally be associated with contaminated run-off, which may arise from normal vehicle operation (tyre wear, minor leaks of lubricants and fuels), maintenance practices, or a spill or accident. These risks would be similar to the existing situation, although the risk of accidents may be reduced with the proposed safety improvements.

### 6.6.4 Safeguards and management measures

Table 6-21: Soil contamination and water environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Soils	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction.	Contractor	Pre-construction	Section 2.1 of QA G38 Soil and Water Management
Soils	A site-specific Erosion and Sediment Control Plan/s will be prepared and implemented as part of the Soil and Water Management Plan. The ESCP will follow the requirements of RMS specification G38.	Contractor	Pre-construction	Section 2.2 of QA G38 Soil and Water Management
Soils	The Erosion and Sediment Control Plan/s will include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.  The Plan/s will also include measures to minimise the impact of discharging site water to the swale on the northern side of Maitland Bay Drive.	Contractor	Pre-construction	Section 2.2 of QA G38 Soil and Water Management
Potential acid sulfate soils	An Acid Sulfate Soil Management plan will be prepared for the proposal in accordance with the Guidelines for the Management of Acid Sulfate Materials: Acid Sulfate Soils, Acid Sulfate Rock and Monosulfidic Black Ooze (Roads and Traffic Authority, 2005). The plan will include specific measures to prevent any water quality impacts or effects on aquatic and terrestrial ecology.	Contractor	Pre-construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
Contaminated land – potential onsite and off-site sources	<p>An unexpected finds procedure will be developed in the proposal CEMP for contamination.</p> <p>The procedure will ensure that if contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Roads and Maritime Environment Manager and/or EPA.</p>	Contractor	Detailed design / Pre-construction	Section 4.2 of QA G36 <i>Environment Protection</i>
Water quality	Discharge of highly chlorinated water is to be consistent with Central Coast Council requirements. There is to be no direct discharge to drainage lines or inlets.	Contractor	Construction	Additional measure
Accidental spill	A site-specific emergency spill plan will be developed and include spill management measures in accordance with the Roads and Maritime <i>Code of Practice for Water Management</i> (RTA, 1999) and relevant EPA guidelines.	Contractor	Pre-construction	Section 4.3 of QA G36 <i>Environment Protection</i>
Accidental spills	<p>The emergency spill plan will address measures to be implemented in the event of a spill, including:</p> <ul style="list-style-type: none"> <li>Initial response and containment (e.g. shutting valves, crimping of hoses, use of booms, pads and absorbent material)</li> <li>Notification of emergency services and relevant authorities (including Roads and Maritime and EPA officers).</li> </ul>	Contractor	Pre-construction	Section 4.3 of QA G36 <i>Environment Protection</i>

## 6.7 Aboriginal cultural heritage

### 6.7.1 Methodology

The approach to the assessment of potential Aboriginal heritage impacts has involved a search of the Aboriginal Heritage Information Management System (AHIMS) (4 August 2019) and a consideration of the levels of previous disturbance within the proposal site. Consultation with representatives of the Darkinjung Local Aboriginal Land Council was completed on 21 August 2019.

### 6.7.2 Existing environment

The proposal site is primarily within an urban context, with substantial previous disturbance having occurred for road construction and underground utilities. Less disturbed areas are the Blackwall Mountain area to the immediate north and the open space areas of Ettalong Oval and Kitchener Park.

The Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (Department of Environment, Climate Change and Water, 2010) identifies rock shelters, sand dunes, natural waterways, waterholes and wetlands as indicators of the likely existence of likely existence of Aboriginal objects. None of these landscape features are known to be present within the proposal site although the surrounding area (Ettalong, Blackwall Mountain) is understood to be rich in both registered and non-registered cultural sites, middens, ground deposits, caves, sandstone overhangs, tool grooves and artwork.

The AHIMS search returned 110 records for the broader area, with only one site located near the proposal site. Site 45-6-2444 (axe Grinding Groove) is located near the high point of Blackwall Mountain, about 120 metres from the proposal site. There are no declared Aboriginal places near the proposal site.

### 6.7.3 Potential impacts

The sandstone rock outcrops and mature trees on Blackwall Mountain are understood to be culturally significant for Aboriginal people. These areas would not be affected by the proposal.

Due to the level of previous disturbance within the proposal site and the absence of landscape features that suggest the presence of Aboriginal objects, impacts on Aboriginal objects are not expected. There would be no predicted impacts on the nearest known Aboriginal site 45-6-2444 which lies well outside the proposal boundaries.

### 6.7.4 Safeguards and management measures

Table 6-22: Aboriginal heritage environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Aboriginal heritage	The Standard Management Procedure - Unexpected Heritage Items (Roads and Maritime, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This	Contacto	Pre-construction	Section 4.9 of QA G36 <i>Environment Protection</i>

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<p>applies where Roads and Maritime does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place.</p> <p>Work will only re-commence once the requirements of that Procedure have been satisfied.</p>			
Aboriginal heritage	Aboriginal cultural heritage awareness will be covered in site inductions and pre-work 'tool box' talks.	Contractor	Pre-construction	Additional measure
Aboriginal heritage	Opportunities for incorporation of Aboriginal cultural interpretative material as part of the proposal will be explored in consultation with Aboriginal stakeholders.	Roads and Maritime	Detailed design	Additional measure

## 6.8 Other impacts

### 6.8.1 Existing environment and potential impacts

Table 6-23: Review of other environmental issues

Environmental factor	Existing environment	Potential impacts
Air quality	<p>Sensitive receivers near the proposal site include residential receivers, a scout hall and sporting fields.</p> <p>The dominant source of emissions near the proposal site is from motor vehicles travelling along Maitland Bay Drive and the local road network.</p>	<p>Emissions from work vehicles/equipment would be minor.</p> <p>The potential for dust generation from excavation would be minimal and dependent on soil moisture content, prevailing weather conditions and the types of activities being carried out.</p> <p>The proposed compound is set back from the more active areas of Ettalong Oval and has a buffer of about 30 metres with some existing vegetation screening to residences on Mountain View Circuit.</p> <p>With appropriate and regular stabilisation of vehicle and plant accesses and other trafficked areas, it is considered that impacts on air quality from compound operation would be negligible. Screening of compound perimeter fencing would further mitigate potential impacts.</p>
Socio-economic	<p>The area around the proposal site includes important social infrastructure including active recreation areas and a scout hall.</p> <p>The proposal corridor forms part of an important link between communities and is an important means by which people gain accesses to and from their places of employment.</p>	<p>The proposal would deliver better traffic efficiency, improved safety, and better pedestrian/cyclist connections, all of which represent a social benefit.</p> <p>The proposal would not directly affect access or inhibit use of any key social infrastructure (such as schools, places of worship, medical centres, community centres, etc). There would be a small loss of passive recreation space (e.g. walking, dog walking) during construction and operation as the footprint of the proposal extends into the northern part of Ettalong Oval.</p> <p>Potential amenity impacts have been considered as follows:</p>

Environmental factor	Existing environment	Potential impacts
		<ul style="list-style-type: none"> <li>• Air quality (refer this table)</li> <li>• Noise and vibration (refer Section 6.3)</li> <li>• Visual impacts (refer Section 6.2).</li> </ul>
Non-Aboriginal heritage	<p>A search of the following statutory and non-statutory heritage lists/registers was carried out in June 2019:</p> <ul style="list-style-type: none"> <li>• NSW heritage database (including State Heritage Register)</li> <li>• Roads and Maritime Heritage and Conservation Register</li> <li>• Australian Heritage Database</li> <li>• Australian Heritage Places Inventory</li> <li>• Gosford LEP.</li> </ul> <p>The searches identified no heritage items near the proposal site, with the nearest items being located along the foreshore at Ettalong Beach. Furthermore, no potential heritage items were identified during site inspections.</p>	No direct or indirect impacts on non-Aboriginal heritage items are expected as a result of the proposal.
Waste and resource use	<p>Roads and Maritime is committed to ensuring the responsible management of unavoidable waste and promotes the reuse of such waste in accordance with the resource management hierarchy principles outlined in the Waste Avoidance and Resource Recovery Act 2001. These resource management hierarchy principles, in order of priority are:</p> <ul style="list-style-type: none"> <li>• Avoid unnecessary resource consumption as a priority</li> <li>• Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery)</li> </ul>	<p>The proposal is not expected to generate large quantities of waste materials. The following waste streams have been identified:</p> <ul style="list-style-type: none"> <li>• Spoil</li> <li>• Waste concrete / asphalt</li> <li>• Removed signage</li> <li>• Waste from removed water and sewer mains</li> <li>• Waste from guardrail removal</li> <li>• Wastewater (excavation dewatering, testing and commissioning of water/sewer mains)</li> <li>• General garbage and refuse.</li> </ul>

Environmental factor	Existing environment	Potential impacts
	<ul style="list-style-type: none"> <li>Disposal is undertaken as a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001).</li> </ul> <p>By adopting the above principles, Roads and Maritime aims to efficiently reduce resource use, reduce costs, and reduce environmental harm in accordance with the principles of ecologically sustainable development.</p>	
Hazards and risk management	<p>Existing hazards and risks are associated with operation the road network and include the risk of crashes.</p> <p>The proposal site is adjacent to Category 1 vegetation on Blackwall Mountain, which is the highest risk for bush fire. This vegetation category has the highest combustibility and likelihood of forming fully developed fires including heavy ember production. The footprint itself lies on Category 2 vegetation.</p>	<p>Hazards and risks associated with the construction of the proposal would potentially include:</p> <ul style="list-style-type: none"> <li>Carrying out work within or next to a busy road and areas with high pedestrian activity</li> <li>Carrying out work near existing services and utilities (e.g. power lines and gas mains)</li> <li>The use and storage of hazardous materials</li> <li>The use of heavy machinery</li> <li>Unexpected excavation of contaminated land</li> <li>Sparks and/or hot works causing fire, particularly during dry, hot periods</li> <li>Unauthorised access to the construction work site.</li> </ul> <p>Construction hazards and risks are manageable through the application of standard mitigation measures, which would be developed by the construction contractor prior to construction.</p> <p>Hazards or risks associated with the operation of the proposal would be limited to the potential for changed motorist behaviour associated road and messaging changes.</p> <p>The proposal complies with the design principles for public roads as outlined in Planning for Bushfire Protection 2006 (NSW Rural Fire Services, 2006). So as not to impede access/egress for firefighting operations, landscaping would include a managed verge with planting limited to grass / ground covers and would</p>

Environmental factor	Existing environment	Potential impacts
		ensure that existing trees do not overhang the road (i.e. four metre vertical clearance).

## 6.8.2 Safeguards and management measures

Table 6-24: Other issues environmental management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Air quality	<p>An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to:</p> <ul style="list-style-type: none"> <li>• potential sources of air pollution (including compound operation)</li> <li>• air quality management objectives consistent with any relevant published EPA and/or OEH guidelines</li> <li>• mitigation and suppression measures to be implemented</li> <li>• methods to manage work during strong winds or other adverse weather conditions</li> <li>• a progressive rehabilitation strategy for exposed surfaces.</li> </ul>	Contactors	Pre-construction	Section 4.4 of QA G36 <i>Environment Protection</i>
Socio-economic	<p>A Communication Plan will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The Communication Plan will include (as a minimum):</p> <ul style="list-style-type: none"> <li>• Mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions, and changes to available open space at Ettalong Oval</li> <li>• Contact name and number for complaints</li> <li>• Notification requirements for noise generating activities</li> </ul> <p>Procedures for communicating with other projects to determine the potential for concurrent activities and associated cumulative impacts.</p>	Roads and Maritime Project Manager	Pre-construction	Standard safeguard

Impact	Environmental safeguards	Responsibility	Timing	Reference
Non-Aboriginal heritage	<p>The <i>Standard Management Procedure - Unexpected Heritage Items</i> (Roads and Maritime, 2015) will be followed in the event any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered.</p> <p>Work will only re-commence once the requirements of that Procedure have been satisfied.</p>	Contractor	Detailed design / pre-construction	Section 4.10 of QA G36 <i>Environment Protection</i>
Waste	<p>A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to:</p> <ul style="list-style-type: none"> <li>measures to avoid and minimise waste associated with the project</li> <li>classification of wastes and management options (re-use, recycle, stockpile, disposal)</li> <li>statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions</li> <li>procedures for storage, transport and disposal</li> <li>monitoring, record keeping and reporting.</li> </ul> <p>The WMP will be prepared taking into account the <i>Environmental Procedure - Management of Wastes on Roads and Maritime Services Land</i> (Roads and Maritime, 2014) and relevant Roads and Maritime Waste Fact Sheets.</p>	Contacto	Detailed design / pre-construction	Section 4.2 of QA G36 <i>Environment Protection</i>
Utilities	<p>Prior to the commencement of works:</p> <ul style="list-style-type: none"> <li>the location of existing utilities and relocation details will be confirmed following consultation with the affected utility owners</li> <li>If the scope or location of proposed utility relocation works falls outside of the assessed proposal scope and footprint, further assessment will be undertaken.</li> </ul>	Contacto	Pre-construction	
Hazards and risk management	<p>A Hazard and Risk Management Plan (HRMP) will be prepared and implemented as part of the CEMP. The HRMP will include, but not be limited to:</p>	Contacto	Pre-construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<ul style="list-style-type: none"> <li>• details of hazards and risks associated with the activity (including consideration of bushfire)</li> <li>• measures to be implemented during construction to minimise these risks</li> <li>• record keeping arrangements, including information on the materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials</li> <li>• a monitoring program to assess performance in managing the identified risks</li> <li>• contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations.</li> </ul> <p>The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or Office of Environment and Heritage publications.</p>			

## 6.9 Cumulative impacts

### 6.9.1 Study area

A cumulative impact occurs when two or more projects are carried out concurrently and near to one another. The impacts may be caused by both construction and operational activities and can result in a greater impact to the surrounding area than would be expected if each project was carried out in isolation.

A search of the Department of Planning, Industry and Environment's Major Projects Register and the Central Coast Council ePlanning portal was carried out in September 2019 for Ettalong Beach and Umina Beach with no proposals identified that are likely interact with the intersection upgrade.

Other developments likely to occur within the locality would be small-scale projects and would be unlikely to result in a cumulative impact with the proposal.

### 6.9.2 Other projects and developments

At the time of review, there were no development applications lodged with Central Coast Council or other Roads and Maritime projects likely to interact with the proposal. No projects on the Major Projects Register are expected to interact with the proposal.

A future upgrade of the roundabout at Memorial Avenue and Barrenjoey Road is being investigated; however, construction is not currently planned to occur concurrently with this proposal.

### 6.9.3 Potential impacts

No potential cumulative impacts associated with the proposal have been identified.

### 6.9.4 Safeguards and management measures

Minimising impacts attributable to the proposal is the best way to address any potential cumulative effects. Measures to minimise impacts have been proposed in Section 6 and are summarised in Table 7-1.

# 7. Environmental management

## 7.1 Environmental management plan

A number of safeguards and management measures have been identified in the REF in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposal. Should the proposal proceed, these safeguards and management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

A Construction Environmental Management Plan (CEMP) will be prepared to describe the safeguards and management measures identified. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The CEMP will be prepared prior to construction of the proposal and must be reviewed and certified by the Roads and Maritime Environment Officer, Greater Sydney Project Office, prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the specifications set out in the [adjust as necessary: QA Specification G36 – *Environmental Protection (Management System)*, QA Specification G38 – *Soil and Water Management (Soil and Water Plan)*, QA Specification G40 – *Clearing and Grubbing*, QA Specification G10 – *Traffic Management*].

## 7.2 Summary of safeguards and management measures

Environmental safeguards and management measures outlined in this REF will be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The safeguards and management measures are summarised in Table 7-1.

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 will be prepared and submitted for review and endorsement of the Roads and Maritime Environment Manager prior to commencement of the activity.</p> <p>As a minimum, the CEMP will address the following:</p> <ul style="list-style-type: none"> <li>• any requirements associated with statutory approvals</li> <li>• details of how the project will implement the identified safeguards outlined in the REF</li> <li>• issue-specific environmental management plans</li> <li>• roles and responsibilities</li> <li>• communication requirements</li> <li>• induction and training requirements</li> <li>• procedures for monitoring and evaluating environmental performance, and for corrective action</li> <li>• reporting requirements and record-keeping</li> <li>• procedures for emergency and incident management</li> <li>• procedures for audit and review.</li> </ul> <p>The endorsed CEMP will be implemented during the undertaking of the activity.</p>	Contractor /	Pre-construction	
GEN2	General - notification	All businesses, residential properties and other key stakeholders (e.g. schools, local councils) affected by the activity will be	Contractor / Roads and	Pre-construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		notified at least five business days prior to commencement of the activity.	Maritime project manager		
GEN3	General – environmental awareness	<p>All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular "toolbox" style briefings.</p> <p>Site-specific training will be provided to personnel engaged in activities or areas of higher risk. These include adjoining residential areas requiring particular noise management measures.</p>	Contractor / Roads and Maritime project manager	Pre-construction / detailed design	
TT1	Traffic and transport	<p>A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Roads and Maritime <i>Traffic Control at Work Sites Manual</i> (RTA, 2010) and <i>QA Specification G10 Control of Traffic</i> (Roads and Maritime, 2008). The TMP will include:</p> <ul style="list-style-type: none"> <li>• confirmation of haulage routes</li> <li>• measures to maintain access to local roads and properties</li> <li>• site-specific traffic control measures (including signage) to manage and regulate traffic movement</li> <li>• measures to maintain pedestrian and cyclist access</li> <li>• requirements and methods to consult and inform the local community of impacts on the local road network</li> <li>• access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads</li> <li>• a response plan for any construction traffic incident</li> </ul> <p>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</p>	Contractor	Detailed design / Pre-construction	Section 4.8 of QA G36 Environment Protection

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<p>vehicle traffic monitoring, review and amendment mechanisms</p> <ul style="list-style-type: none"> <li>detour routes for any short-term closures of Picnic Parade.</li> </ul>			
TT2	Emergency services vehicles and buses	Traffic management measures will be implemented to ensure larger emergency services vehicles and buses can negotiate the intersection during construction.	Contractor	Construction	Additional measure
TT3	Emergency services vehicles	Brisbane Water Ambulance and Umina Fire and Rescue will be kept informed of construction activities and any relevant changes to traffic management arrangements.	Contractor	Construction	Additional measure
TT4	Temporary loss of parking	Alternative parking arrangements, particularly during events at Ettalong Oval / Kitchener Park, will be communicated to affected people in consultation with Central Coast Council.	Roads and Maritime project manager	Construction	Additional measure
LV1	Landscape character and visual impact	<p>An Urban Design Plan (including detailed urban design drawings and landscape plans) will be prepared to support the final detailed project design.</p> <p>The Urban Design Plan will present an integrated urban design for the project, providing further practical detail on the application of design principles and objectives identified in this REF. The Plan will build on the urban design concept described in this REF and confirm design treatments for:</p> <ul style="list-style-type: none"> <li>location and identification of existing vegetation and proposed landscaped areas, including species to be used</li> <li>pedestrian and cyclist elements including footpath location, paving types and pedestrian crossings</li> <li>fixtures such as seating, lighting, fencing and signs</li> <li>details of the staging of landscape works taking account of related environmental controls such as erosion and sedimentation controls and drainage</li> </ul>	Contacto	Detailed design / pre-construction	Standard measure

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> <li>procedures for monitoring and maintaining landscaped or rehabilitated areas.</li> </ul> <p>The Urban Design Plan will be prepared in accordance with relevant guidelines, including:</p> <ul style="list-style-type: none"> <li>Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014)</li> <li>Landscape Guideline (Roads and Maritime Services, 2019).</li> </ul>			
LV2	Visual impact during construction	An Ancillary Facilities Plan will be prepared and will include a layout of compound/storage areas to maximise screening and minimise visual impact. Routine inspections will be conducted to ensure sites are maintained in a clean state.	Contractor	Construction	Additional measure
LV3	Visual impact during construction	Following the completion of construction works, plant/equipment will be removed, and disturbed areas will be revegetated, turfed or otherwise restored as appropriate.	Contractor	Construction	Additional measure
LV4	Visual impact during construction	Replacement plantings will be provided at a 2:1 ratio and opportunities for early plantings outside the road corridor would be reviewed in consultation with Central Coast Council.	Contractor Roads and Maritime	Construction	Additional measure
LV5	Impact from lighting	Temporary site lighting will be installed and operated in accordance with AS4282:1997 Control of the Obtrusive Effect of Outdoor Lighting, and an approved Traffic Management Plan.	Contractor	Construction	Additional measure
NV1	Noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP.	Contacto	Detailed design / pre-construction	Section 4.6 of QA G36 <i>Environment Protection</i>
NV2	Noise and vibration	The NVMP will generally follow the approach in the Interim Construction Noise Guideline (ICNG) (DECC, 2009) and the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016) and identify:	Contacto	Pre-construction	Section 4.6 of QA G36 <i>Environment Protection</i>

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> <li>• all potential significant noise and vibration generating activities associated with the activity</li> <li>• feasible and reasonable mitigation measures to be implemented</li> <li>• a monitoring program to assess performance against relevant noise and vibration criteria</li> <li>• a review process scheduling and assessing out-of-hours activities including consideration of alternatives to out-of-hours work, plant selection, work locations and screening to minimise impacts</li> <li>• a working schedule which records respite periods for extended out-of-hours works</li> <li>• arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures</li> </ul> <p>contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.</p>			
NV3	Construction vibration	<p>Where vibration intensive plant such as vibratory rollers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures. This includes adhering to the recommended minimum working distances for vibration intensive plant identified in Section 7.1 of the Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016).</p> <p>If recommended minimum working distances cannot be met by selecting smaller plant vibration monitoring will occur to quantify and help manage vibration emissions. If necessary, trial vibration measurements will be conducted before activities to further assess any possible impacts and buffer distances that may be required.</p>	Contactor	Construction	Additional measure

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NV4	Noise and vibration	<p>All sensitive receivers likely to be affected will be notified at least five working days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of:</p> <ul style="list-style-type: none"> <li>the project</li> <li>the construction period and construction hours</li> <li>contact information for project management staff</li> <li>complaint and incident reporting</li> </ul> <p>how to obtain further information.</p>	Contractor	Detailed design / pre-construction	Standard measure
HF1	Flooding and hydrology	Staging for the construction of the proposal will consider adequate stormwater flow paths (including diversions and temporary connections as required) to be implemented and maintained during construction to minimise the potential on-site or upstream flooding.	Contractor	Construction	Additional measure
HF2	Flooding and hydrology	A flood management procedure will be prepared to detail procedures to be implemented where extreme weather is predicted and where there is a risk of flooding affecting the work site and compound, including removal and storage of plant and equipment and securing of site.	Contractor	Construction	Additional measure
HF3	Flooding and hydrology	Locations where dewatering may be needed and requirements for the temporary storage of extracted water will be identified during pre-construction planning. Dewatering of construction excavations will occur in accordance with the Technical Guideline - Environmental Management of Construction Site Dewatering (Roads and Traffic Authority, 2011).	Contractor	Construction / pre-construction	Additional measure
BIO1	Biodiversity	A Flora and Fauna Management Plan will be prepared in accordance with Roads and Maritime's <i>Biodiversity Guidelines</i> :	Contractor	Pre-construction	Section 4.8 of QA G36

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<p><i>Protecting and Managing Biodiversity on RTA Projects</i> (RTA, 2011) and implemented as part of the CEMP.</p> <p>The Flora and Fauna Management Plan will include, but not be limited to:</p> <ul style="list-style-type: none"> <li>plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas</li> <li>pre-clearing survey requirements</li> <li>procedures for unexpected threatened species finds and fauna handling.</li> <li>protocols to manage weeds and pathogens.</li> </ul>			<i>Environment Protection</i>
BIO2	Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Roads and Maritime	Detailed design	Additional measure
BIO3	Biodiversity	An exclusion zone surrounding the area containing the five known specimens of <i>Syzygium paniculatum</i> will be established prior to commencement of work on replacing the guardrail on the north side of Maitland Bay Drive using hi-vis fencing or similar and signage.	Contractor	Construction	Additional measure
BIO5	Biodiversity	The narrow swale on the north side of Maitland Bay Drive will be protected by maintaining a ground cover on the embankment or other appropriate controls or temporary cover to minimise erosion and sedimentation.	Contractor	Construction	Additional measure
BIO6	Biodiversity	Mature trees to be retained adjacent to Maitland Bay Drive will be protected in accordance with AS 4970-2009 Protection of trees	Contractor	Construction	Additional measure

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		on development sites. This will include establishment of tree protection zones.			
SW1	Soils	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction.	Contractor	Pre-construction	Section 2.1 of QA G38 Soil and Water Management
SW2	Soils	A site-specific Erosion and Sediment Control Plan/s will be prepared and implemented as part of the Soil and Water Management Plan. The ESCP will follow the requirements of RMS specification G38.	Contractor	Pre-construction	Section 2.2 of QA G38 Soil and Water Management
SW3	Soils	The Erosion and Sediment Control Plan/s will include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather. The Plan/s will also include measures to minimise the impact of discharging site water to the swale on the northern side of Maitland Bay Drive.	Contractor	Pre-construction	Section 2.2 of QA G38 Soil and Water Management
SW4	Potential acid sulfate soils	An Acid Sulfate Soil Management plan will be prepared for the proposal in accordance with the Guidelines for the Management of Acid Sulfate Materials: Acid Sulfate Soils, Acid Sulfate Rock and Monosulfidic Black Ooze (Roads and Traffic Authority, 2005). The plan will include specific measures to prevent any water quality impacts or effects on aquatic and terrestrial ecology.	Contractor	Pre-construction	Additional measure
SW5	Contaminated land– potential onsite and off-site sources	An unexpected finds procedure will be developed in the proposal CEMP for contamination. The procedure will ensure that if contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of	Contractor	Detailed design / Pre-construction	Section 4.2 of QA G36 <i>Environment Protection</i>

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		contamination. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Roads and Maritime Environment Manager and/or EPA.			
SW6	Water quality	Discharge of highly chlorinated water is to be consistent with Central Coast Council requirements. There is to be no direct discharge to drainage lines or inlets.	Contractor	Construction	Additional measure
SW7	Accidental spill	A site-specific emergency spill plan will be developed and include spill management measures in accordance with the Roads and Maritime <i>Code of Practice for Water Management</i> (RTA, 1999) and relevant EPA guidelines.	Contractor	Detailed design / Pre-construction	Section 4.3 of QA G36 <i>Environment Protection</i>
SW8	Accidental spills	The emergency spill plan will address measures to be implemented in the event of a spill, including: <ul style="list-style-type: none"> <li>Initial response and containment (e.g. shutting valves, crimping of hoses, use of booms, pads and absorbent material)</li> <li>Notification of emergency services and relevant authorities (including Roads and Maritime and EPA officers).</li> </ul>	Contractor	Pre-construction	Section 4.3 of QA G36 <i>Environment Protection</i>
AH1	Aboriginal heritage	The Standard Management Procedure - Unexpected Heritage Items (Roads and Maritime, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Roads and Maritime does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place.	Contractor	Detailed design / pre-construction	Section 4.9 of QA G36 <i>Environment Protection</i>

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		Work will only re-commence once the requirements of that Procedure have been satisfied.			
AH2	Aboriginal heritage	Aboriginal cultural heritage awareness will be covered in site inductions and pre-work 'tool box' talks.	Contactora	Pre-construction	Additional measure
AH3	Aboriginal heritage	Opportunities for incorporation of Aboriginal cultural interpretative material as part of the proposal will be explored in consultation with Aboriginal stakeholders	Roads and Maritime	Detailed design	Additional measure
AQ1	Air quality	<p>An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to:</p> <ul style="list-style-type: none"> <li>• potential sources of air pollution (including compound operation)</li> <li>• air quality management objectives consistent with any relevant published EPA and/or OEH guidelines</li> <li>• mitigation and suppression measures to be implemented</li> <li>• methods to manage work during strong winds or other adverse weather conditions</li> </ul> <p>a progressive rehabilitation strategy for exposed surfaces.</p>	Contactora	Pre-construction	Section 4.4 of QA G36 <i>Environment Protection</i>
SE1	Socio-economic	<p>A Communication Plan will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The Communication Plan will include (as a minimum):</p> <ul style="list-style-type: none"> <li>• Mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions, and changes to available open space at Ettalong Oval</li> </ul>	Roads and Maritime Project Manager	Pre-construction	Standard safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> <li>Contact name and number for complaints</li> <li>Notification requirements for noise generating activities</li> </ul> <p>Procedures for communicating with other projects to determine the potential for concurrent activities and associated cumulative impacts.</p>			
HH1	Non-Aboriginal heritage	<p>The <i>Standard Management Procedure - Unexpected Heritage Items</i> (Roads and Maritime, 2015) will be followed in the event any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered.</p> <p>Work will only re-commence once the requirements of that Procedure have been satisfied.</p>	Contractor	Detailed design / pre-construction	Section 4.10 of QA G36 <i>Environment Protection</i>
UT1	Utilities	<p>Prior to the commencement of works:</p> <ul style="list-style-type: none"> <li>the location of existing utilities and relocation details will be confirmed following consultation with the affected utility owners</li> <li>If the scope or location of proposed utility relocation works falls outside of the assessed proposal scope and footprint, further assessment will be undertaken.</li> </ul>	Contacto	Detailed design / pre-construction	
HZ1	Hazards and risk management	<p>A Hazard and Risk Management Plan (HRMP) will be prepared and implemented as part of the CEMP. The HRMP will include, but not be limited to:</p> <ul style="list-style-type: none"> <li>details of hazards and risks associated with the activity (including consideration of bushfire)</li> <li>measures to be implemented during construction to minimise these risks</li> <li>record keeping arrangements, including information on the materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials</li> </ul>	Contacto	Detailed design / pre-construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> <li>a monitoring program to assess performance in managing the identified risks</li> </ul> <p>contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations.</p> <p>The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or Office of Environment and Heritage publications.</p>			

## 7.3 Licensing and approvals

Table 7-2 provides a summary of the licensing and approval requirements relevant to the proposal.

Table 7-2: Summary of licensing and approvals required

<b>Instrument</b>	<b>Requirement</b>	<b>Timing</b>
Water Management Act 2000 (Section 92)	Water supply work approval (for dewatering of excavations)	Prior to dewatering activity
<i>Roads Act 1993</i> (Section 138)	Road occupancy licence for lane closures on Maitland Bay Drive / Picnic Parade.	Prior to road occupancy

## 8. Conclusion

This chapter provides the justification for the proposal taking into account its biophysical, social and economic impact, the suitability of the site and whether or not the proposal is in the public interest. The proposal is also considered in the context of the objectives of the EP&A Act, including the principles of ecologically sustainable development as defined in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

### 8.1 Justification

The proposal would reduce average delays at the Maitland Bay Drive / Picnic Parade intersection, allowing it to operate efficiently well into the future, even with projected traffic growth. It would also improve safety and deliver better connections for pedestrians and cyclists.

There would be some short-term disruption while the proposal is being built, for example due to noise, traffic and amenity-based impact. These potential impacts are consistent with similar road-development proposals and would be addressed through standard safeguards and mitigation measures.

The proposal would result in some visual change which would be addressed through the design process and the provision of suitable landscaping. There would also be some impacts to biodiversity with the loss of about 0.13 hectares of highly disturbed vegetation, although significant impacts on threatened species and communities are not expected.

Overall the proposal is considered to be justified. It has been developed through an options assessment and refinement process (see Section 2.4) to identify a preferred option that best meets the proposal objectives, while minimising the construction and operational impact.

### 8.2 Objects of the EP&A Act

Table 8-1 below provides consideration of the proposal in accordance with the objects of the EP&A Act.

Table 8-1: Objects of the EP&A Act review

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The proposal would improve safety. Social and economic impacts are assessed in Section 6.8. The assessment includes management measures to avoid and/or minimise impacts
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development is considered in Sections 8.2.1 – 8.2.4 below.
1.3(c) To promote the orderly and economic use and development of land.	The proposal supports growth (and associated increases in travel demand) in the local area.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the project.

Object	Comment
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 proposal involves the use of land which has primarily been zoned for road purposes. The would be a minor loss of native vegetation (about 0.13 hectares), however impacts on threatened species and communities have been assessed as not significant.  There would also be acquisition of a small area of passive open space at the northern end of Ettalong Oval, however this would not impact function or affect biodiversity.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	There is not expected to be any impacts on Aboriginal and non-Aboriginal heritage. Refer to Section 6.7 and Section 6.8 respectively
1.3(g) To promote good design and amenity of the built environment.	As part of the design development of the proposal, consideration of the environment, landscape and visual impacts occurred. Landscape character and visual impacts are considered in Section 6.2.
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 project.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the project.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	The proposal development process has involved extensive consultation with relevant stakeholders and the community. Consultation carried out to date and proposed ongoing consultation is outlined in Chapter 5.

## 8.2.1 The precautionary principle

The precautionary principle deals with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

The threat of serious or irreversible environmental damage is one of the essential preconditions to the engagement of the precautionary principle. In this case there is no threat of serious or irreversible environmental damage.

## 8.2.2 Intergenerational equity

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The proposal would not impact on the health, diversity and productivity of the local environment or communities in a way that would disadvantage future generations.

### 8.2.3 Conservation of biological diversity and ecological integrity

The twin principles of biodiversity conservation and ecological integrity have been a consideration during the design and assessment process with a view to identifying, avoiding, minimising and mitigating impacts.

The proposal is not expected to have significant biodiversity impacts. Refer to Section 6.5.

### 8.2.4 Improved valuation, pricing and incentive mechanisms

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by a project, including air, water, land and living things. While it is often difficult to place a reliable monetary value on the residual, environmental and social effects of the project, the value placed on environmental resources within and around the corridor is evident in the extent of environmental investigations, planning and design of impact mitigation measures to prevent adverse environmental impacts.

## 8.3 Conclusion

The proposed upgrade of the Maitland Bay Drive and Picnic Parade intersection at Ettalong Beach is subject to assessment under Division 5.1 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration (where relevant) of conservation agreements and plans of management under the NPW Act, biodiversity stewardship sites under the BC Act, wilderness areas, areas of outstanding value, impacts on threatened species 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 proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives but would still result in some impacts on biodiversity, the visual environment and amenity. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also deliver benefits in terms of reduced delays, improved safety and better pedestrian and cyclist connections. On balance, the proposal is considered justified and the following conclusions are made.

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

The proposal 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 proposal 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 proposal is not likely to have a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the *Environment Protection and Biodiversity Conservation Act 1999*. A referral to the Australian Department of the Environment and Energy is not required.

## 9. Certification

This review of environmental factors provides a true and fair review of the proposal 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 proposal.



Stuart Hill

Environmental Planner

Beca

13 October 2019

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



Vicky Lee

Project Manager, Greater Sydney Project Office

13 October 2019

## 10. References

- Chapman, G. A., & Murphy, C. L. (1989). *Soil Landscapes of the Sydney 1:100,000 Sheet*. Sydney: Soil Conservation Services of NSW.
- Department of Environment and Climate Change. (2009). *Interim Construction Noise Guideline*. Sydney: Department of Environment and Climate Change.
- Department of Environment, Climate Change and Water. (2010). *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. Sydney: Department of Environment, Climate Change and Water.
- Department of Environment, Climate Change and Water. (2011). *NSW Road Noise Policy*. Sydney: Department of Environment, Climate Change and Water.
- Department of Planning. (1995). *Is an EIS required? : best practice guidelines for part 5 of the Environmental Planning and Assessment Act 1979*. Sydney: Department of Planning.
- Department of Urban Affairs and Planning. (1996). *Roads and Road Related Facilities EIS Guideline*. Sydney: Department of Urban Affairs and Planning.
- DHI. (2010). *Woy Woy Peninsula Flood Study Final Report*. Gosford: Gosford City Council.
- NSW Department of Planning and Environment. (2016). *Central Coast Regional Plan 2036*. Sydney: Department of Planning and Environment.
- Roads and Maritime Services. (2014). *Beyond the Pavement: Urban Design Policy, Procedures and Design Principles*. Sydney: Roads and Maritime Services.
- Roads and Maritime Services. (2015). *Noise Criteria Guideline*. Sydney: Roads and Maritime Services.
- Roads and Maritime Services. (2015). *Noise Mitigation Guideline*. Sydney: Roads and Maritime Services.
- Roads and Maritime Services. (2016). *Construction Noise and Vibration Guideline*. Sydney: Roads and Maritime Services.
- Roads and Maritime Services. (2016). *Guideline for Biodiversity Offsets*. Sydney: Roads and Maritime Services.
- Roads and Maritime Services. (2018). *Environmental Impact Assessment Guidance Note EIA-N04 Guidelines for landscape character and visual impact assessment*. Sydney: Roads and Maritime Services.
- Roads and Maritime Services. (2018). *Roads and Maritime Services Corporate Plan 2018-2021*. Sydney: Roads and Maritime Services.
- Roads and Traffic Authority. (2001). *Environmental Noise Management Manual*. Sydney: Roads and Traffic Authority.
- Roads and Traffic Authority. (2005). *Guidelines for the Management of Acid Sulfate Materials: Acid Sulfate Soils*. Sydney: Roads and Traffic Authority.
- Transport for NSW. (2013). *Central Coast Regional Transport Plan 2013*. Sydney: Transport for NSW.
- Transport for NSW. (2018). *Future Transport Strategy 2056*. Sydney: Transport for NSW.

## Terms and acronyms used in this REF

Term / Acronym	Description
ARI	Average Recurrence Interval
BC Act	<i>Biodiversity Conservation Act 2016</i> (NSW).
CEMP	Construction environmental management plan
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	<i>Fisheries Management Act 1994</i> (NSW)
Heritage Act	<i>Heritage Act 1977</i> (NSW)
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.
NPW Act	<i>National Parks and Wildlife Act 1974</i> (NSW)
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.
QA Specifications	Specifications developed by Roads and Maritime Services for use with road work and bridge work contracts let by Roads and Maritime Services.

## Appendix A

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

## Clause 228(2) Checklist

In addition to the requirements of the *Is an EIS required?* guideline (DUAP 1995/1996) and the *Roads and Related Facilities EIS Guideline* (DUAP 1996) as detailed in the 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 proposal on the natural and built environment.

Factor	Impact
<p>a) Any environmental impact on a community? The proposal would have the potential for short-term traffic and transport and noise impacts on nearby residents and road users during construction. There would be potential for localised dust impacts and potential temporary changes to private property access. Safeguards have been proposed to minimise the extent and duration of these potential impacts.</p>	Minor short-term negative
<p>b) Any transformation of a locality? The proposal would not result in the transformation of a locality as the works would occur in an existing road corridor and are limited in scope and extent.</p>	Nil
<p>c) Any environmental impact on the ecosystems of the locality? The proposal would result in the removal of about 0.13 hectares of highly disturbed urban vegetation (managed landscape). There would be removal of threatened fauna species foraging habitat including seasonal flowing resources. Assessments of significance determined that the proposal is unlikely to have a significant impact on the biodiversity values of the area.</p>	Minor short-term negative
<p>d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? The proposal would have minor short-term and long-term negative aesthetic impacts. Safeguards have been proposed to address the identified potential impacts. A reduction in recreational, scientific or other environmental quality or value of the locality is not anticipated</p>	Minor short-term negative
<p>e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The proposal would not have an effect on a locality, place, building of aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations.</p>	Nil
<p>f) Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks and Wildlife Act 1974</i>)? The proposal would impact the habitat of protected fauna with 0.13 hectares of foraging habitat removed. The assessment of significance determined that the removal of this vegetation would not constitute a significant impact for threatened species.</p>	Minor short-term negative
<p>g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposal would not endanger any species of animal, plant or other form of life.</p>	Nil
<p>h) Any long-term effects on the environment? The nature and scale of the proposal are such that long-term effects on the environment are not expected.</p>	Nil

Factor	Impact
<p>i) Any degradation of the quality of the environment? The proposal would have some potential for temporary degradation of the quality of the environment through the generation of dust, potential release of sediment, noise generation, and vegetation clearing. Safeguards have been proposed to address this risk.</p>	<p>Minor short-term negative</p>
<p>j) Any risk to the safety of the environment? During construction, the proposal would involve minimal risk to the safety of the environment due to the limited scope of works and the implementation of appropriate work health and safety measures.</p>	<p>Nil</p>
<p>k) Any reduction in the range of beneficial uses of the environment? The proposal would not reduce the range of beneficial uses of the environment.</p>	<p>Nil</p>
<p>l) Any pollution of the environment? The proposal would not result in pollution of the environment. There would be short-term minor risks to local water quality in the event of a spill or release of sediment off site. Noise would be generated during construction and there would be potential for dust generation. Safeguards have been proposed to address the risk of pollution.</p>	<p>Minor short-term negative</p>
<p>m) Any environmental problems associated with the disposal of waste? Waste generated by the proposal would be contained and removed for disposal at approved facilities or appropriately licenced landfill.</p>	<p>Nil</p>
<p>n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The proposal would not increase demand for resources which are, or likely to become, in short supply.</p>	<p>Nil</p>
<p>o) Any cumulative environmental effect with other existing or likely future activities? The proposal is not expected to result in cumulative impacts given its relatively small scale and the absence of other development works in the immediate locality.</p>	<p>Nil</p>
<p>p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposal would not impact coastal processes and coastal hazards.</p>	<p>Nil</p>

# Matters of National Environmental Significance and Commonwealth land

Under the environmental assessment provisions of the EPBC Act 1999, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government Department of the Environment and Energy.

A referral is not required for proposed actions that may affect nationally listed threatened species, endangered ecological communities and migratory species. Impacts on these matters are still assessed as part of the REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Factor	Impact
a) Any impact on a World Heritage property? The proposal would not impact on World Heritage property given lack of proximity.	Nil
b) Any impact on a National Heritage place? The proposal would not impact on a National Heritage place given lack of proximity.	Nil
c) Any impact on a wetland of international importance? The proposal is not located near a wetland of international importance. Indirect impacts are not expected.	Nil
d) Any impact on a listed threatened species or communities? The proposal would not affect Commonwealth listed species or communities.	Nil
e) Any impacts on listed migratory species? Listed migratory species are considered unlikely to occur in the proposal area given the lack of suitable habitat.	Nil
f) Any impact on a Commonwealth marine area? The proposal would not impact on a Commonwealth marine area given lack of proximity.	Nil
g) Does the proposal involve a nuclear action (including uranium mining)? The proposal does not involve a nuclear action.	Nil
h) Additionally, any impact (direct or indirect) on the environment of Commonwealth land? The proposal would not affect Commonwealth land.	Nil

## Appendix B

### Statutory consultation checklists

# Infrastructure SEPP

## Certain development types

Development type	Description	Yes / No	If 'yes' consult with	ISEPP clause
Car Park	Does the project include a car park intended for the use by commuters using regular bus services?	No		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

## Council related infrastructure or services

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
Stormwater	Are the works likely to have a <i>substantial</i> impact on the stormwater management services which are provided by council?	Yes	Central Coast Council consulted See Section 5.4	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)
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	No		ISEPP cl.13(1)(d)

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
	so, will this require the use of a <i>substantial</i> volume of water?			
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?	Yes	Central Coast Council consulted See Section 5.4	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?	Yes	Central Coast Council consulted See Section 5.4	ISEPP cl.13(1)(f)

### Local heritage items

Issue	Potential impact	Yes / No	If 'yes' consult with	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?	Minor impacts only	Central Coast Council consulted due to location on flood liable land See Section 5.4	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	Yes	State Emergency Services consulted See Section 5.4	ISEPP cl.15AA

**Public authorities other than councils**

<b>Issue</b>	<b>Potential impact</b>	<b>Yes / No</b>	<b>If 'yes' consult with</b>	<b>ISEPP clause</b>
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	Office of Environment and Heritage	ISEPP cl.16(2)(a)
National parks and reserves	Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No	Office of Environment and Heritage	ISEPP cl. 16(2)(b)
Aquatic reserves	Are the works adjacent to an aquatic reserve or a marine park declared under the <i>Marine Estate Management Act 2014</i> ?	No	Department of Industry	ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the <i>Sydney Harbour Foreshore Authority Act 1998</i> ?	No	Sydney Harbour Foreshore Authority	ISEPP cl.16(2)(d)
Bush fire prone land	Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional centre or group home in bush fire prone land?	No	Rural Fire Service	ISEPP cl.16(2)(f)
Artificial light	Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	No	Director of the Siding Spring Observatory	ISEPP cl.16(2)(g)
Defence communications buffer land	Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhardt LEP 2012, Narrandera LEP 2013 and Urana LEP 2011.	No	Secretary of the Commonwealth Department of Defence	ISEPP cl. 16(2)(h)
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the <i>Mine Subsidence Compensation Act 1961</i> ?	No	Mine Subsidence Board	ISEPP cl. 16(2)(i)



[rms.nsw.gov.au/](https://rms.nsw.gov.au/)



13 22 13



Customer feedback  
Roads and Maritime  
Locked Bag 928,  
North Sydney NSW 2059

**October 2019**  
RMS 19.1414  
ISBN: 978-1-922338-01-3