PACIFIC HIGHWAY UPGRADE – WARRELL CREEK TO NAMBUCCA HEADS

North Macksville Ramps – Modification Environmental Assessment

MARCH 2016

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Document Control

Document description

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General Description	Modification Environmental Assessment Report relating to the North Macksville Ramps and associated refinements in the vicinity of Old Coast Road, Letitia Close and the Pacific Highway near North Macksville that are not deemed consistent with the Approved Project.	

Document development

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Revision	**Date**	Sarah Webb	Mike Luger	
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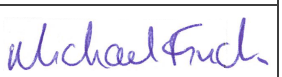
03	27 January 2016			

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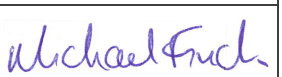
04	09 March 2016			

Issue summary

Revision	**Date**	**Issue description**	**Distribution**
01	06-11-2015	First Draft	RMS and AFJV review
02	11-12-2015	Final Draft	RMS and AFJV review
03	27-01-2016	Final	RMS and AFJV
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Glossary

AADJV	Arup Aurecon Design Joint Venture
AADT	Annual average daily traffic
AFJV	Acciona-Ferrovial Joint Venture
AHIMS	Aboriginal Heritage Information Management System
Approved Project	The Approved Project represents the scope of works as originally approved, including realignment of Old Coast Road to pass above the upgraded highway but not including north facing ramps at North Macksville
ASS	Acid sulfate soils
Consistency Assessment	A report undertaken to assess whether design refinements or minor changes to a project
dB; Decibel	A relative unit of measurement widely used in acoustics, electronics and communications. The dB is a Logarithmic unit used to describe a ratio between the measured level and a reference or threshold level of 0dB. The ratio may be Sound Power, Sound Pressure, voltage or Sound Intensity etc
EA	Environmental Assessment
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process
LEP	Local Environmental Plan
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers
Modification	An environmental impact assessment undertaken in terms of Section 75 W Act to seek approval to an additional element of a project that has been approved under Part 3A of the EP&A Act
PAD	Potential archaeological deposit
PAS	Potential archaeological sensitivity
RMS	NSW Roads and Maritime Services
Roads and Maritime	NSW Roads and Maritime Services
RoTAP	Rare or Threatened Australian Plants
SEPP	State Environmental Planning Policy
WC2NH	Warrell Creek to Nambucca Heads

1. Introduction

1.1 Background

Roads and Maritime has engaged Pacifico, an Acciona and Ferrovial Joint Venture, to design and build the 20 kilometre Warrell Creek to Nambucca Heads section of the Pacific Highway upgrade. The Approved Project involves upgrading the highway to a four lane divided road between the Allgomera deviation, south of Warrell Creek and Nambucca Heads, just south of the railway line (the project).

Roads and Maritime Services (Roads and Maritime) completed an environmental assessment of the Warrell Creek to Urunga Pacific Highway upgrade (the Project EA) in January 2010. The Project EA identified a range of environmental, social and planning issues associated with the design, construction and operation of the Pacific Highway Upgrade between Warrell Creek and Urunga and proposed measures to mitigate or manage the potential impacts. The project was designated critical infrastructure, under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and was formally approved on 19 July 2011. Following the approval of the Project EA, seven modifications to the Project EA have been approved.

For the purposes of this document, the concept design described and assessed in the Project EA and modifications, and approved by the Minister is referred to as the Approved Project.

Following approval of the project, representations from Nambucca Shire Council and the Macksville Chamber of Commerce were considered which has resulted in a modification to the Approved project being proposed at North Macksville. The design, construction and operation of the proposed modification is the subject of this modification environmental assessment (the proposed modification).

The proposed modification would generally include a northbound on ramp onto the upgraded Pacific Highway, a southbound off ramp from the upgraded Pacific Highway, connection of the ramps to local roads, an upgraded intersection at Old Coast Road and the existing Pacific Highway (existing highway) and a median cross-over facility to enable emergency vehicles (including ambulances stationed at North Macksville) to travel north and south on the upgraded highway. **Section 2.2** provides a full description of the proposed modification.

Three options for the design of the proposed modification were investigated and developed by Roads and Maritime. An Options Assessment workshop was held by Roads and Maritime to compare and assess the three options using a Value Management methodology. From this workshop Option 2 was selected as the preferred option.

The Preferred Option Report was displayed from 16 September to the 12 October 2015. Community comment was invited and in consideration of submissions received some refinements were made to the proposed modification. Community consultation is discussed further in **Section 4**.

This modification environmental assessment would be submitted to the NSW Department of Planning and Environment in order to request planning approval as part of a Modification under Section 75W of the EP&A Act.

The modification environmental assessment may be displayed by the NSW Department of Planning and Environment and public comment invited. In this instance, a Submissions Report would be prepared on the basis of submissions received during public display and the concept design and environmental assessment may be further refined in response to public feedback.

Following the NSW Department of Planning and Environment approval of the modification, construction would proceed subject to meeting any approval conditions.

1.2 Purpose of this report

This modification environmental assessment provides an overview of:

- The process leading to the selection of the preferred design for the proposed modification
- The community consultation activities and outcomes undertaken in relation to the proposed modification
- An assessment of the potential impacts of the proposed modification and the measures proposed to mitigate or manage the potential impacts.

The modification environmental assessment builds upon work already undertaken in the Warrell Creek to Urunga Pacific Highway upgrade environmental assessment, the Warrell Creek to Urunga Pacific Highway upgrade environmental assessment submissions report, the North Facing Ramps Options Assessment Report (May 2015), North Facing Ramps Preferred Option Report (Sep 2015) and the North Macksville Ramps submission report (Dec 2015).

This modification environmental assessment seeks planning approval for the proposed modification as a modification to the Approved Project under Section 75 W of the EP&A Act.

1.3 Benefits of the proposed modification

The proposed modification would provide improvements to the Warrell Creek to Nambucca Heads Pacific Highway upgrade. Benefits of the proposed modification would include:

- Improved connectivity between Macksville and areas to the north, and in particular the proposed modification would provide improved connectivity between Macksville and Nambucca Heads
- Improved connectivity to Macksville - While Macksville is not identified by Roads and Maritime as a Service Centre, the addition of the proposed modification and appropriate signage would, in conjunction with the Bald Hill Road interchange to the south, allow both northbound and southbound vehicles using the upgraded highway to stop at Macksville more easily
- Improved utilisation of the upgraded highway between Macksville and the Nambucca Heads interchange by providing north facing ramps at North Macksville
- Safer and faster travel onto the upgraded highway for Macksville traffic travelling north
- Improved access to and from Macksville by emergency services and reduced emergency response times
- Improved heavy vehicle access between the existing highway and Old Coast Road.

1.4 Project objectives

Specific project objectives were developed for the Warrell Creek to Nambucca Heads upgrade. These objectives align with and relate to the overall objectives for the wider Pacific Highway Upgrade Program. These project objectives were reviewed for the proposed modification. The project objectives that are relevant to the proposed modification are:

- Develop solutions for the ultimate grade separation of the Pacific Highway and local road intersections including consolidation of accesses by the use of service roads
- Provide rest areas within the investigation area
- Achieve safe driving conditions on the highway for travel speeds of 110 km/h in rural areas and 80 km/h in urban areas
- Have acceptable roadway capacity for traffic volumes 30 years after opening
- Develop a dual carriageway road that accommodates all vehicles up to and including B-Doubles
- Provide acceptable access to properties
- Maintain highway access during flood conditions
- Integrate input from local communities into the development of the proposal
- Provide connections from the upgraded highway to the key centres of Macksville, Nambucca Heads and Urunga
- Develop delay management strategies to minimise disruption to local and through traffic and maintain access to affected properties and land during construction
- Provide transport infrastructure that is complementary with surrounding land use
- Ensure the project outcomes achieve value for money
- Develop solutions that facilitate the staged construction of the project.

2. Description of the proposed modification

2.1 The Approved Project

The Approved Project consists of the upgrade of about 42 kilometres of the Pacific Highway. The upgrade commences at the northern end of the existing Allgomera deviation of the Pacific Highway, south of Warrell Creek and ends at the existing Waterfall Way interchange to the north. The Approved Project was divided into two sections for construction:

- Nambucca Heads to Urunga Pacific Highway upgrade: A 22 kilometre long project which involves upgrading the highway to a four lane divided road between Nambucca Heads, just south of the railway line and the existing waterfall Way interchange at Raleigh
- Warrell Creek to Nambucca Heads Pacific Highway upgrade: A 20 kilometre project which involves upgrading the highway to a four lane divided road between the Allgomera deviation, south of Warrell Creek and Nambucca Heads, just south of the railway line.

The proposed modification is located within the Warrell Creek to Nambucca Heads Pacific Highway upgrade section of the Approved Project.

The Approved Project includes two grade separated interchanges at:

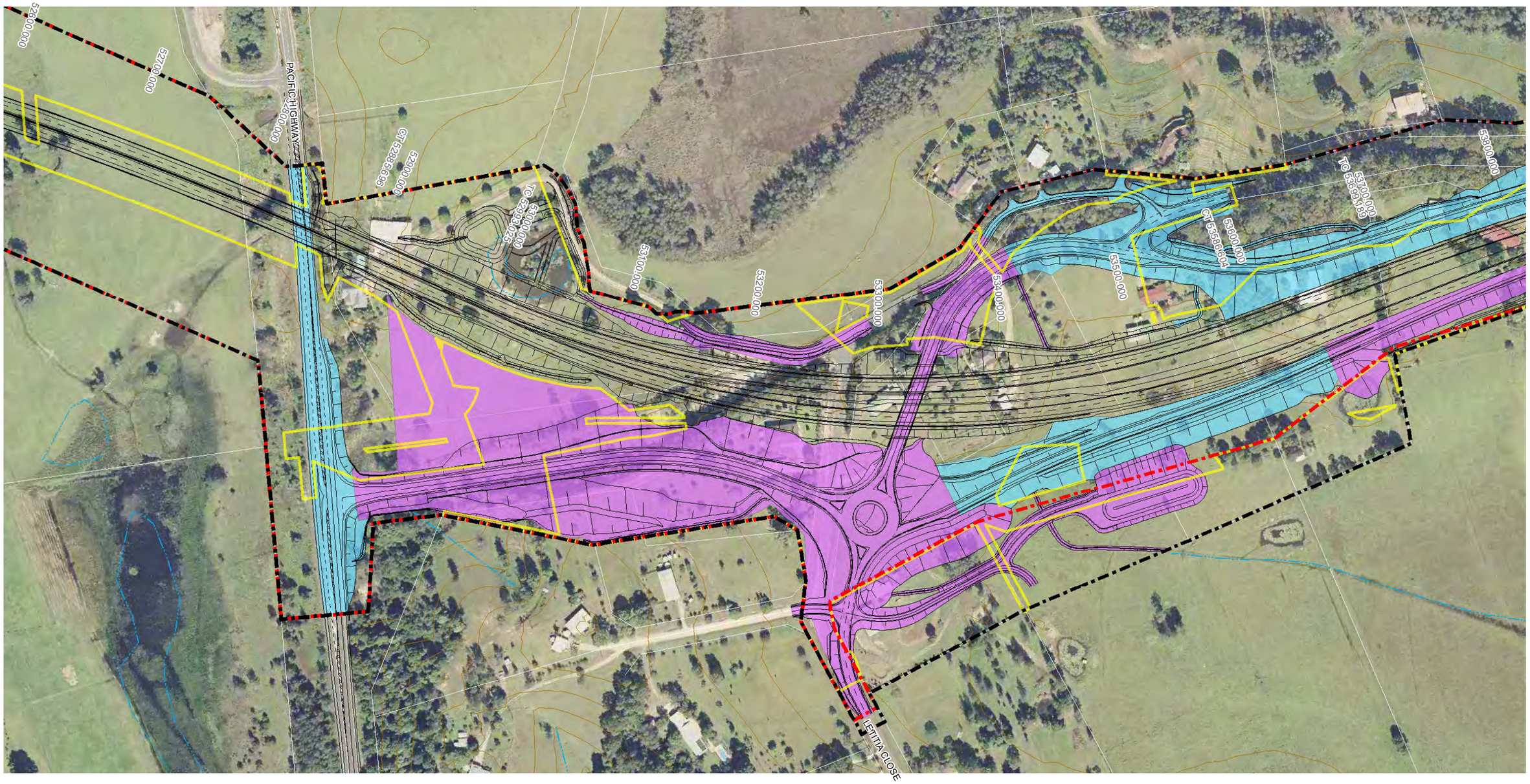
- South Macksville at Bald Hill Road
- Warrell Creek at Browns Crossing Road.

In response to representations received from Nambucca Shire Council and the Macksville Chamber of Commerce, Roads and Maritime announced, in September 2014, that north facing ramps would be included at North Macksville. This new interchange would be provided in addition to the two approved interchanges. This was not part of the Approved Project.

2.2 Description of the proposed modification

This modification environmental assessment addresses the introduction of the North Macksville Ramps. The proposed modification is located at North Macksville to the north of the Pacific Highway and east of Old Coast Road. The concept plan for the proposed modification is shown in **Figure 2-1**. The proposed modification generally includes:

- Construction of North Macksville Ramps at the site of the Old Coast Road overbridge. New ramps would include a northbound on ramp onto the upgraded highway and a southbound off ramp from the upgraded highway
- Connection of the ramps to local roads including:
  - The northbound on ramp connects to the realigned Old Coast Road South with a T-intersection where the priority has been reversed, with access onto the northbound on ramp given priority over traffic from Old Coast Road
  - The southbound off ramp connects with Old Coast Road south and Letitia Close at a new roundabout.
- Upgrade of the existing channelised intersection where Old Coast Road south connects to the existing Pacific Highway
- Relocation of an emergency U-turn facility
- Property access adjustments.



Subject to modification
Subject to consistency review
Approved project boundary (including design refinements)
North Facing Ramps proposed project boundary (03/09/2015 including Design refinements)
Approved clearing limit (including design refinements, MaCR, MiCR) inside proposed boundary only
Design under modification

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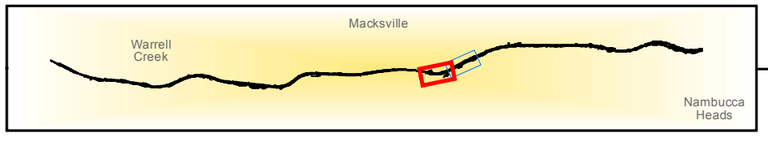

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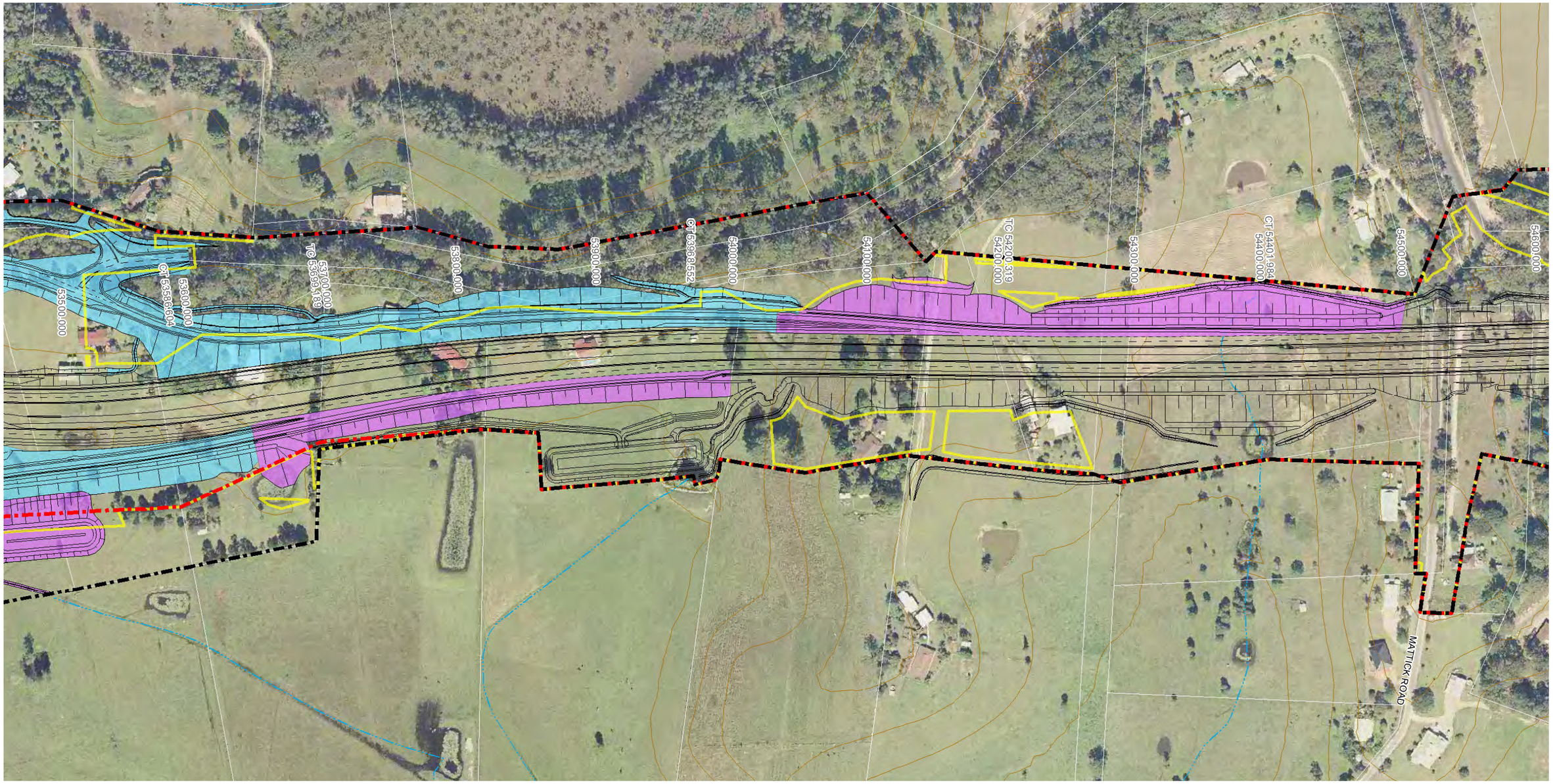
PACIFIC HIGHWAY UPGRADE **WC2NH**

North Facing Ramps at North Macksville – Modification environmental assessment

Projection: GDA 1994 MGA Zone 56
Source: RMS, AADJV, Geolink, Benwell

FIGURE: Assessment reviews (Map 1 of 2)



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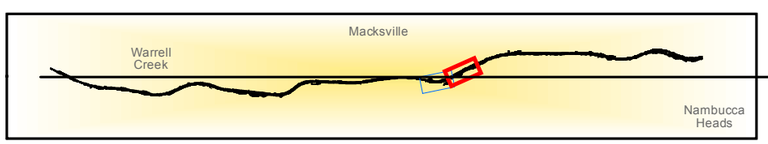

PACIFIC HIGHWAY UPGRADE **WC2NH**
North Facing Ramps at North Macksville – Modification environmental assessment

Projection: GDA 1994 MGA Zone 56
Source: RMS, AADJV, Geolink, Benwell

FIGURE: Assessment reviews
(Map 2 of 2)

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2.2.1 Northbound ramp

The northbound on ramp is about 500 metres long from the intersection with the realigned Old Coast Road to the connection to the merge taper (chainage 53,550 to 54,050) as shown in **Figure 2-1**. The cross section of the ramp consists of a 3.5 metre lane with a two metre left hand side shoulder and a one metre right hand side shoulder. The ramp has a 0.9 per cent down-grade which would assist with acceleration for merging with the upgraded highway. The length of the on ramp achieves a truck speed of 75 km/h at the start of the 110 metre merge length.

The northbound on ramp would connect with a section of realigned Old Coast Road as a T-intersection. The proposed Old Coast Road ties-in with the existing Old Coast 100 metres north of the T-intersection. To the south, the proposed Old Coast Road connects in with the Approved Project before crossing the highway at an overbridge. The batters on the western side of road have been designed to reduce vegetation clearance in this area.

The majority of traffic using the ramps would approach from the existing Pacific Highway and the intersection has been designed to give priority to traffic as they enter the ramp. The intersection is T-intersection with priority given to northbound on ramp traffic over southbound traffic from Old Coast Road. Due to the comparatively low turning traffic volumes of southbound traffic on Old Coast Road, for this intersection, no channelised left turn lane is provided. One light would be installed to light the intersection and additional signage would be installed. Current pedestrian and cyclist access would remain unchanged.

2.2.2 Southbound ramp

The southbound off ramp is about 350 metres long from the realigned Old Coast Road to the connection to the exit taper (chainage 53,300 to 53,650) as shown in **Figure 2-1**. The cross section of the ramp consists of a 3.5 metre lane with a two metre left hand side shoulder and a one metre right hand side shoulder. The ramp has a three per cent climbing grade which would assist with deceleration.

A roundabout would connect the southbound off ramp to Old Coast Road and Letitia Close. The T-intersection of the Old Coast Road and Letitia Close, as outlined in the Approved Project, would be modified through line marking and batter refinements. Four additional lights (one light is currently approved) and signage relating to the roundabout and ramps would also be installed. Current pedestrian and cyclist facilities would be upgraded to provide access for crossing Old Coast Road on the southern side of the roundabout and Letitia Close.

The roundabout would control speeds, improve visibility and allows safe and convenient access to Letitia Close from all directions. The roundabout has an 11 metre radius central island and a 20 metre radius inscribed circle, and is designed for B-Double access to and from the ramps.

This proposed modification retains the visual mound on the east side as described in the Approved Project. With the ramp in place the mound extends from chainage 53,425 to 53,650, with the ramp itself effectively extending the visual barrier to the upgraded highway where it is on fill as it climbs to the Old Coast Road roundabout.

2.2.3 Upgrade of existing highway intersection

Upgrade of the existing channelised intersection where Old Coast Road connects to the existing Pacific Highway would be retained and upgraded to allow for heavy vehicles to use the ramps. The lower volume of traffic on the existing highway means that the existing layout with two lanes northbound and separate right and left turn lanes off the highway would meet capacity requirements. The proposed line marking along the existing highway has been revised to allow for the safe merging of southbound traffic along the existing Pacific Highway after exiting Old Coast Road south.

An increase in heavy vehicles using Old Coast Road would require the replacement of an existing culvert about 40 metres north of the intersection.

2.2.4 Emergency U-turn facility

A combined median cross-over, emergency U-turn and heavy vehicle stopping bay was located at Chainage 54,000 in the Approved Project. This would coincide with the location of the proposed modification creating an operational safety issue. In order to future-proof the design for the possible addition of North Macksville Ramps it was agreed prior to the 85% detailed design issue of the Approved Project that the facility would be relocated to Chainage 54,750, which is just north of Mattick Road. The design and construction of the facility is the same as the Approved Project, however the location has changed.

The revised location of the median crossover facility is 500 metres north of the ramp merge and diverge and creates the opportunity for improved emergency vehicle access in the area. In the event of a major incident south of the Nambucca River, the median cross-over would provide quick access to the incident from the north side of the river.

It should however be noted that additional measures beyond the standard signage may need to be taken at the cross-over to prevent illegal (and unsafe) usage of the cross-over by other traffic.

2.2.5 Property access adjustments

As a result of the proposed modification, property accesses would require relocation or adjustments.

A new property access, for four properties, would be constructed at chainage 53,550, on the northern section of the realigned Old Coast Road. The new paved property access, would be constructed to tie into the existing access roads while minimising established tree removal. A hardstand area would provide space for eight garbage bins and four letter boxes and a nearby single street light, would provide a visual cue to provide safe access to the four properties.

3. Legislative and planning framework

3.1 Environmental Planning and Assessment Act 1979

3.1.1 Approved Project context

On 5 December 2006, the Minister for Planning under 75B(1) of the EP&A Act ordered 13 components of the Pacific Highway upgrade, including the Warrell Creek to Urunga Pacific Highway upgrade, to be a project to which Part 3A of the Act applies.

The EP&A Act also provides that any project to which Part 3A applies can be declared to be a Critical Infrastructure project if it is of a category that, in the opinion of the Minister for Planning, is essential for the State for economic, social or environmental reasons. On 5 December 2006, the Minister for Planning also declared the same 13 components of the Pacific Highway upgrade to be essential for the State for economic and social reasons. The Warrell Creek to Urunga Pacific Highway upgrade was therefore deemed to be a Critical Infrastructure project under Section 75C of the Act.

The order and declaration were gazetted in the NSW Government Gazette No.175 on 8 December 2006.

The project (excluding the proposed modification) was approved by the Minister for Planning under Part 3A of the EP&A Act on 19 July 2011. Any refinements to the project which are not consistent with the Approved Project must be approved by the Minister for Planning under Section 75W(2) of the Act.

3.1.2 Proposed modification

The Roads and Maritime considers that the proposed modification outlined in this modification environmental assessment is not consistent with the approval for the Warrell Creek to Urunga Pacific Highway upgrade project. Accordingly, the Roads and Maritime propose to seek a modification of the Minister's approval under Section 75W(2) of the EP&A Act.

This modification environmental assessment to the Approved Project has been prepared for the purposes of seeking approval for the proposed North Macksville Ramps as a modification to the Warrell Creek to Urunga Pacific Highway upgrade project.

3.1.3 Director General's requirements

As part of the Part 3A approvals process, the Minister for Planning issues Director General's requirements (DGRs) also known as environmental assessment requirements. The DGRs identify the key issues for the project which are to be addressed within the environmental assessment.

Additional DGRs were not issued for this modification environmental assessment, and as such, the Roads and Maritime has adopted the DGRs from the Warrell Creek to Urunga Pacific Highway upgrade environmental assessment as the key issues for this modification environmental assessment. This modification report addresses the relevant DGRs.

3.2 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The project was referred to the Commonwealth Minister for the Environment in accordance with the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC

Act). The Minister's decision (2013/7101) was received on 11 December 2014 subject to a number of conditions being met.

There have been two modifications of the approval since 11 December 2014. Modification 001 related to the revision numbers of the Koala and Spotted-tail Quoll Management Plans. Modification 002 was approved on 11 May 2015 and revised the wording of condition 1 to include additional area of Freshwater Wetland endangered ecological community.

A description of the likely impacts of the proposed modification against the Minister's conditions is discussed in **Section 6.6**.

3.3 Other environmental legislation

Other environmental legislation which would be relevant to the proposed modification has been reviewed. The review confirmed that there are no additional requirements over and above those already identified in the Warrell Creek to Urunga Pacific Highway upgrade environmental assessment.

4. Consultation

4.1 Community consultation

The North Macksville Ramps Preferred Option Report (Sep 2015) (Preferred Option Report) was placed on public display between 16 September and 12 October 2015.

Roads and Maritime prepared the Preferred Option Report to present and describe the three short-listed ramp options, report on potential impacts, compare the options, and outline how the Preferred Option was selected.

A total of 144 submissions were received in response to the display of the Preferred Option Report comprising one government agency and 143 from the community.

A Submissions Report was prepared (**Appendix B**) and each submission was examined individually to understand the issues being raised. The issues raised in each submission were extracted and collated, and corresponding responses to the issues provided. Where similar issues were raised in different submissions, only one response was provided.

From the submission topics, five main categories were identified regarding the North Macksville Ramps. These include:

- Project development process
- Design change suggestions
- Landscape and visual amenity
- Community consultation
- Noise and vibration.

Comments were considered and where appropriate further refinements were made to the design. These refinements include:

- Realignment of Old Coast Road bridge approach and the road immediately west of the upgraded highway to maximise the distance from private properties, minimise vegetation clearing, and maximise revegetation areas
- The realignment of Letitia Close to improve the safety at the roundabout
- An additional section of visual screening along the southbound off-ramp to reduce the impacts of headlight intrusion
- Addition of a vegetated visual mound on Letitia Close near the south east corner of the roundabout to reduce the impacts of headlight intrusion
- Increased shoulder width on Old Coast Road to accommodate cyclists
- Selection of specialised road lighting to reduce light spillage into adjacent properties
- Relocation of the school bus stop into Letitia Close
- Refinements to Old Coast Road pavement surface to reduce noise.

A more detail description of the refinements are available in **Appendix B**.

5. Options development

5.1 Option development

The introduction of the proposed modification required the examination of alternatives as to how the ramps could be incorporated to ensure that a range of project objectives were best realised. In August 2014, Pacifico developed a number of potential arrangements for review, from which Roads and Maritime selected three options for further investigation.

These three options were further developed and are outlined below. More detail on each option can be found in the Roads and Maritime North Macksville – North Facing Ramps Options Assessment (May 2015).

5.1.1 Option 1

Option 1 was closely aligned to the Approved Project layout which included realignment of Old Coast Road to pass over the upgraded highway. Option 1 was a comparatively simple addition to the Approved Project by adding north facing ramps which connected as T-intersections to the realigned Old Coast Road. At the new intersections priority would have been given to through traffic on the Old Coast Road.

The existing channelised intersection where Old Coast Road connects to the existing Pacific Highway would be retained. With the lower volume of traffic on the existing highway, the existing layout with right and left turn lanes off the highway would meet capacity requirements.

5.1.2 Option 2

Option 2 was a relatively minor variation on Option 1 which aimed at overcoming some of the alignment difficulties in Option 1. It still included realignment of the Old Coast Road to pass over the upgraded highway, and the north facing ramps connecting to the realigned Old Coast Road. The main difference was that the Letitia Close and off ramp intersections connected at a roundabout east of the upgraded highway, allowing the alignment of the bridge over the upgraded highway to be straightened. The other change was that west of the upgraded highway, the priority had been reversed, with access onto the northbound on ramp given priority over traffic from Old Coast Road central.

The existing channelised intersection where Old Coast Road connected to the existing Pacific Highway would be retained. As with Option 1, the lower volume of traffic on the existing highway meant that the existing layout with right and left turn lanes off the highway would meet capacity requirements.

5.1.3 Option 3

Option 3 was quite different from Options 1 and 2. Rather than realigning Old Coast Road onto a new bridge over the upgraded highway, a new connection for Old Coast Road was provided on the west side of the upgraded highway. This connection also provided access between the existing Pacific Highway and the existing Old Coast Road to the north. The proposed treatment of this intersection is a priority T-intersection with channelised right turn and left turn lanes on the highway.

On the eastern side of the ungraded highway, the off ramp connected to the redundant section of Old Coast Road and an intersection allows for connectivity to Letitia Close to be retained. The existing intersection where the redundant section of the Old Coast Road connected to the existing Pacific Highway on the east would be retained with two lanes northbound and separate

right and left turn lanes off the existing highway. Letitia Close would have connected as a T-intersection with priority given to traffic from the off ramp.

This option required the construction of a new connecting road to the existing highway on the west side of the upgraded highway, close to the existing intersection on the east side. This would have avoided the need to construct a bridge for Old Coast Road over the upgraded highway.

5.1.4 Emergency U-turn facilities

The proposed location of the emergency U-turn facility was the same for each option and was about 500 metres north of the ramp merge and diverge.

5.2 Selection of the preferred option

5.2.1 Options assessment workshop

A detailed Options Development Report was prepared by Pacifico in consultation with Roads and Maritime. The three options presented then underwent an assessment by Roads and Maritime to test their performance against a range of agreed criteria.

To determine the preferred option, an Options Assessment Workshop, using a Value Management methodology, was held on 20 May 2015.

The agreed purpose of the workshop was to:

- Obtain an understanding of the project and the planning to date
- Identify, discuss and agree to criteria to be used to assess the options
- Review and then assess the options against the agreed options assessment criteria
- Draw conclusions, select a preferred option and agree to key actions arising.

5.2.2 Options assessment criteria

The purpose of the assessment was to differentiate between the options rather than undertake an absolute assessment of all project criteria for each option. Therefore, only those criteria that highlighted differences were considered in the options assessment workshop.

An assessment criteria to comparatively assess these differences was developed. The assessment criteria was divided into four key perspectives including: constructability and timing, functionality, community impacts and environmental impacts. Each criterion had a number of key descriptive aspects to help assess points of difference between the ramp options.

Scoring for each of the options was undertaken relative to the Approved Project. The scoring scale was from —5 to +5, to acknowledge that some factors, for certain options had negative impacts rather than positive impacts compared to the Approved Project.

5.2.3 The preferred option

The weighted assessment concluded that Option 1 and Option 2 both scored 95 and Option 3 scored a negative 225. Each option was scored relative to the Approved Project and generally for each criteria the results were:

- Constructability and timing: Option 1 and 2 scored highest
- Functionality (traffic efficiency and road user safety): Option 2 scored highest
- Community impacts: Option 1 scored highest
- Environmental impacts: Option 1 scored highest.

As Option 1 and 2 scored equally in the assessment, the workshop then looked at each criteria and descriptive aspects in more detail to determine the preferred option. Option 2 was chosen as the preferred option as:

- It was assessed as better than Option 3 for the constructability and timing criteria and equal to Option 1
- It was assessed as the best option for the Functionality criteria (traffic efficiency and road user safety). In particular it was the preferred option as:
  - It scored highest in road user safety
  - It best caters for traffic growth and long term functionality.
- It was assessed as having less community impacts than Option 3 but more noise and light impacts (due to the roundabout) than Option 1
- It was assessed as having less environmental impacts that Option 3 however it has slightly greater environmental impacts than Option 1 due to additional clearing of native vegetation.

In summary Option 2 was chosen as the preferred option as it is the safest option and improves functionality and road alignment, and is the best option for the long term performance of the North Macksville Ramps.

5.2.4 Refinement of the preferred option

During the option assessment workshop a number of improvement opportunities were identified for the preferred option. Option 2 was compared to Option 1 and the criteria where Option 2 scored less were identified, these were:

- Traffic / accessibility disruptions
- Noise impacts
- Light impacts and intrusion
- Vegetation clearing.

These criteria were examined and discussed in more detail and a number of specific opportunities and design refinements, that could be investigated and adopted in the design and construction phases, were identified for the preferred option. These opportunities and mitigation measures include:

- Extra earth mounds and screenings – would help to address headlight intrusion; eg use surplus soil to create a mound between the roundabout and residences
- Review the design alignment, including the skew angle of the bridge to reduce vegetation clearing
- Put plantings on top of the mounds to increase natural screening.

As part of the concept design development process these opportunities were investigated and a refined preferred option (see **Section 2.2**) was designed. Preliminary property accesses were

also considered and included in the refinement of the design. The refinements that were made included:

- The bridge location was moved about 10 metres to the north and the skew angle increased from 15 degrees to 21 degrees. This allowed for the Old Coast Road, on the western side of bridge, to be realigned and reduce the vegetation clearing required for the Moist Open Forest-White Mahogany-Grey Gum vegetation community which is listed as potential habitat for the Koala, Grey-headed Flying Fox, Spotted-tail Quoll and Milky Silkpod these are federally protected in terms of the EPBC Act. This also moved the road further away from three residences on the western side of Old Coast Road reducing their noise impacts (compared to the Option 2 design). The change in skew angle in the bridge caused the location of the roundabout to move about 12 metres to the south east to maintain sight distance and achieve design criteria
- Moving the roundabout and lowering and realigning the south section of Old Coast Road on the eastern side of the bridge. This increased the depth of the cutting between chainage 53,000 and 53,150, providing some needed additional material, however this does increase vegetation removal of the Regrowth Swamp Oak vegetation community in this area. There would be no change in noise impacts for nearby properties
- Plantings for the approved design were reviewed and these could be incorporated into the landscaping and urban design reports and further refined during detailed design.

6. Environmental assessment

6.1 Context and scope of modification environmental assessment

The Warrell Creek to Urunga Pacific Highway upgrade project environmental assessment (Project EA) details the potential environmental impacts of the project and provides proposed mitigation and management measures.

The Project EA was publicly exhibited and following public exhibition, submissions from stakeholders were received and addressed by Roads and Maritime in the Submissions Report which was lodged with the Director-General in November 2010.

After consideration of the Project EA and Submissions Report, the then Minister for Planning approved the Warrell Creek to Urunga Pacific Highway upgrade under Section 75J Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act) on 19 July 2011 subject to the Minister's Conditions of Approval (CoA) being met.

Subsequent to the EP&A Act approval, Roads and Maritime submitted a referral to the Australian Government Department of the Environment under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). On 23 January 2014, the project was declared to be a controlled action, and assessment and approval under the EPBC Act was required before the project could proceed.

After consideration of the referral and additional information provided by Roads and Maritime, approval under the EPBC Act was granted on 11 December 2014 subject to conditions being met. There have been two modifications of the EPBC approval.

Mitigation and management measures for the Approved Project are also outlined in the Minister's Conditions of Approval.

As this modification environmental assessment focuses specifically on the addition of north facing ramps, only the potential environmental impact over and above those assessed and approved in the Project EA associated with this proposed modification are assessed. Additional mitigation and management measures (to those identified for the Approved Project) are identified where required and feasible.

The scope of the modification environmental assessment is to assess the potential environmental impacts that would result from the construction and operation of the proposed modification and to identify proposed measures to mitigate these potential impacts. In assessing the potential impacts, the issues identified in the Director General's Requirements (as mentioned in **Section 3.1.3** of this report) are the key issues in this environmental assessment. The modification environmental assessment builds on the Warrell Creek to Urunga Pacific Highway upgrade environmental assessment, submissions report, the federal referral and the Preferred Option Report (**Appendix A**) and subsequent Submissions Report (**Appendix B**).

The following sections of this modification address the key issues for the proposed modification, assessing both construction and operational impacts.

6.2 Traffic and transport

6.2.1 Introduction

This section addresses the traffic and transport impacts for the proposed modification. Traffic and transport impacts for the whole of the Approved Project were addressed in Chapter 17 of

the Project EA and a traffic and transport assessment report was included in Appendix G (Working Paper 6). A specialist traffic assessment report was undertaken as part of the options development assessment. The information in the section below was obtained from that assessment.

6.2.2 Methodology

The traffic assessment used a SIDRA intersection analysis (SIDRA is software used for intersection modelling), using outputs from the traffic assessment presented within the *"Pacific Highway Upgrade, Warrell Creek to Urunga, Traffic Modelling Final Report"* dated May 2012. This ramp traffic assessment is based on the same Transcad assignment model that was used for the Project EA.

The process for determining traffic volumes for the proposed modification included:

- Reviewing preliminary outputs from sensitivity tests using the Transcad assignment model
- A check comparing modelled traffic volume estimates at the Bald Hill Road interchange ramps both with and without the North Macksville Ramps, and comparing these to reported estimates at the North Macksville Ramps and Bald Hill Road interchange
- Review by comparing modelled traffic volume estimates with the matrix demands between origins / destinations in proximity to the proposed modification.

Sensitivity tests were performed using the Transcad assignment model and the model was found to be capable of replicating the estimated volumes around the proposed modification.

6.2.3 Existing environment

The roads in the area around the proposed modification provide both regional and local access. Regional roads are sealed and provide access between urban areas, and connections to other centres outside the proposed modification area. The existing Pacific Highway is the main regional road and is predominantly a two-lane single carriageway with a general speed limit of 100 km / h, except where it passes through built-up areas such as Macksville. Local roads (Old Coast Road and Letitia Close) are sealed and provide access to local residences.

Using the methodology described above, traffic volumes on the main links have been estimated as shown in **Table 6-1**. These volumes are the outputs from the Transcad model that was shown to perform closest to the origin destination matrix and to best correlate with the Bald Hill Interchange volumes and the sensitivity checks applied.

Table 6-1 2036 AADT Transcad model volume outputs

Location	Section	Direction	AADT* Approved Project			AADT* with ramps		
			LV	HV	Total	LV	HV	Total
North Macksville Ramps	On ramp	Northbound	N/A	N/A	N/A	424	5	429
	Off ramp	Southbound	N/A	N/A	N/A	391	55	446
Macksville Bridge		Northbound	2,104	110	2,215	2,371	114	2,485
		Southbound	1,738	158	1,896	1,962	192	2,154
Bald Hill Interchange	Off ramp	Northbound	652	1	653	652	1	653
	On ramp	Northbound	4,191	1,218	5,408	3,905	1,214	5,119
	Off ramp	Southbound	5,717	903	6,620	5,478	870	6,348
	On ramp	Southbound	288	5	293	288	5	293
Existing Highway	West of North Macksville Ramps	Northbound				1,903	44	1,947
		Southbound				1,503	106	1,609
	East of North Macksville Ramps	Northbound				1,479	39	1,518
		Southbound				1,112	51	1,163
New Highway	South of Upper Warrell Creek Interchange	Northbound	5,059	1,040	6,099	5,059	1,040	6,099
		Southbound	4,447	1,155	5,602	4,443	1,155	5,597
	Upper Warrell Creek Interchange to Bald Hill Interchange	Northbound	4,044	592	4,636	4,044	592	4,636
		Southbound	3,001	623	3,624	2,997	623	3,619
	Bald Hill Interchange (between Off and On ramps)	Northbound	3,392	591	3,983	3,392	591	3,983
		Southbound	2,713	618	3,331	2,709	618	3,326
	Bald Hill - North Macksville Ramps	Northbound	7,583	1,809	9,391	7,297	1,805	9,102
		Southbound	8,430	1,521	9,951	8,187	1,487	9,674
	North of North Macksville Ramps	Northbound	7,583	1,809	9,391	7,721	1,810	9,531
		Southbound	8,430	1,521	9,951	8,578	1,542	10,120

* AADT: Annual Average Daily Traffic

For traffic capacity calculations the 100th Highest Hourly Volumes have been derived from the modelling as shown in the following **Table 6-2** below.

Table 6-2 2036 AADT and 100th highest hourly volumes

Road	Section	Direction	100th Highest Hourly Volumes		
			Light Vehicles	Heavy Vehicles	Total
North Macksville Ramps	On Ramp	Northbound	40	0	40
	Off Ramp	Southbound	37	5	42
New Highway	Bald Hill to Macksville	Northbound	686	170	856
		Southbound	770	140	909
	North of North Macksville Ramps	Northbound	726	170	896
		Southbound	806	145	951
Existing Highway	West of North Macksville Ramps	Northbound	179	4	183
		Southbound	141	10	151
	East of North Macksville Ramps	Northbound	139	4	143
		Southbound	105	5	109

6.2.4 Impact assessment

6.2.4.1 Construction traffic impacts

The proposed modification area is included in the Project EA and therefore potential impacts were considered in the approved environmental assessment. Construction traffic impacts for the project (including the proposed modification area) were considered in Chapter 17 of the Project EA. Additional construction impacts could include a minor increase of construction vehicles within the proposed modification area and depending on construction staging some increase in duration. These would be temporary and impacts would be considered negligible as the area would be managed through the Approved Project Traffic Management Plan.

6.2.4.2 Operational traffic impacts

An operational traffic analysis has been carried out for the proposed modification. While some discrepancies were found in adapting the model to incorporate the ramps, the forecast volumes on the ramps are relatively low and would be unlikely to change significantly using a different traffic model. The forecast volumes are considered low and impacts to existing local traffic would be negligible to minor.

The traffic analysis shows that the vast majority of traffic that would use the proposed modification has an origin or destination west towards Macksville on the existing Pacific Highway.

The predicted traffic volumes for the proposed modification are provided in **Table 6-1**. As the proposed modification would not generate any additional traffic, but rather would be used by traffic already on the highway, the annual average daily traffic volumes identified would not increase from traffic volumes for the Approved Project.

The proposed modification would:

- Improve connectivity between Macksville and areas to the north, and in particular the proposed modification would provide improved connectivity between Macksville and Nambucca Heads
- Improve connectivity to Macksville as the addition of the proposed modification, in conjunction with the Bald Hill Road interchange to the south, would allow both northbound and southbound vehicles using the upgraded highway to stop at Macksville more easily
- Improve utilisation of the infrastructure proposed between Macksville and the Nambucca Heads interchange by providing the proposed modification
- Result in safer and faster travel onto the upgraded highway for Macksville traffic travelling north
- Improve access to and from Macksville by emergency services and reduced emergency response times
- Improve heavy vehicle access between the existing highway and Old Coast Road.

6.2.4.3 Intersection analysis

An analysis of the future intersection performance during the morning and afternoon peak hour periods has been undertaken for the proposed modification using SIDRA. Level of Service (LoS) is a qualitative measure that is used to assess the traffic efficiency of a road or intersection. LoS ranges from 'LoS A' which generally indicates free flowing traffic conditions to 'LoS F' which typically indicates fully congested traffic conditions. The LoS was modelled to be a LoS A at all intersections for the proposed modification.

The design hourly turning volume at the new intersection located with the northbound ramp is about 29 vehicles per hour and low through volume (42 vehicles per hour). Due to these comparatively low turning traffic volumes, no channelised left turn lane is needed.

The intersection of Old Coast Road South and the Existing Pacific Highway adopts a similar layout to the existing configuration with some localised widening and new line marking.

6.2.5 Mitigation/ management measures

Mitigation measures that have been identified in the Project EA are sufficient to address potential construction impacts from the Approved Project and the proposed modification. No additional mitigation measures are proposed.

6.3 Noise and vibration

6.3.1 Introduction

A noise assessment has been undertaken for the potential noise impacts from the proposed modification.

This noise assessment is based on the same approach and methodology adopted for the Approved Project in the Project EA. An additional operational noise assessment report was prepared to comply with the conditions of approval, that document (Warrell Creek to Nambucca Heads Operational noise modelling and assessment, Roads and Maritime Services, March 2015) has been used as the comparison base. This assessment addresses the same items that were addressed in the Project EA.

6.3.2 Methodology

The proposed modification was incorporated into the Detail Design acoustic model. As the assessment was to compare against the Project EA, the superseded Environmental Criteria for Road Traffic Noise was used to determine the appropriate noise criteria. Criteria for sensitive receivers around the proposed modification area are detailed in the following section.

6.3.2.1 Noise criteria

Under the Environmental Criteria for Road Traffic Noise (ECRTN), road developments are classified as either “new road” or “redevelopment of an existing road”. The relevant criteria set out in **Table 6-3** will apply.

Table 6-3 ECRTN Criteria for operational traffic noise – residences

Type of development	Noise level criteria		Where criteria are already exceeded
	Day (7.00am-10.00pm)	Night (10.00pm-7.00am)	
New freeway or arterial road corridor	LA_{eq},15hr 55dB(A)	LA_{eq},9hr 50dB(A)	The new road should be designed so as not to increase existing noise levels by more than 0.5dB.
Redevelopment of existing freeway/arterial road	LA_{eq},15hr 60dB(A)	LA_{eq},9hr 55dB(A)	In all cases, the redevelopment should be designed so as not to increase existing noise levels by more than 2dB.

Sensitive receivers that would be affected by noise from the proposed modification are either affected by a new road or a redevelopment. Based on this criteria, a target noise goal was identified for each sensitive receiver.

6.3.2.2 Traffic volumes

Traffic volumes for local roads and the proposed ramps have been sourced from the 2026 traffic volumes. For the purposes of the noise modelling the AADT traffic volumes for the year 2026 were split into estimated daytime 15 hour and night-time 9 hour volumes using the same day/night splits that were adopted in the Project EA. Traffic volumes used for the night-time criteria assessment are shown in **Table 6-4**.

Table 6-4 2026 Traffic volumes used for the acoustic assessment

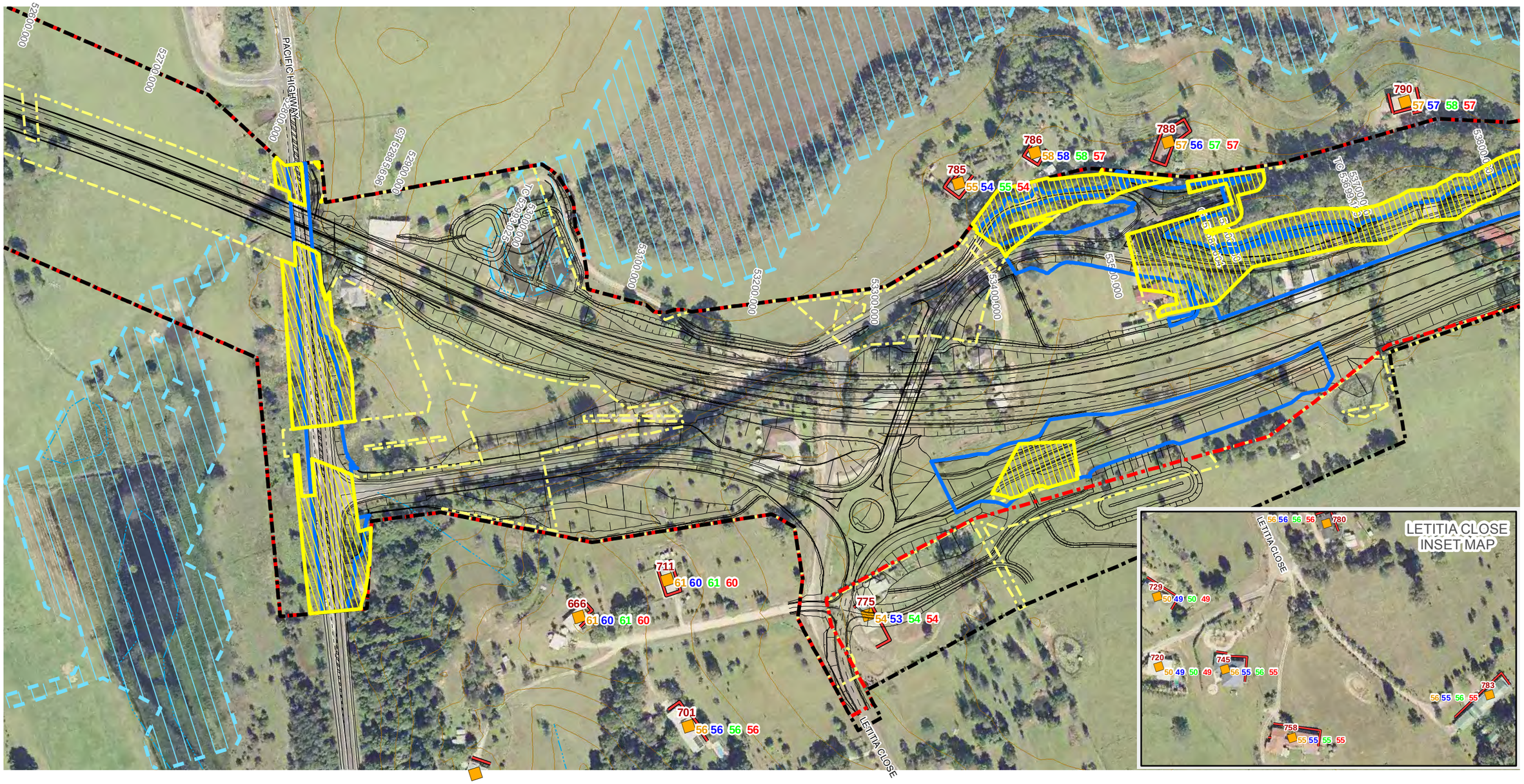
Location	Section	Direction	Day – 7am to 10pm (15hr)			Night – 10pm to 7am (9hr)		
			Total vehicles	% Heavy vehicles	Speed	Total vehicles	% Heavy vehicles	Speed
Proposal	On Ramp	Northbound	235	1	80	34	6	80
	Off Ramp	Southbound	239	10	80	47	36	80
Upgraded Highway	Bald Hill to Macksville	Northbound	4,796	16	115	1,122	50	120
		Southbound	5,145	13	115	1,091	43	120
	North of Macksville Interchange	Northbound	5,031	16	115	1,156	49	120
		Southbound	5,384	13	115	1,139	42	120
Existing Highway	West of Macksville Interchange	Northbound	1,306	1	50/70/100	192	8	50/70/100
		Southbound	1,063	4	50/70/100	175	20	50/70/100
	East of Macksville Interchange	Northbound	1,017	2	50/70/100	151	9	50/70/100
		Southbound	774	3	50/70/100	121	14	50/70/100
Old Coast Road	North of Interchange (excluding ramp traffic)	Northbound	230	7	60	43	37	60
		Southbound	230	7	60	43	37	60

6.3.3 Impact assessment

6.3.3.1 Construction noise

The proposed modification would result in additional construction activities being undertaken near Letitia Close and Old Coast Road. These activities could result in an increase in construction noise and vibration impacts, with increased personnel and truck movements involved. However, as the works would be undertaken within the Approved Project boundary, there is not expected to be an increase in the number of sensitive receivers that would be subject to noise levels that exceed the construction noise criteria.

The closest sensitive receivers are shown in **Figure 6-1** and are within about 20 metres of the proposed modification. The receivers west of the Upgraded Highway along Old Coast Road would experience the largest impact. It is unlikely that construction of the proposed modification would be undertaken at the same time as the realignment of Old Coast Road and construction of the main line. The proposed modification would extend the construction phase and therefore the time that receivers would be exposed to construction noise.



Additional clearing required under Modification for North Facing Ramps
Area of design subject to modification
Approved clearing limit (including design refinements, MaCR, MiCR) inside proposed boundary only
North Facing Ramps proposed project boundary (03/09/2015 including Design refinements)
Approved project boundary (including design refinements)
5m contours
20yr ARI flood
Natural drainage

Acoustic

Facade treatments to noise receivers
Sensitive noise receiver

Sensitive Noise Receiver Labels

5 1 Day without North Facing Ramps
5 1 Night without North Facing Ramps
5 1 Day with North Facing Ramps
5 1 Night with North Facing Ramps

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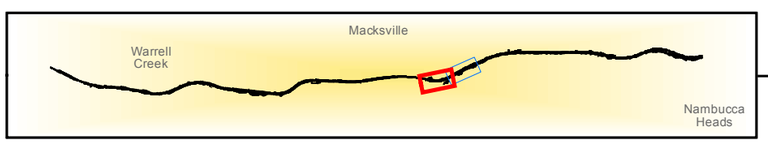

PACIFIC HIGHWAY UPGRADE **WC2NH**

North Facing Ramps at North Macksville – Modification environmental assessment

Projection: GDA 1994 MGA Zone 56
Source: RMS, AADJV, Geolink, Benwell

FIGURE: Noise
(Map 1 of 2)

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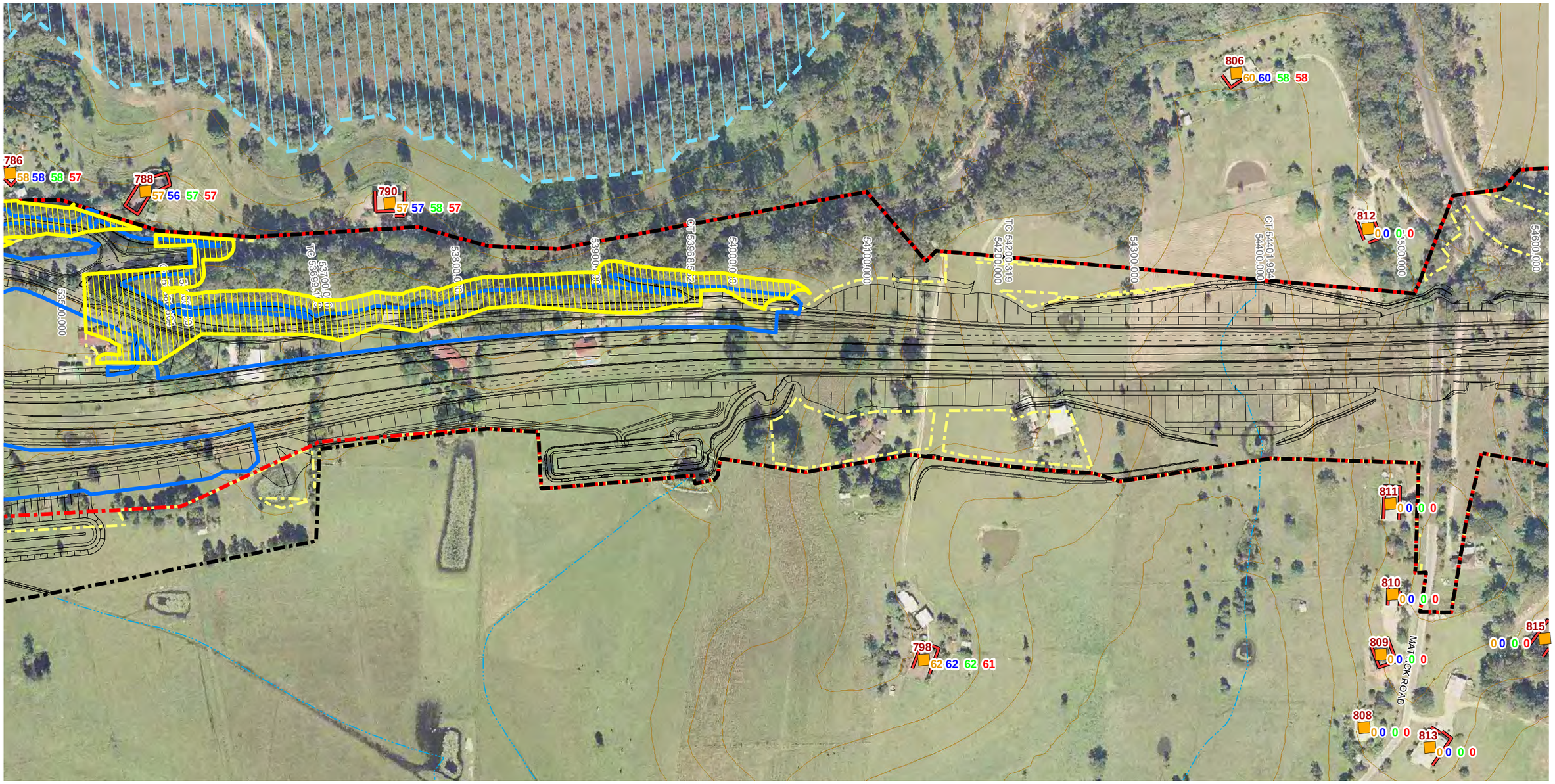

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Facade treatments to noise receivers
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5 1 Day with North Facing Ramps
5 1 Night with North Facing Ramps

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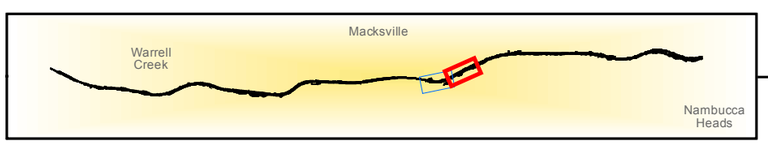

PACIFIC HIGHWAY UPGRADE **WC2NH**

North Facing Ramps at North Macksville – Modification environmental assessment

Projection: GDA 1994 MGA Zone 56
Source: RMS, AADJV, Geolink, Benwell

FIGURE: Noise
(Map 2 of 2)

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6.3.3.2 Operational noise

External noise predictions were made at one metre from facades most affected by traffic noise for daytime LAeq(15hr) and night-time LAeq(9hr) periods, comprising future existing (2016), opening year (2016) and design year (2026) operational scenarios. Only the properties that are potentially affected by the Macksville Interchange were assessed. As the period of greatest noise impact was found to be the design year (2026) night time period, this has been the focus of the assessment. The results of the loudest facade noise levels for each receiver are shown in **Table 6-5** and **Figure 6-1**. Noise levels marked in bold are where noise levels have increased (nearest whole number) due to the proposed modification.

Table 6-5 Comparison of noise levels between the Approved Project and the proposed modification

Receiver ID	Target criteria[1]		Approved project (March 2015 assessment)		Proposed modification	
	Day	Night	Day	Night	Day	Night
639	55	50	54	54	54	54
666	55	50	61	60	61	60
701	55	50	56	56	56	56
711	55	50	61	60	61	60
720	60	55	50	49	50	49
729	55	50	56	55	56	55
745	55	50	55	55	55	55
758	55	50	54	53	54	54
775	55	50	56	56	56	56
780	55	50	56	55	56	55
783	55	50	55	54	55	54
785	55	50	58	58	58	57
786	55	50	57	56	57	57
788	55	50	57	57	58	57
790 Ground floor	55	50	62	62	62	61
790 First floor	55	50	63	63	64	63
798	55	50	55	55	55	55
801	55	50	54	54	55	54
806	55	50	60	60	58	58

[1] *Due to the influence of the Existing Highway the target noise criteria was determined as "Redevelopment of an existing freeway" for some areas of the Approved Project. These properties use the daytime criteria of 60 dB(A) and night-time criteria of 55 dB(A).*

Table 6-5 shows that when compared to the Approved Project, only slight noise level increases are predicted at receiver IDs 758, 786, 788, 790 and 801. On average, noise levels have remained unchanged and have not increased by more than 1 dB(A) at any facade for any receiver.

All the properties above, with the exception of receiver ID 720, have been identified as requiring at house noise treatment as part of the Approved Project. As receiver ID 720 is within the noise criteria, with no additional increase in noise levels anticipated due to the proposed modification, no at-property treatment is required.

6.3.4 Mitigation/ management measures

Mitigation measures that have been identified in the Project EA are sufficient to address the noise impacts from the Approved Project and the proposed modification. No additional mitigation measures are proposed.

6.4 Aboriginal and non-Aboriginal heritage

6.4.1 Introduction

Aboriginal and non- Aboriginal heritage impacts and significance were discussed in the Project EA in Chapter 15 and Section 19.3.

A specific Heritage due diligence assessment (Jacobs, 2015) was undertaken as part of the ramp options development process in April 2015. This assessment surveyed the area of the proposed modification including a 50 metre buffer measured from the footprint of the ramp options.

6.4.2 Methodology

The desktop assessment for Aboriginal and non- Aboriginal heritage included:

- A search and review of the Aboriginal Heritage Information Management System (AHIMS)
- A search and review of the Nambucca Local Environmental Plan (LEP) 2010, the NSW State Heritage Register, Australian Heritage Database, the Roads and Maritime Section 170 Heritage and Conservation Register, National Heritage List, Commonwealth Heritage List, Register of the National Estate and World Heritage List
- Use of the ArcGIS system established for this assessment to analyse:
  - Updated data from AHIMS and the relevant historic heritage registers
  - Heritage data from earlier assessments, including areas of potential archaeological deposits (PAD) and potential archaeological sensitivity (PAS), Aboriginal heritage sites and Aboriginal cultural places and historical heritage sites
  - Aerial imagery.
- The proposed modification area was subsequently considered in relation to the Aboriginal and historical heritage data identified above. The following types of intersects were identified:
  - Any intersects between the proposed modification area with heritage data were examined in greater detail
  - Any heritage items within 100 metres of the proposed modification area.

- Archaeological sensitivity of the proposed modification area and the need for any further assessment or consultation was then determined by considering the following factors:
  - Location of the proposed modification area
  - The proximity to known Aboriginal or non-Aboriginal heritage sites. An indicative distance of 100 metres was used to identify areas where the proposed modification area may be in conflict with heritage sites
  - The archaeological potential and archaeological sensitivity of the landforms contained within the proposed modification area, based upon predictive modelling.
- Review of previous cultural heritage assessments including:
  - Mills (2004) Pacific Highway Upgrading Program, Options Investigation Phase, Macksville to Urunga, Preliminary Options Assessment: Heritage Assessment. Prepared for SKM on behalf of Roads and Traffic Authority (RTA)
  - SKM (2008) Warrell Creek to Urunga, Upgrading the Pacific Highway Historic Heritage Desktop Assessment. Prepared for the RTA
  - Brooke (2009) Warrell Creek to Urunga, Upgrading the Pacific Highway. Working Paper No.4 Aboriginal Cultural Heritage. Prepared for the RTA
  - Collard et.al. (2012) Warrell Creek to Urunga Pacific Highway Upgrade Archaeological Salvage Works. Prepared for Roads and Maritime Services
  - Brooke and Collard (2014) Warrell Creek to Urunga Pacific Highway Upgrade: Utilities Relocation Cultural Heritage Assessment Report. Prepared for Roads and Maritime Services, Melbourne, Sinclair Knight Merz
  - Collard and Goldfarb (2014) Warrell Creek to Nambucca Heads Pacific Highway Upgrade Ancillary Area Cultural Heritage Assessment Report Prepared for AFJV.

6.4.3 Existing environment

The proposed modification area is located on the mid-upper slopes of a rise overlooking Newee Creek, on mid-lower slopes, or on low-lying swampy floodplain. Areas of the proposed modification are also heavily disturbed by property access tracks and a former quarry.

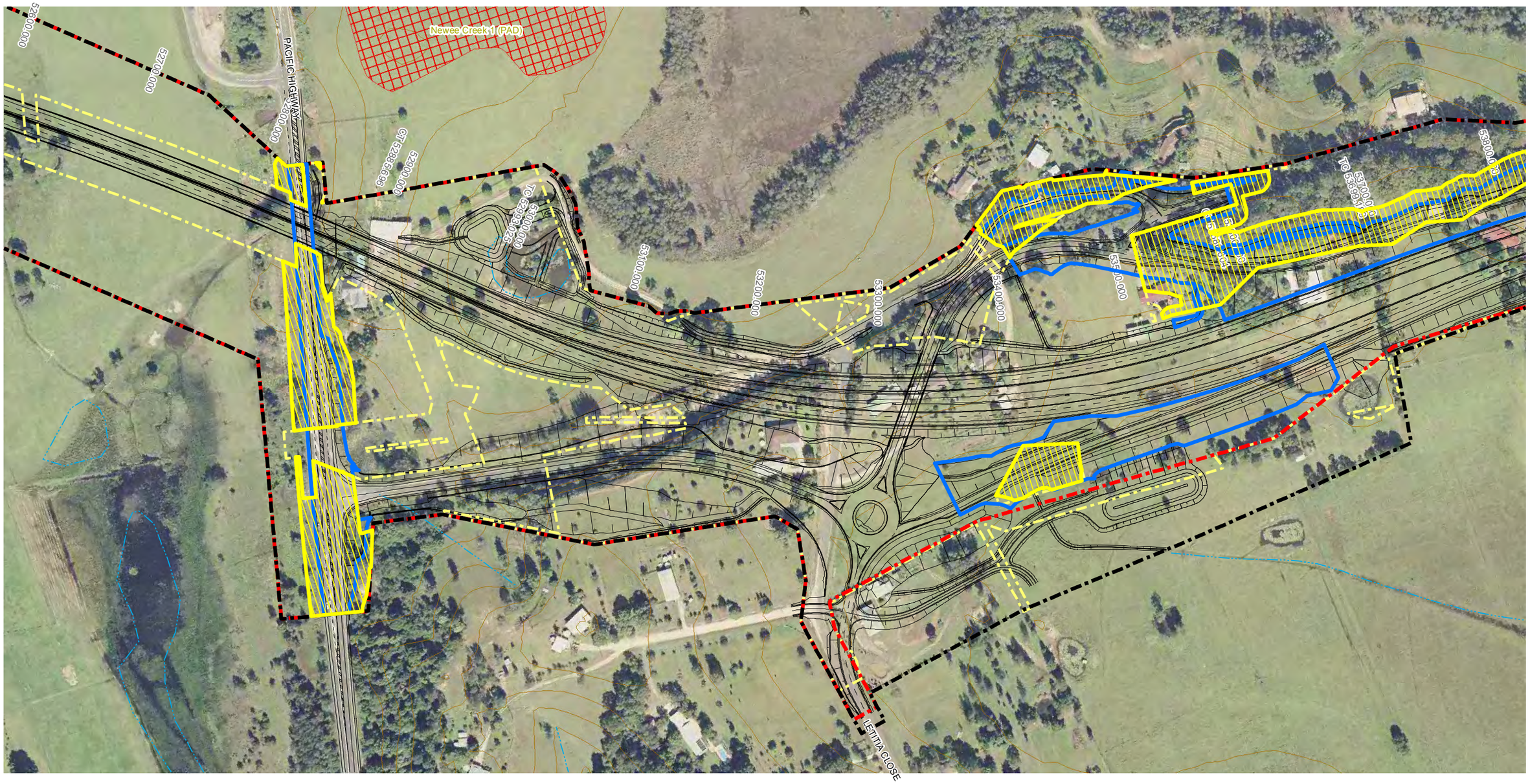
No non-Aboriginal heritage items were identified from the database searches within the proposed modification area.

One unlisted non Aboriginal heritage item, originally identified during the Project EA, is located within the proposed modification area. An assessment of this is detailed in **Section 6.4.4**.

Aboriginal cultural heritage datasets relevant to the proposed modification area derived primarily from previous assessments conducted for earlier stages of the Approved Project. A summary of these areas and the assessments are detailed in **Section 6.4.4**.

6.4.4 Impact assessment

The proposed modification area as show in **Figure 6-2** contains some heritage items both within the Approved Project area as well as within previously assessed ancillary or utilities refinement areas.



Additional clearing required under Modification for North Facing Ramps

Area of design subject to modification

Approved clearing limit (including design refinements, MaCR, MiCR) inside proposed boundary only

North Facing Ramps proposed project boundary (03/09/2015 including Design refinements)

Approved project boundary (including design refinements)

5m contours

Natural drainage

Heritage

Archaeological PAD/Site

Heritage item

 # denotes: Project boundary based on WC2NH_Approved_Project_Boundary_20141202_V2.shp received 02/12/2014, and adjusted to suit survey accurate cadastre (edited at Northern end)

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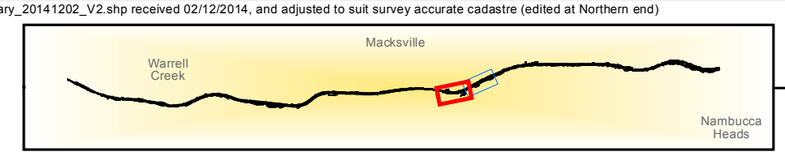

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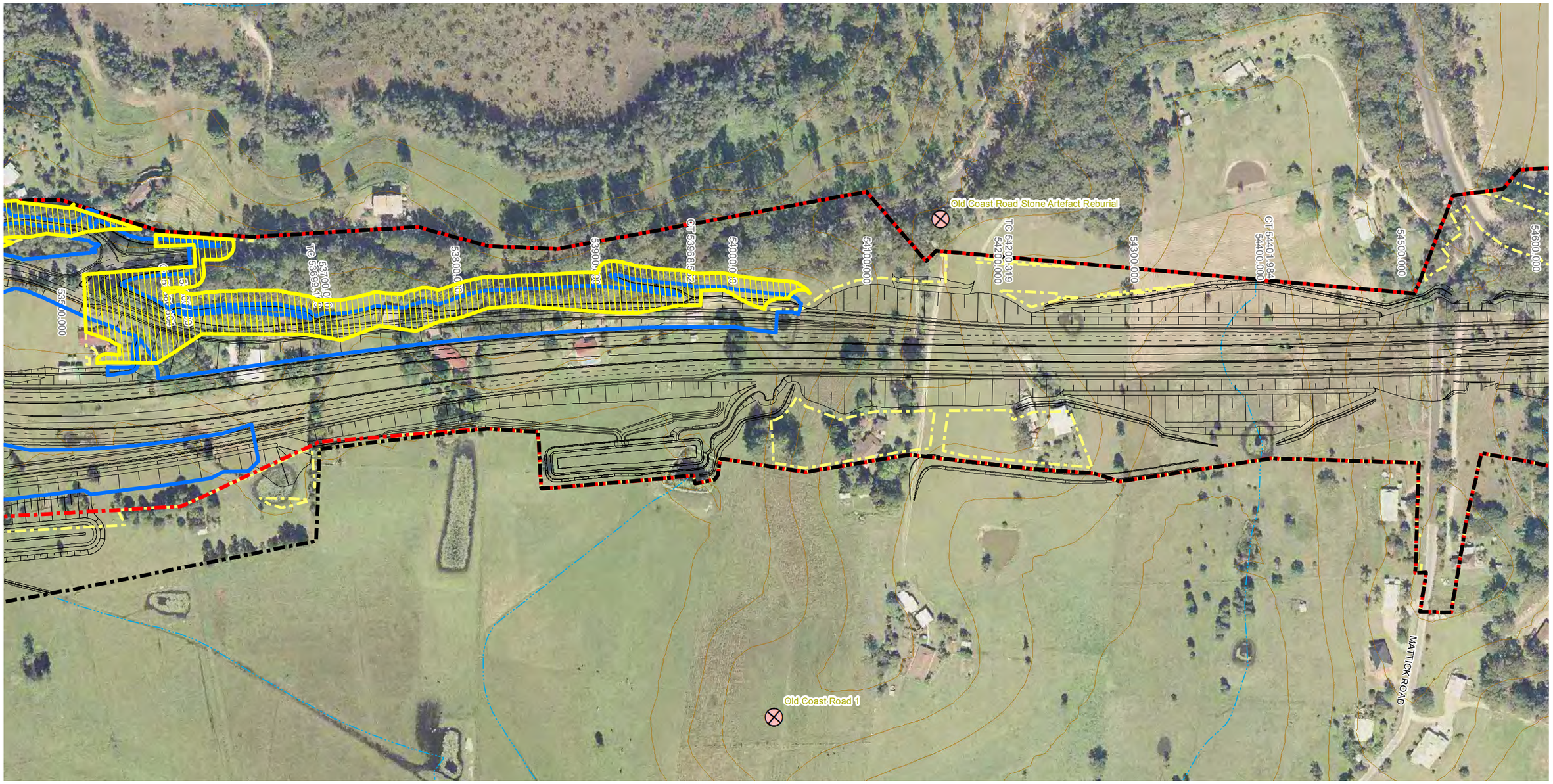
PACIFIC HIGHWAY UPGRADE **WC2NH**

North Facing Ramps at North Macksville – Modification environmental assessment

Projection: GDA 1994 MGA Zone 56

Source: RMS, AADJV, Geolink, Benwell

FIGURE: Heritage
(Map 1 of 2)



Additional clearing required under Modification for North Facing Ramps
Area of design subject to modification
Approved clearing limit (including design refinements, MaCR, MiCR) inside proposed boundary only
North Facing Ramps proposed project boundary (03/09/2015 including Design refinements)
Approved project boundary (including design refinements)
5m contours
Natural drainage

Heritage

Archaeological PAD/Site
Heritage item

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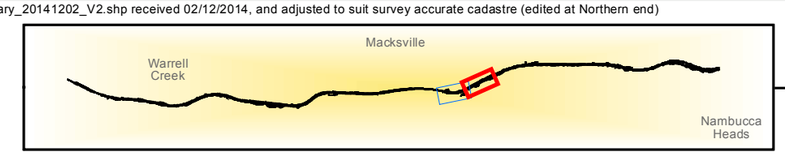

PACIFIC HIGHWAY UPGRADE **WC2NH**

North Facing Ramps at North Macksville – Modification environmental assessment

Projection: GDA 1994 MGA Zone 56
Source: RMS, AADJV, Geolink, Benwell

FIGURE: Heritage
(Map 2 of 2)

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The results of the cultural heritage desktop assessment for the proposed modification areas are summarised in **Table 6-6**.

Table 6-6 Heritage items identified in the heritage survey area

Historical heritage place and Chainage	Desktop assessment	Heritage significance and recommendations
Farmhouse – North Macksville Chainage 52,800-53,300, West side of upgraded highway	One historical heritage item (Farmhouse - North Macksville) is within 100 m. This item was demolished in accordance with Condition of Approval B20.	No further assessment required.
Newee Creek 1 (21-6- 0402) PAD Chainage 52,800-53,300, West side of upgraded highway	One area of PAD is located within 100 m, but not intersected by the heritage survey area and therefore the proposed modification would not impact on this PAD.	An exclusion zone to be established prior to construction to avoid damage to PAD. The exclusion zone must be located at least 20 m away from the recorded extent of Newee Creek 1 (21-6-0402). This must consist of fencing such as would exclude entry by people or plant not authorised by the WC2NH Environmental Manager (eg high visibility construction webbing). No further assessment required.
Old Coast Road Stone Artefact (Reburial) (21-6-0288) Chainage 54,125-54,240 West side of upgraded highway	One Aboriginal heritage site (isolated artefact reburial) located within the heritage survey area. This site is some 75m from the proposed modification footprint. This area has low potential archaeological sensitivity.	The exclusion zone previously recommended for Old Coast Road Stone Artefact (Reburial) (AHIMS 21-6-0288) (Collard and Goldfarb 2014) must be maintained. This must remain at a distance of at least 5 m away from the recorded site extent and consist of fencing such as would exclude entry by people or plant not authorised by the WC2NH Environmental Manager (eg high visibility construction webbing). No further assessment required

The assessment of the area affected by the proposed modification identified that impacts to cultural heritage values are unlikely with mitigation measures that have already been identified in previous assessments for the Approved Project. No further assessment is required.

Overall, there are no known Aboriginal heritage items, potential archaeological deposits or non-Aboriginal heritage sites directly impacted by this proposed modification.

6.4.5 Mitigation/ management measures

Mitigation measures that have been identified in the Project EA are sufficient to address known and unexpected heritage sites and impacts associated with the proposed modification. No additional mitigation measures are proposed.

6.5 Landscape and urban design

6.5.1 Introduction

This section addresses the landscape and visual impacts of the proposed modification. These impacts for the Approved Project were addressed in the Project EA in Chapter 13 (landscape, visual and urban design) and *Working Paper 2 – Visual amenity and design*. As per the Project

EA, the visual impact of the proposed modification considers both the visual effect of the proposed works and the visual sensitivity of the surrounding areas.

6.5.2 Existing environment

To the south of the proposed modification area is the Nambucca River, the river valley and rural areas are situated on the flood plain that follows the river as it bends east and then north towards Nambucca Heads. The existing highway follows the river, providing a highly scenic journey with frequent views over the river.

The area around Old Coast Road, Letitia Close, Mattick Road and Florence Wilmont Drive are associated with semi-rural and rural residential areas with scattered residences. The houses in Letitia Close and Mattick Road are located on a hill to take advantage of the views over the rural landscape. The area to the north is forested and undulating, particularly along the Old Coast Road and areas east of the road in the Nambucca State Forest.

6.5.3 Impact assessment

Potential impacts from the proposed modification relate to cut batters and fill embankments, over bridge structures and associated local road realignment. The Project EA assessed these impacts as having a high to very high visual impact for the Approved Project.

The proposed modification footprint of the proposed modification would be contained within the existing Approved Project boundary, with little visual impact outside of the immediate vicinity.

The introduction of a roundabout on the eastern side of the upgraded highway would increase the visual impact along Old Coast Road from the Pacific Highway and along Letitia Close.

The proposed modification would, in compliance with the requirements of relevant Authorities, including local councils, need to include additional lighting from that already approved under the Approved Project. Lighting would be provided at:

- Lighting at the roundabout connecting Letitia Close, the off ramp, and the realigned Old Coast Road
- Flag lighting at the on ramp intersection with the realigned Old Coast Road
- Flag lighting at the Old Coast Road intersection with the existing Pacific Highway.

6.5.4 Mitigation/ management measures

Management measures identified in the Project EA included the preparation of an Urban design and Landscape plan. This plan was completed in October 2015.

The mitigation measures that have been developed for the proposed modification area as part of the Approved Project include:

- A visual mound on the east side of the upgraded highway from chainage 53,425 to 53,650
- Regularly spaced tree planting along local road connections
- Clustered tree planting along the highway and at ends of cuttings
- Tree and shrub planting on embankments
- A suite of mitigation measures for Old Coast Road overbridge.

These measures are relevant for the proposed modification and would be implemented in the updated Urban design and landscape strategy for the Approved Project.

No further management measures are required for the proposed modification.

6.6 Biodiversity

6.6.1 Introduction

This section addresses the biodiversity impacts of the proposed modification. The impacts for the Approved Project were addressed in the Project EA in Chapter 10 (Flora and fauna) and Working Paper 1 – Flora and fauna. This section evaluates the impacts and mitigation required for biodiversity.

An additional report, *Biodiversity Assessment, North Facing Ramps – Warrell Creek to Nambucca Heads Pacific Highway Upgrade (GeoLINK 2016)* (see **Appendix C**) (the biodiversity report) was undertaken in November 2015 by GeoLINK to assess the potential impacts of the addition of the proposed modification to the Approved Project. The biodiversity report assessed all additional areas that encompass the North Macksville Ramps project. However some areas have been approved in a Major Consistency Assessment Report. This section summarises the biodiversity report assessment sections that only apply to the proposed modification.

6.6.2 Methodology

The methodology used to assess the proposed modification is summarised as:

- Desktop review of:
  - Environmental websites, databases and registers
  - Relevant reports and documents, including previous environmental assessments of the Approved Project
  - Previous data and mapping.
- Undertake additional flora and fauna field surveys
- Assess the habitat value
- Assess the ecological impacts
- Outlined mitigation measures to be implemented to reduce potential impacts.

The assessment covers the proposed modification area as shown in **Figure 2-1**. Detailed methodology for the assessment is provided in the biodiversity report in **Appendix C**.

6.6.3 Existing environment

6.6.3.1 Threatened species database searches

A summary of the threatened species database search results is listed below for the full North Macksville Ramps project. A search area about 10 km surrounding the proposed modification (study area) was used for database searches. Marine species were excluded from the assessments as no suitable habitat occurs on or adjacent to the proposed modification area. The full results and potential occurrence assessments are attached in the biodiversity report in **Appendix C**.

- OEH BioNet Atlas of NSW Wildlife: 33 threatened species (seven flora and 26 fauna species) listed under the TSC Act
- EPBC Protected Matters Report: 65 threatened species (11 flora and 18 fauna species) listed under the EPBC Act that are 'likely to occur' or 'may occur' within the search area or have habitat that is 'likely to occur' or 'may occur' within the search area
- Migratory Species: 60 migratory species listed under the EPBC Act. Seven are listed as migratory terrestrial species, 15 are listed as migratory wetland species and the remainder are listed as migratory marine species
- Threatened Ecological Communities: Three threatened ecological communities Littoral Rainforest and Coastal Vine Thickets of Eastern Australia, Lowland Rainforest of Subtropical Australia and Subtropical and Temperate Coastal Saltmarsh are listed under the EPBC Act and were identified as likely to occur within the search area by the Protected Matters Search Tool.

6.6.3.2 Critical Habitat

A search of the Register of Critical Habitat (6/11/2015) indicated that the proposed modification does not contain or adjoin any areas of listed Critical Habitat.

6.6.3.3 SEPP14 Coastal Wetland

No occurrences of SEPP 14 Coastal Wetlands or SEPP 26 Littoral Rainforest are within the study area. The closest area of SEPP 14 Coastal Wetland is associated with the Nambucca River floodplain and Newee Creek to the west of the study area.

6.6.3.4 Review of Project Environmental Reports

Threatened fauna species identified as potential occurrences and needing consideration for impact assessment were identified through review of the Project EA with additional species identified through the updated EPBC Act Protected Matters Search Tool and OEH BioNet database searches.

The Project EA confirmed 14 threatened species and considered a further 13 threatened species as potential occurrences within the Approved Project study area (refer to Table 10-7 in Section 7 of the Project EA). The EPBC Act Protected Matters Search Tool and OEH BioNet database searches identified a further 24 threatened fauna species or species habitat that are known or likely to occur within 10 km of the Approved Project footprint, excluding marine species. Refer to the potential occurrence assessment for these species in the biodiversity report in **Appendix C**.

Threatened flora species identified as being potential occurrences and needing consideration for impact assessment were based on the list of species identified in the Approved Project Threatened Flora Management Plan (Ecos Environmental 2013). Twenty known or potentially occurring threatened flora species were identified as target species for threatened flora surveys of the Project construction footprint (plus 10 metres) undertaken by Ecos Environmental (2013). No additional species were identified in the EPBC Act Protected Matters Search Tool and OEH BioNet database search.

6.6.3.5 Field Surveys

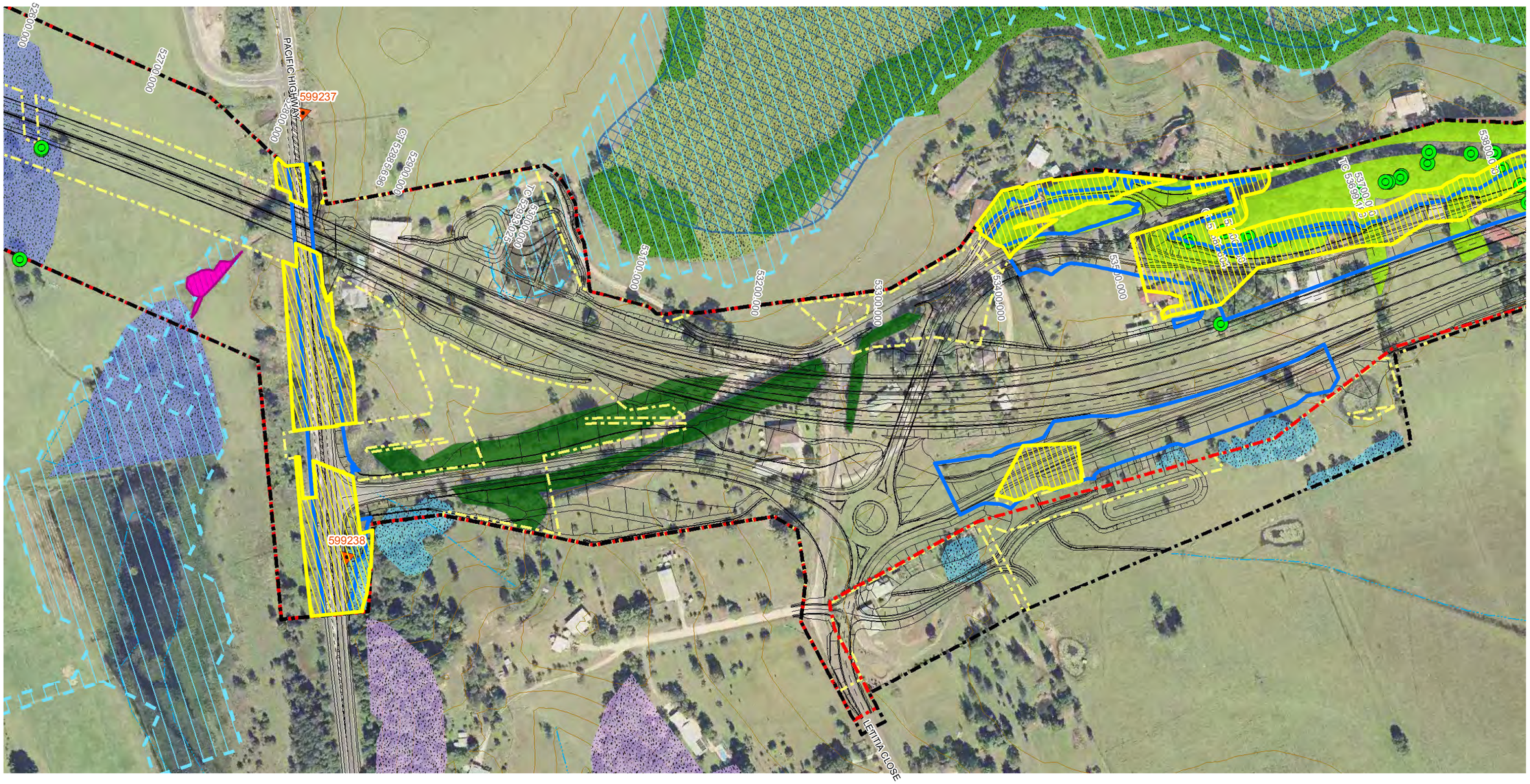
In general the areas surveyed comprised of largely cleared and modified lands which have been historically used for agricultural pursuits. Native vegetation on the sites is represented by isolated paddock trees and some small areas comprising the following native vegetation communities:

- Moist Open Forest – White Mahogany – Grey Gum
- Swamp Oak regrowth
- Dry Open Forest – Blackbutt
- Swamp Mahogany/ Paperbark Forest (Swamp Sclerophyll Forest Endangered Ecological Community (EEC)).

A summary of the field survey results are shown in **Table 6-7**. Ecological constraints associated with the sites are shown in **Figure 6-3** and discussed in the sections below.

Table 6-7 Summary of field survey results

Area	Vegetation Description	Fauna Habitats Present
Existing Highway intersection with Old Coast Road	A small area of *Swamp Mahogany/ Paperbark Forest (Swamp Sclerophyll Forest EEC)* occurs in the south eastern corner of the site directly adjacent to the existing Pacific Highway. The inundated portion of the site supports a number of common Freshwater Wetland species dominated by *Blechnum* Fern with nearby forested Swamp Forest EEC. Weed species such as Lantana, Camphor Laurel and Morning Glory also occur in this portion of the site.	The inundated area would provide habitat for aquatic fauna and locally occurring/ migratory wetland birds.
Northbound on-ramp and Old Coast Road (west of the over bridge)	This area is predominantly cleared pasture land dominated by Broad-leaved Paspalum with a remnant stand of mature *Moist Open Forest – White Mahogany Grey Gum* occurring in the western portion of the site, which runs parallel to Old Coast Road on both the eastern and western sides of the road. This vegetation contains a high density of hollow-bearing trees with a number of trees supporting multiple hollows. This area was nominated as *Nest Box Replacement Zone 'S'*, within the WC2NH Nest Box Management Plan. A total of 25 nest boxes have been installed (with a further 24 nest boxes prescribed for installation in this area) to compensate for hollow bearing trees cleared for highway construction. Scattered paddock trees also occur on cleared areas of the site including Swamp Turpentine, Tallowwood and conifer species.	Hollows within mature trees/ stags would provide nesting/ denning or roosting habitat for hollow dependant fauna species. This area also supports known records of Slender Marsdenia nominated for insitu roadside monitoring as the plants are outside of the current approved clearing limits. Areas of Moist Open Forest representing potential Koala habitat occur within the Moist Open Forest within the site and would be impacted by the proposal. Potential habitat for locally occurring arboreal mammals including Koala, Glider and Possums as part of the surrounding forested areas of the Nambucca State Forest.
Southbound off-ramp	Predominantly cleared pasture land surrounds a residential property which supports Swamp Forest EEC and adjacent low lying areas in the eastern part of the site. This stand includes some ephemeral wetland elements and has a small dam and drainage line which runs through the property.	A number of small farm dams occurs on the site and would provide habitat opportunities for aquatic fauna and locally occurring migratory/ wetland birds. Wetland areas surrounding the site provide potential habitat for locally occurring migratory/ wetland birds. A small area of Swamp Forest EEC provides potential roosting/ nesting habitat for locally occurring/ migratory bird species. One Nest box installed by the landowner and two active bird nests are present within the stand.



Additional clearing required under Modification for North Facing Ramps
Area of design subject to modification
Approved clearing limit (including design refinements, MaCR, MiCR) inside proposed boundary only
North Facing Ramps proposed project boundary (03/09/2015 including Design refinements)
Approved project boundary (including design refinements)
5m contours
20yr ARI flood
Natural drainage
SEPP14 wetland

Contamination
Potential contaminated site

Biodiversity - Flora
Alexfloydia repens
Artanema fimbriatum
Goodenia fordiana
Marsdenia longiloba
Maundia triglochinoides
Niemeyera whitei
Tylophora woollsii
Pseudovanilla foliata
Caladenia (Spider Orchid)
Parsonia dorrigoensis
Hollow-bearing tree/Habitat tree
Microbat roost site/habitat
Green-thighed frog breeding pond
Green-thighed frog habitat
Likely Green-thighed frog habitat
Giant Barred frog habitat
Flying Fox camp (Jan 2015)
Location of Maundia
Persicaria elatior
Floyd's Grass habitat
Translocation receival site

DPI Fisheries
Mangrove and pneumataphores
Salt marsh

Vegetation Community (EEC)
Freshwater Wetlands (EEC)
Mixed Floodplain Forest (EEC)
Swamp Forest - Swamp Mahogany/ Paperbark EEC
Swamp Oak Forest (EEC)
Saltmarsh EEC

Vegetation Community
Mangrove Forest
Moist Open Forest - Flooded Gum
Moist Open Forest - White Mahogany - Grey Gum
Open Forest - Blackbutt
Hardwood Plantation - mostly cleared
Regrowth Swamp Oak

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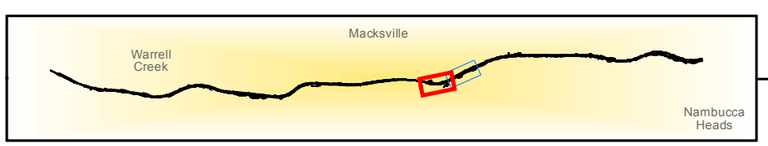

PACIFIC HIGHWAY UPGRADE **WC2NH**

North Facing Ramps at North Macksville – Modification environmental assessment

Projection: GDA 1994 MGA Zone 56
Source: RMS, AADJV, Geolink, Benwell

FIGURE: Biodiversity (Map 1 of 2)

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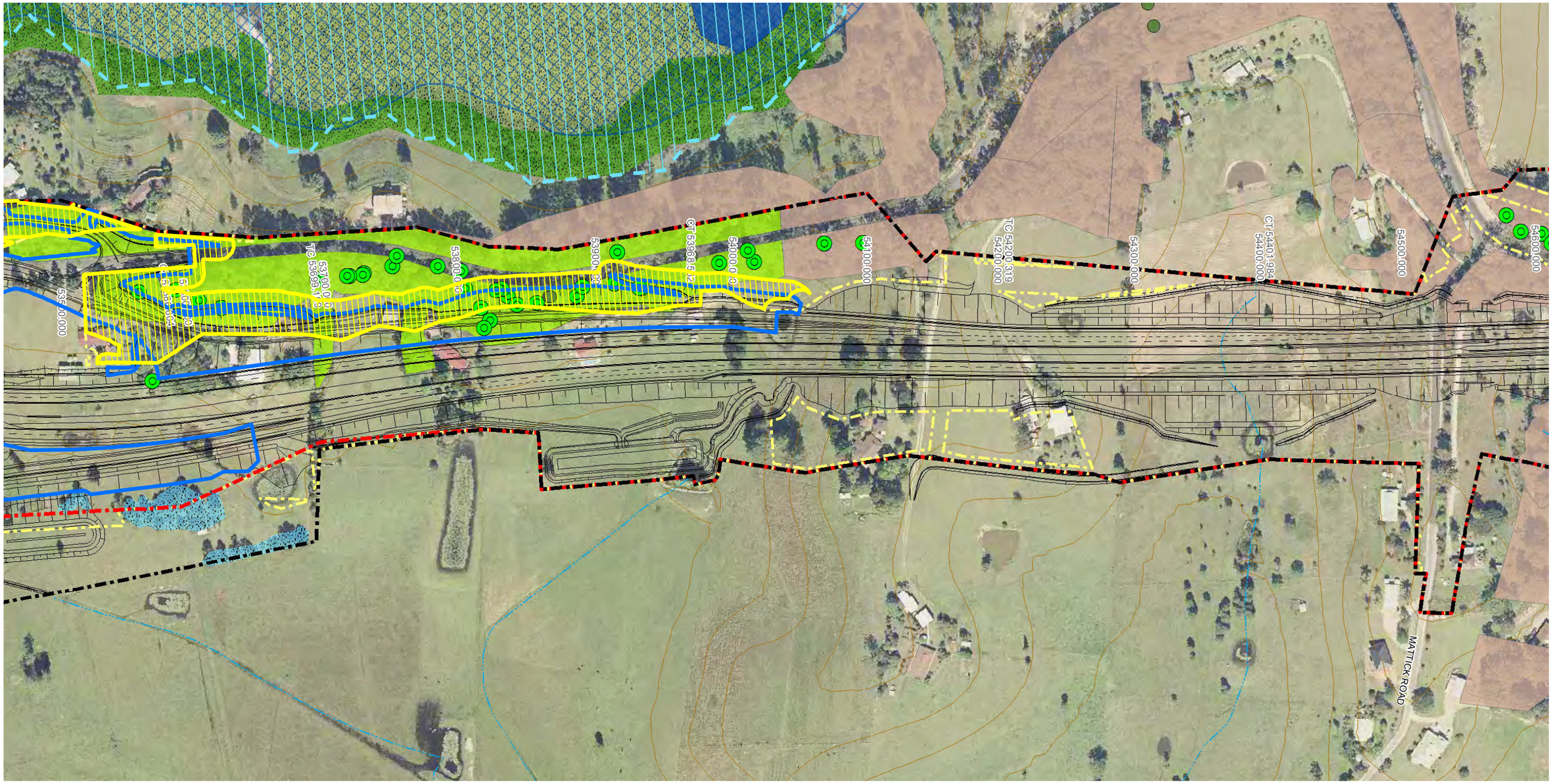

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Additional clearing required under Modification for North Facing Ramps
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North Facing Ramps proposed project boundary (03/09/2015 including Design refinements)
Approved project boundary (including design refinements)
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Vegetation Community (EEC)
Freshwater Wetlands (EEC)
Mixed Floodplain Forest (EEC)
Swamp Forest - Swamp Mahogany/ Paperbark EEC
Swamp Oak Forest (EEC)
Saltmarsh EEC

Vegetation Community
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Open Forest - Blackbutt
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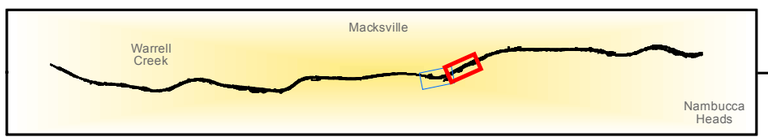

PACIFIC HIGHWAY UPGRADE **WC2NH**

North Facing Ramps at North Macksville – Modification environmental assessment

Projection: GDA 1994 MGA Zone 56
Source: RMS, AADJV, Geolink, Benwell

FIGURE: Biodiversity (Map 2 of 2)

6.6.3.6 Noxious Weeds

Noxious weeds listed under the Noxious Weeds Act 1993 (NW Act) present within the study area include:

- Fireweed
- Lantana
- Blackberry (mostly under control).

Additionally, environmental weeds including Whiskey Grass, Camphor Laurel and Coolatai Grass were detected over large parts of the study area. Measures to manage these weed species are outlined in the Weed and Pathogen Management Plan (WPMP) for the Approved Project.

6.6.3.7 Threatened Flora Species

One threatened flora species was detected within the study area, namely Slender Marsdenia (*Marsdenia longiloba*) which is listed as endangered under the TSC Act and vulnerable under the EPBC Act.

A number of Slender Marsdenia plants occur immediately adjacent to Old Coast Road (recorded previously as part of earlier studies on the Approved Project) associated with areas of Moist Open Forest as seen in **Figure 6-3**.

These plants are included as part of the WC2NH Threatened Flora Management Plan as threatened plants which are to be retained and monitored in situ. It is envisaged that should impacts to Slender Marsdenia be unavoidable, translocation of impacted plants should be undertaken in accordance with the requirements of the Approved Project Threatened Flora Management Plan.

Milky Silkpod (Parsonsia dorrigoensis) has been recorded at the southern extent of the Approved Project associated with areas of Moist Open Forest. This species has some potential to occur within areas associated with the study area, based on appropriate habitat type being present. However it is considered to have a very low potential to occur based on the extensive surveys undertaken associated with the study area which have not detected this species to date.

6.6.3.8 Endangered Ecological Communities

The following TSC Act listed EECs occur within the broader area surrounding the subject sites (including a 50 metre buffer zone):

- Swamp Sclerophyll Forest EEC
- Swamp Forest – Swamp Mahogany/ Paperbark EEC
- Freshwater Wetland EEC
- Swamp Oak Forest EEC.

The proposed modification would clear an additional 0.077 hectares of Swamp Forest – Swamp Mahogany/ Paperbark EEC (**Figure 6-3**). The EEC is moderately to highly disturbed (following historic clearing, livestock grazing, drainage modification and dam construction, and edge effects). This vegetation comprises relatively small and fragmented patches of regrowth vegetation. Similar areas of EEC occur adjacent to the study area and within the broader locality, where equivalent and better quality examples occur on the Nambucca River and Warrell Creek floodplains.

6.6.3.9 Fauna Habitat Assessment

Fauna Habitat Types

The proposed modification includes the following general fauna habitat types as described in the Project EA:

- Aquatic/ riparian habitats: occurrences on site are of low to moderate habitat value
- Modified habitats: dominant habitat type across the site and of low habitat value
- Dry open forests: small areas of this habitat type (e.g. Blackbutt forest) associated with the site
- Moist open forest: small areas of this habitat type associated with sites of moderate habitat value
- Swamp forest: small occurrences on site are of low to moderate habitat value.

Descriptions of the values of these habitats are provided in the Project EA. The key habitat features within the study area include:

- Aquatic/ riparian habitats: occur within parts of the proposed modification consisting of disturbed swamp forest wetlands, farm dams and modified drainage lines providing potential habitat for common frogs (low likelihood of supporting threatened frog species) and birds, including the TSC Act listed species Black-necked Stork and Brolga
- Hollow-bearing trees: a number of hollow-bearing trees are associated with mature trees occurring on the sites. It is envisaged that a number of mature trees containing hollows will be impacted by the proposal
- Nest Box Replacement Zone: a total of 49 Nest boxes have been prescribed for installation within Nest Box Replacement Zone S with 25 already installed at this location. It is envisaged that a number of trees supporting nest boxes will be impacted by the proposal
- Koala food trees: low densities of primary Koala food trees Tallowwood (*Eucalyptus microcorys*) and Swamp Mahogany are associated with areas of moist open forest and to a lesser extent swamp forest. However, scat and scratch searches below trees failed to record any evidence of Koala activity. Based on Koala Population Monitoring undertaken, it is currently considered that study areas associated with the proposed modification experience low level usage by Koalas and is not considered Koala habitat (critical to the survival).

In general, although the study area was found to contain a variety of fauna habitat resources, relative to the extent of habitat within the Approved Project footprint and retained habitats within the broader locality the proposed modification affects a minor portion of the habitat available locally.

Threatened Fauna

No threatened fauna species were detected during the field surveys. The study area provides moderate to high value habitat locally throughout moist open forest due to the density of hollow bearing trees which is expected to be partially impacted by the proposal. A potential occurrence assessment of threatened fauna species and full list of threatened fauna species which were considered with known/ potential occurrences in areas is provided in the biodiversity report in **Appendix C**.

For all known/ potential species, the habitat within the study area forms a minor portion of the habitat available to populations of these species in the locality. Key habitat features (eg significant foraging habitat, potential breeding habitat, etc.) for most of these species either do

not occur within the study area or are minor occurrences within the study area relative to their local occurrence.

6.6.3.10 EPBC Act Listed Migratory Species

The values of the study area for EPBC Act listed migratory species is generally as described in the Project EA. Results of the field survey and the nature of the proposed modification (small vegetation impacts) concur with the Project EA statement that: '*There is no evidence to suggest that an area of important habitat exists or that the study area is occupied by an ecologically significant proportion of a population of a migratory species.*' Consequently, it is unlikely that any EPBC Act listed migratory species would be significantly affected by the proposed modification, triggering the need for referral to the Australian Government Department of Environment (DoE).

6.6.4 Impact assessment

6.6.4.1 EP&A Act Approval (NSW)

Section 10.4.2.1 of the Project EA (Table 10-10), identifies the area of impacts on native vegetation for the Warrell Creek to Urunga Pacific Highway upgrade. The total vegetation clearance for the project is 258.45 hectares (based on a 10 metre buffer from the concept design) (see **Table 6-8**).

The Nambucca Heads to Urunga stage of Warrell Creek to Urunga upgrade is currently under construction and the majority of the clearing required for that stage is complete. It is anticipated that the Nambucca Heads to Urunga (NH2U) project would result in the clearance of 171.33 hectares of native vegetation. As such, native vegetation clearing available for the Warrell Creek to Nambucca Heads (WC2NH) project is 87.09 hectares in accordance with the Project EA.

Since the Project EA was prepared, vegetation communities within the project boundary have been ground truthed by the Pacifico project ecologist, GeoLINK. This has resulted in:

- Identification of some areas that contained no native vegetation as EEC
- Reclassification of some areas of EEC to other native vegetation (non-EEC)
- Reclassification of some areas of EEC and other native vegetation (non-EEC) to non-native vegetation.

Table 6-8 Approved clearing areas

Vegetation type	Total for Warrell Creek to Urunga project (ha) (from EA)	NH2U clearing undertaken/ proposed (ha)	Residual for WC2NH Project (ha)
Endangered ecological communities (EEC)			
Freshwater Wetlands	4.842	1.44	3.40
Lowland Rainforest	0.58	0.23	0.35
Mixed Floodplain Forest	12.49	10.64	1.85
Swamp Forest - Swamp Mahogany / Paperbark	12.47	8.68	3.79
Swamp Forest - Swamp Oak	33.07	11.36	21.71
Subtotal	*63.45*	*32.35*	*31.10*
Other native vegetation (non EEC)			
Moist Open Forest – Flooded Gum	21.91	11.88	10.03
Moist Open Forest - White Mahogany / Grey Gum / Ironbark	28.76	28.89	-0.13
Open Forest – Blackbutt	144.11	98.18	46.93
Open Forest – Scribbly Gum	0	0.03	-0.03
Mangroves	0.19	0.00	0.19
Subtotal	*194.97*	*138.98*	*55.99*
TOTAL	**258.42**	**171.33**	**87.09**

Since the Project EA was approved a number of design refinements have been made and these have been approved through Consistency Assessment reports. Additional vegetation clearance has been included in some of these assessments. Therefore the amount of vegetation clearance currently approved for the WC2NH project (based on the 100% detailed design and some smaller sections of concept design) is 89.36 hectares, including 10.47 hectares of EEC and 78.88 hectares of other native vegetation (non-EEC).

Proposed clearing areas to vegetation communities from the proposed modification is summarised in **Table 6-9**. Clearing areas are shown including a 10 metre buffer from the concept design for the EP&A Act approvals.

[2] *The total amount of freshwater Wetlands clearing incorporates the increase as a result of the EPBC Act modification.*

Table 6-9 Additional clearing areas under EP&A Act

Vegetation communities	Additional clearing areas (ha) (10m buffer)	Approved Project clearing areas (ha)	Approved areas cleared to date for Approved Project (ha)
Moist Open Forest – White Mahogany, Grey Gum	1.324	-0.13	5.50
Swamp Mahogany/ Paperbark (Swamp Sclerophyll Forest EEC)	0.077	3.79	4.238
Total Area	***1.401***		

The proposed design refinements have resulted in a minor increase of 1.401 hectares of additional vegetation clearing. This includes 0.077 hectares of EEC and 1.324 hectares of non-EEC vegetation. The additional clearing would exceed the Approved Project clearing areas for each vegetation type. Additional impacts to the EEC and other native vegetation would be relatively minor however cumulative in relation to impacts associated with the broader Approved Project. These additional impacts would not alter the conclusions of the Project EA in relation to the EEC.

Although the overall total clearing of 90.76 hectares for the project would exceed the 89.36 hectares approved under the Project EA (including subsequent approved Consistency Assessments) by 1.401 hectares, the project has significantly reduced the impact on total EEC vegetation by 20.55 hectares compared to the Approved Project. This is considered a positive outcome for the overall project.

6.6.4.2 EPBC Act approval (Commonwealth)

The Conditions of Approval under the EPBC Act provide limits of clearing areas for particular EPBC Act listed species habitat that can be cleared as part of the project.

The clearing calculations and areas of habit affected for the Approved Project were calculated for the referral using a more conservative method. Instead of calculating areas by using the concept design with a 10 metre buffer the referral buffer area were calculated based on the following:

- Concept design with 15 metre buffer
- Operational water quality basins with 10 metre buffer
- Adjustments to access roads within Nambucca State Forest with 10 metre buffer
- Utility adjustments with clearing requirements of utility authorities
- Three metre clearing width for boundary fencing - excluding within Nambucca State Forest and swamp forest where a flying fox camp is located
- A 10 per cent contingency which includes provision for clearing for construction phase water quality basins, accesses to ancillary facilities, stockpile sites and design refinements.

To ensure consistency with the Approved Project and the referral the clearing areas for the EPBC Act assessment have been calculated in **Table 6-10** using the same buffer area assumptions as the referral.

Table 6-10 Additional clearing areas under EPBC Act

Threatened Fauna Potential Habitat	Additional clearing areas (ha) EPBC Act buffer	Approved referral clearing area (ha) EPBC Act buffer	Approved areas cleared to date for Approved Project (ha)
Vegetation Communities			
Open Forest - Blackbutt	0.001	77.00	54.55
Moist Open Forest – White Mahogany, Grey Gum	1.525	5.50	5.50
Swamp Mahogany/ Paperbark (Swamp Sclerophyll Forest EEC)	0.084	5.30	4.18
Total Area	***1.610***		
Threatened Fauna Potential Habitat			
Koala Habitat	1.610	106.60	82.90
Grey-headed Flying-fox habitat (foraging habitat)	1.610	106.60	82.90
Spotted-tailed Quoll habitat	1.610	114.10	89.42
Regent Honeyeater and Swift Parrot (wintering habitat)	0.084	5.30	4.32
Threatened Flora Habitat			
Slender Marsdenia/clear Milkvine and Wooll's Tylophora/Cryptic Forest Twiner Habitat	1.525[3]	17.80	16.12
Parsonsia dorrigoensis (Milky Silkpod) habitat	1.525	24.30	22.22

As seen in **Table 6-10** an additional clearing of 0.001 hectares of Open Forest – Blackbutt, 1.525 hectares of Moist Open Forest – White Mahogany, Grey Gum and 0.837 hectares of Swamp Forest – Swamp Mahogany / Paperbark EEC, would be required for the proposed modification. These vegetation types are listed as potential habitat under the EPBC Act for Koala, Grey-headed Flying Fox, Spotted Quoll, Regent Honeyeater, Swift Parrots and Milky Silkpod.

Clearing of 1.525 hectares of Moist Open Forest – White Mahogany, Grey Gum would exceed the 5.5 hectares of clearing that was approved in the referral for the Approved Project. A modification to the referral would need to be submitted and approved prior to clearing of this vegetation community.

A number of Slender Marsdenia plants occur immediately adjacent to Old Coast Road (recorded previously as part of earlier studies on the Approved Project) associated with the 1.525 hectares of Moist Open Forest – White Mahogany, Grey Gum that would be cleared. Clearing this area does not exceed the clearing areas approved in the referral (EPBC CoA 1a) and Project EA, however these plants are included as part of the WC2NH Threatened Flora Management Plan as threatened plants which are to be retained and monitored in situ. It is envisaged that should

[3] *As the area of Slender Marsdenia was not survey the area of Moist Open Forest – White Mahogany, Grey Gum was utilised.*

impacts to Slender Marsdenia be unavoidable, translocation of impacted plants should be undertaken in accordance with the requirements of the Approved Project Threatened Flora Management Plan.

6.6.4.3 Additional impacts

Previous assessments of significance for threatened species, migratory species and EECs impacted by the broader WC2NH project have been prepared for the Project EA. These assessments have been reviewed and updated in relation to additional impacts to threatened species, migratory species and EECs from the potential clearing of the Project footprint. Whilst these works would contribute to additional incremental impacts to threatened species and EECs as part of the broader WC2NH project, the Proposal would not increase the risk of 'significant impacts' to threatened species and EECs.

In addition the proposed modification would have the following impacts on biodiversity:

- Potential clearing impacts to a number of Slender Marsdenia adjacent to Old Coast Road. Impacts to this species are to be avoided if possible
- Habitat removal for potentially occurring EPBC, TSC Act and ROTAP listed flora species
- Likely loss of hollow-bearing trees but as mentioned it is envisaged that clearing of mature vegetation would be minimised where possible
- Likely loss of trees currently supporting nest boxes installed for hollow bearing tree loss, however these boxes can relocated. Partial loss of Nest Box Replacement Zone S
- Likely habitat removal for locally occurring fauna species although habitats present are generally of low quality with the exception of native vegetation represented by the moist open forest stand which would be partially impacted
- The Proposal may contribute to habitat fragmentation although this would be minor given that clearing of native vegetation would be avoided
- Construction of the proposed modification would have the potential to contribute to the risk of introducing/ and or spreading weeds and pathogens to/ from the site
- The proposed modification would incrementally contribute to the overall risk associated the wildlife injury and mortality associated with the Approved Project during vegetation/ habitat removal/ modification, though only to a relatively minor extent.

6.6.5 Mitigation/ management measures

In order to minimise impacts to biodiversity it is recommended that the detailed design process would aim to position the proposed modification to:

- Avoid direct impacts (clearing) to areas of EEC and provide a 10 metre buffer to these areas where possible
- Avoid impacts to the identified locations of Slender Marsdenia with the final design of the proposed modification
- Avoid clearing of native vegetation where possible
- Avoid clearing of hollow bearing trees where possible.

Additionally the following measures should be undertaken in order to ameliorate impacts to biodiversity.

- An additional Nest Box Replacement Zone of similar quality habitat should be selected for relocation of nest boxes

- Should impacts to Slender Marsdenia be unavoidable, translocation of the affected individuals must be undertaken in accordance with the WC2NH Threatened Flora Management Plan. In this instance, consideration of additional biodiversity offsetting requirements should be undertaken by Roads and Maritime
- All environmental biodiversity management plans should be updated to include the additional areas of the proposal.

6.7 Hydrology, water quality and soil management

6.7.1 Introduction

This section addresses the hydrological, water quality and soil impacts of the proposed modification. These impacts for the Approved Project were addressed in the Project EA in Chapter 16 (water quality and hydrology) and Working Paper 5 – Water (flooding and water quality). This section evaluates the impacts and mitigation required for hydrology, water quality and erosion and sediment control.

6.7.2 Existing environment

The key water quality consideration in this location is a SEPP 14 Wetland located around 100 metres to the west of the upgraded highway. While Approved Project requirements do not specifically require water quality control measures for local roads, including on and off ramps, due to the proximity of the wetland, it is proposed that all pavement runoff from the upgraded highway or local roads be treated before discharging into this SEPP 14 Wetland.

The drainage design of the upgraded highway includes a permanent water quality basin, named B52.93, located on the western side of the upgraded highway at chainage 53,000 to treat, and provide spill containment, before road water runoff is released into the SEPP 14 Wetland. The Approved Project also includes a clean water detention basin next to B52.93 which is required to maintain the flood immunity of the property access track downstream and manage flows to the downstream wetland. In developing the options, consideration was given to their impact on the permanent and the temporary basins, as well as on the clean water detention basin.

A permanent water quality basin is also proposed on the eastern side of the southbound off ramp at chainage 53450 to treat, and provide spill containment, before road water runoff is released downstream to the east of the main alignment.

Temporary erosion and sediment control for this proposed modification has been developed based on the Landcom publication Managing Urban Stormwater – Soils and Construction Volume 1 – 4th Edition (2004), commonly known as the Blue Book. Temporary basins have been specified for areas where average annual soil loss is greater than 150m^3/year. A set of progressive erosion and sediment control plans will be prepared on site to ensure that sediment runoff is managed to suit construction activity.

6.7.3 Impact assessment

The proposed modification would have construction and operational impacts on groundwater and surface water, sediment and acid sulphate soil impacts similar to that detailed in the Project EA for this section of the highway.

The proposed modification would not impact the permanent basin B52.93 or the adjacent clean water detention basin. Therefore the permanent water quality design measures of the upgraded highway would not need to be altered. Access to the basin would need to be provided in coordination with a new property access for an affected landholder.

Some backwater effects from the Nambucca River cause water to pond to the west of the upgraded highway during major regional events. Two key flooding and hydrology considerations are:

- The flood immunity available for access to the ramps and to Old Coast Road central
- Potential discharge to the SEPP 14 Wetland downstream of culvert C53.02 which could be sensitive to changes in flow rates. This culvert is linked to the permanent basin B52.93 and the associated clean water detention basin that is part of the Approved Project without the ramps.

In terms of flood immunity, for access to the ramps and Old Coast Road, and the proposed modification would allow access in a 20 year flood event and still be accessible in a 50 year event. A small section of the existing Old Coast Road just north of the intersection with the existing highway would start to go under water in a 100 year flood event and would start to restrict access to the ramps, Letitia Close and Old Coast Road central in anything above a 100 year flood event.

In terms of the second consideration of discharge to the SEPP 14 Wetland, the following **Table 6-11** summarises the flow rates and velocities discharging to the SEPP 14 Wetland, for the existing situation, the Approved Project and proposed modification.

Table 6-11 Discharge into SEPP 14 Wetland at culvert C53.02 and permanent basin B 52.93

Case	5 year event		100 year event	
	Velocity (m/s)	Flow rate (m^3/s)	Velocity (m/s)	Flow (m^3/s)
Existing	2.03	0.092	2.31	0.154 (pipe) 0.201 (over road)
Approved Project and proposed modification	1.49	0.142	2.05	0.227*

* *This flow would occur both over the access road and through the pipe. The exact split would be likely to be similar to the split in the existing situation*

For the Approved Project, the permanent basin B52.93 is supplemented by a clean water detention basin which reduces peak flows into the wetland and allows the existing flood immunity of the access track between the basin and the SEPP 14 Wetland to be maintained. With these measures in place, **Table 6-11** shows that the Approved Project would generally have lower discharge velocities and lower peak discharges than the existing situation.

The proposed modification would not affect the upgraded highway and location of culvert C53.02, or the permanent basin B52.93 and clean water retention basin. Therefore the proposed modification would also have generally lower discharge velocities and lower peak discharges to the SEPP 14 Wetland than the existing situation.

The proposed modification would require a new culvert to drain the trapped area between the southbound off ramp and the upgraded highway at chainage 53,450 and replacement and widening of a culvert on Old Coast Road, 40 metres from the intersection with the existing highway, with a new pipe. In addition, it would require minor adjustments to a number of other culverts and outlets associated with the Approved Project.

Earthworks quantities have been estimated for the ramps, local roads and upgrade to the intersection of Old Coast Road and the Existing Pacific Highway. The proposed modification would require borrowing about 16,000 cubic metres.

6.7.4 Mitigation/ management measures

Detailed construction and operational phase environmental safeguards are described in the Project EA and Working Paper, and detailed in the soil and water management plan and acid sulphate management plan amongst others. These will be relevant to this proposed modification and no additional management or mitigation measures are required.

6.8 Planning and land use

6.8.1 Introduction

This section considers potential land use and property impacts that may result from the proposed modification. These issues were addressed in chapter 11 (Social and economic) of the Project EA. Additional impacts on land which has already been acquired by Roads and Maritime are not considered in this assessment.

6.8.2 Impact assessment

As the proposed modification is mostly situated within the existing Approved Project boundary, there would be limited property impacts. There would only be minor impacts to adjoining land uses.

The proposed modification would be mostly within the Approved Project boundary as identified in the Project EA. However, on the eastern side of the highway, additional land take is required to ensure that the roundabout, the off ramp and Letitia Close have appropriate sight lines for safe traffic movement. This has resulted in the acquisition of one additional property on Letitia Close. Due to this, access to an adjoining property without street access, would be moved away from the highway corridor and be placed in a safer location. The impacts of this access have been considered in the Major Consistency Assessment for the proposed design refinements to Old Coast Road (RMS, 2015).

There is a permanent water quality basin proposed to the east of the southbound off ramp. This basin is to be located outside the existing Project Boundary and within the adjacent property, which is owned by Roads and Maritime.

6.8.3 Mitigation/ management measures

Mitigation/management measures for the Approved Project are relevant to the proposed modification. No additional mitigation measures are required.

6.9 Socio-economic analysis

6.9.1 Introduction

This section considers potential socio-economic impacts that may result from the proposed modification. These issues were addressed in chapter 12 (Social and economic) of the Project EA. This assessment addresses the same items that were addressed in the environmental assessment.

6.9.2 Impact assessment

Regional agricultural and forestry impacts and local community socio-economic

The proposed modification would not result in any additional impacts from that already assessed by the Project EA.

Access

During construction, there may be additional construction traffic and activities being undertaken in the area, due to the increase in infrastructure required at this location. However, it is not expected to materially affect local access arrangements beyond that identified in the Project EA. As per the Project EA, local access would be managed during construction.

During operation, the addition of the ramps would not result in any changes to community and property access. Property accesses would be maintained as identified in the Project EA. Local access would also be maintained, with Letitia Close still crossing the highway via a bridge to maintain east west access.

Under the Approved Project, southbound highway vehicles would have had to exit the highway at Bald Hill Interchange or the Nambucca Heads Interchange to access Macksville. The introduction of the proposed modification would reduce travel time for highway vehicles heading south to Macksville. Further details on the traffic impacts are addressed in **Section 6.2** of this report.

Following discussions with the local bus service providers, it has been agreed that the existing bus access arrangements are to be retained for Letitia Close. Given the very low traffic volumes, no formalised bus bay is required.

Business exposure

The reduction of time to access Macksville would improve the attractiveness of the town as a 'rest stop' for highway traffic. This could result in additional traffic electing to use Macksville as a rest stop and to obtain fuel and food.

The improved connectivity to Macksville resulting from the addition of the proposed modification, in conjunction with the Bald Hill Road interchange to the south, would allow both northbound and southbound vehicles using the upgraded highway to stop at Macksville more easily which could have benefits for local businesses.

Community cohesion

During construction of the proposed modification, it is not expected that there would be any additional community cohesion issues than those identified in the Project EA.

During operation, there may be a perceived additional loss of cohesiveness in the Letitia Close/ Old Coast Road area due to highway/ through traffic mixing with local traffic on Old Coast Road. However, the proposed modification would not result in a reduced level of local access. All traffic movements on the local road network have been retained, the only change being the introduction of highway bound traffic along a short stretch of the local road.

Amenity effects

Due to the introduction of the ramps, there would be additional construction activity in the Approved Project area. The potential amenity effects during construction including noise and visual impacts would be consistent with what was identified in the Project EA. The same measures identified in the EA would be used to mitigate and manage these impacts.

During operation, there would be a change in amenity impacts as identified in the Project EA. As discussed in **Section 6.3**, there would be little change in the expected noise levels as a result of the introduction of the proposed modification.

There would be a change in visual impacts, with an increased project footprint at this location. However, this would be confined to the immediate properties adjacent to the Approved Project and Letitia Close and Old Coast Road. Visual impacts are discussed in **Section 6.5**.

The northbound off ramp connects to a roundabout with Letitia Close/Old Coast Road. This traffic movement would result in potential head light glare to one property as vehicles travel up

the ramp. Modelling of the potential visual light intrusion has identified that this could impact one of the properties located on the hill to the south of the roundabout. Potential alternatives to manage this intrusion are being considered, including visual mounds adjacent the road or on-property treatments.

Tourism impacts

The proposed modification would not directly impact on any tourism activities and destinations.

However, the ramps would improve travel times and access to Macksville and nearby areas, making the region more readily accessible, when compared to the Approved Project. Car transport is important for tourists visiting the area and the improvement in travel time would enhance the attractiveness of Macksville and nearby areas and local tourism locations (eg the Nambucca River Tourist Park) as a destination.

As per the Project EA, signage would be used at the off ramp location to identify Macksville as a place for supplies, fuel, accommodation, tourist locations, facilities and other services.

6.9.3 Mitigation/ management measures

Mitigation/management measures for the Approved Project are relevant to the proposed modification. There are additional management measures in relation to light intrusion of the proposed modification:

- An additional section of visual screening along the southbound off-ramp to reduce the impacts of headlight intrusion
- Addition of a vegetated visual mound on Letitia Close near the south east corner of the roundabout to reduce the impacts of headlight intrusion
- The two properties where headlight glare may intrude into residences, Roads and Maritime will consult with the property owners to determine the best visual barrier (block out blinds, vegetation screen) to install to minimise head light intrusion.

6.10 Other environmental issues

6.10.1 Air quality

Considering that air quality impacts of the Approved Project were assessed in the Project EA as minor or negligible, the ramps with their relatively low traffic flows would have negligible impact on air quality and there would be no significant differences between options.

6.10.2 Hazard and risk

There would be no additional hazards and risks from the Project EA as a result of the proposed modification. There would only be a small portion of heavy vehicles with a hazardous load which would use the proposed modification.

6.10.3 Waste management

There would be no additional waste management impacts from the Project EA as a result of the proposed modification.

6.10.4 Energy

There would be no additional impacts on energy from the Project EA as a result of the proposed modification.

6.10.5 Greenhouse gas

There would be small additional impacts from greenhouse gases during the construction of the proposed modification.

During operation, the main sources of greenhouse gases would be from electricity in road lighting and vehicle emissions. Due to the improved highway access to Macksville from the north, there may be a small reduction in emissions as vehicles drive on a better pavement and grade, and have a shorter distance to access Macksville.

7. Conclusion and additional management measures

7.1 Conclusion

In response to representations from Nambucca Shire Council and the Macksville Chamber of Commerce to the Approved Project, Roads and Maritime are proposing to include north facing ramps at North Macksville (proposed modification).

The proposed modification would include a northbound on ramp onto the upgraded highway, a southbound off ramp from the upgraded highway, tie-ins of the ramps to local roads, an upgraded intersection at Old Coast Road and the existing Pacific Highway (existing highway) and a median cross-over facility to enable emergency vehicles (including ambulances stationed at North Macksville) to travel both north and south on the upgraded highway.

This modification environmental assessment has been prepared in order to seek planning approval for the proposed modification. The report addresses the key issues identified in the Director General's requirements for the Warrell Creek to Urunga Pacific Highway upgrade as well as issues raised in the Preferred Options report (refer to **Appendix A**).

The proposed modification has been designed to be mostly within the Approved Project boundary. Only small impacts in addition to these associated with the Approved Project are anticipated and include:

- Potential light intrusion to one residence in Letitia Close due to vehicle head lights on the off ramp and roundabout
- Additional construction traffic in the proposed modification area and possibly an increased duration of construction activities
- Slight increase in noise levels experienced by receivers (no more than 1 dB(A) for any receiver)
- Additional vegetation clearing including state and federally listed species.

7.2 Additional mitigation and management measures

Mitigation and management measures identified in the Project EA, are sufficient to address the majority of additional impacts. However, additional mitigation measures have been developed to address headlight intrusion of the proposed modification. These measures are:

- An additional section of visual screening along the southbound off-ramp to reduce the impacts of headlight intrusion
- Addition of a vegetated visual mound on Letitia Close near the south east corner of the roundabout to reduce the impacts of headlight intrusion
- The property where headlight glare may intrude into the residence - Roads and Maritime will consult with the property owner in connection with visual screening adjacent the road or on-property treatments
- An additional Nest Box Replacement Zone of similar quality habitat should be selected for relocation of nest boxes

- Should impacts to Slender Marsdenia be unavoidable, translocation of the affected individuals must be undertaken in accordance with the WC2NH Threatened Flora Management Plan. In this instance, consideration of additional biodiversity offsetting requirements should be undertaken by Roads and Maritime
- All environmental biodiversity management plans should be updated to include the additional areas of the proposal.

8. References

Austroads *Guide to Traffic Management Part 3: Traffic Studies and Analysis*

GeoLink 2016, *Biodiversity Assessment, North Facing Ramps – Warrell Creek to Nambucca Heads Pacific Highway Upgrade,* March, Sydney.

Roads and Maritime Services 2010, *Warrell Creek to Urunga Pacific Highway upgrade Environmental Impact Assessment*, January, Sydney.

Roads and Maritime Services 2016 *Warrell Creek to Nambucca Heads, Major Consistency Assessment - Proposed design refinements to Old Coast Road*, March, Sydney.

Roads and Maritime Services 2016 *Warrell Creek to Nambucca Heads North Macksville ramps Submissions report*, March, Sydney.

Roads and Maritime Services 2015 *Warrell Creek to Nambucca Heads Operational noise modelling and assessment*, March, Sydney.

Roads and Maritime Services 2015 *Warrell Creek to Nambucca Heads North Facing Ramps at North Macksville – Preferred option report*, September, Sydney.

Roads and Maritime Services 2012 *Pacific Highway Upgrade, Warrell Creek to Urunga, Traffic Modelling Final Report*, May, Sydney.

Appendix A

Pacific Highway upgrade – Warrell Creek to Nambucca Heads, North facing ramps at North Macksville preferred option report

Transport Roads & Maritime Services

Warrell Creek to Nambucca Heads Pacific Highway upgrade

North facing ramps at North Macksville preferred option report

September 2015

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Glossary

AADJV	Arup Aurecon Design Joint Venture
AADT	Annual average daily traffic
AFJV	Acciona-Ferrovial Joint Venture
AHIMS	Aboriginal Heritage Information Management System
Approved layout	The approved layout represents the scope of works as originally approved, including realignment of Old Coast Road to pass above the upgraded highway but not including north facing ramps at North Macksville
ASS	Acid sulfate soils
dB; Decibel	A relative unit of measurement widely used in acoustics, electronics and communications. The dB is a Logarithmic unit used to describe a ratio between the measured level and a reference or threshold level of 0dB. The ratio may be Sound Power, Sound Pressure, voltage or Sound Intensity etc
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers
Roads and Maritime	NSW Roads and Maritime Services
RoTAP	Rare or Threatened Australian Plants
WC2NH	Warrell Creek to Nambucca Heads

1. Introduction

1.1 Background

Roads and Maritime Services (Roads and Maritime) completed an environmental assessment of the Warrell Creek to Urunga Pacific Highway upgrade (the Project EA) in January 2010. The Project EA identified a range of environmental, social and planning issues associated with the construction and operation of the Pacific Highway Upgrade between Warrell Creek and Urunga and proposed measures to mitigate or manage those potential impacts. This project was designated critical infrastructure, under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and was formally approved on 19 July 2011.

Roads and Maritime Services has engaged Pacifico, an Acciona and Ferrovial Joint Venture, to design and build the 20 kilometre Warrell Creek to Nambucca Heads section of the Pacific Highway upgrade. The project involves upgrading the highway to a four lane divided road between the Allgomera deviation, south of Warrell Creek and Nambucca Heads, just south of the railway line.

In response to representations from Nambucca Shire Council and the Macksville Chamber of Commerce, north facing ramps are proposed at North Macksville. This is in addition to the approved interchanges at Warrell Creek and at Bald Hill Road south of Macksville. The proposed ramps would include a northbound on-ramp onto the highway, a southbound off-ramp from the highway and a median cross-over facility to enable emergency vehicles (including ambulances stationed at North Macksville) to travel both north and south on the highway.

Inclusion of the north facing ramps and median cross-over brings a number of advantages to the Warrell Creek to Nambucca Heads Pacific Highway upgrade:

- The ramps would improve connectivity between Macksville and areas to the north, and in particular connectivity between Macksville and Nambucca Heads
- While Macksville is not identified by Roads and Maritime as a Service Centre, addition of the north facing ramps and appropriate signage would, in conjunction with the Bald Head Road interchange to the south, allow both northbound and southbound vehicles using the upgraded highway to stop at Macksville with only a short diversion
- The ramps would allow greater utilisation of the infrastructure investment in the section of the Warrell Creek to Nambucca Heads upgrade between Macksville and the Nambucca Heads interchange, about 10 kilometres to the north. By adding the north facing ramps at Macksville, more vehicles will be able to take advantage of safer and faster travel on the upgraded highway to the north
- The ramps would improve access to and from Macksville for emergency services and reduce response times. The northbound entry ramp, in conjunction with the proposed emergency vehicle cross-carriageway access just north of Mattick Road, would provide improved access to a major incident on the upgraded highway south of the Nambucca River.

Since these ramps are not currently included in the approved Warrell Creek to Nambucca Heads project, planning approval will need to be obtained before being built.

Three options for the layout of the north facing ramps and their connections to the road network were investigated and developed as documented in this report. On 20 May 2015 an Options Assessment workshop was held by Roads and Maritime to compare and assess the

three options using a Value Management methodology, from this Option 2 was selected as the preferred option.

Community comment on the preferred option is invited.

An assessment of the potential environmental impacts of the preferred option and proposed measures to mitigate these impacts will be prepared. Community comment on the preferred option will be considered in the environmental assessment.

Potential impacts to be identified and assessed include:

- Compliance with design criteria and safety impacts
- Traffic impacts
- Noise and vibration impacts
- Air quality impacts
- Impacts on native plants and animals
- Impacts on Aboriginal and non-Aboriginal heritage
- Impacts on flooding, drainage and groundwater
- Property impacts.

The environmental assessment would then be submitted to the NSW Department of Planning and Environment for planning approval as part of a Modification Assessment Report under Section 75 W of the EP&A Act.

The modification would be displayed by the NSW Department of Planning and Environment for public comment. A Submissions report would then be prepared and the concept design and environmental assessment would be refined as required to address feedback.

Following the NSW Department of Planning and Environment approval of the modification, construction can proceed subject to meeting any approval conditions.

1.2 Purpose of this report

The proposed addition of two north facing ramps at North Macksville to the Warrell Creek to Nambucca Heads Pacific Highway Upgrade project, created the need to examine alternatives as to how the ramps could be incorporated to ensure that a range of project objectives are best realised.

In August 2014, Pacifico developed potential arrangements for review, from which Roads and Maritime selected three options for further investigation.

The purpose of this report is to present and describe the three short-listed ramp options, report on potential impacts, compare the options, and outline how the preferred option was selected.

In comparing the options in this report, assessment of the impacts of the three options are relative to the impact of the approved layout in the area that the north facing ramps are located (Chainage 52800 to 54250). The approved layout includes realignment and provision of a new overbridge for the Old Coast Road to pass above the upgraded highway but does not include north facing ramps. The designs of the approved layout and the three options layouts that were developed are shown in **Appendix A**.

Section 2 describes the design criteria used in developing the three options and the description of each of the three options.

Section 3 provides a comparative assessment of the three options according to the criteria identified in **Section 2.1** and **2.2**.

Section 4 is a summary of the key differences identified in the comparative assessment.

Section 5 outlines the options selection workshop and the selection of the preferred option.

Section 6 describes refinements to the preferred option following the options selection workshop.

Section 7 describes the next steps which are proposed in order to obtain the planning approval that is required before the ramps can be constructed.

2. Development of options

2.1 Objectives

As part of the Project EA specific project objectives were developed for the Warrell Creek to Nambucca Heads upgrade. These align and relate to the overall objectives of the Pacific Highway Upgrade Program. When developing the north facing ramps options these objectives were reviewed and those considered relevant used to guide the development. The project objectives are:

- Develop solutions for the ultimate grade separation of the Pacific Highway and local road intersections including consolidation of accesses by the use of service roads
- Provide rest areas within the investigation area
- Achieve safe driving conditions on the highway for travel speeds of 110 km/h in rural areas and 80 km/h in urban areas
- Have acceptable roadway capacity for traffic volumes 30 years after opening
- Develop a dual carriageway road that accommodates all vehicles up to and including B-Doubles
- Provide acceptable access to properties
- Maintain highway access during flood conditions
- Integrate input from local communities into the development of the Proposal
- Provide connections from the upgraded highway to the key centres of Macksville, Nambucca Heads and Urunga
- Develop delay management strategies to minimise disruption to local and through traffic and maintain access to affected properties and land during construction
- Provide transport infrastructure that is complementary with surrounding land use
- Ensure the project outcomes achieve value for money
- Develop solutions that facilitate the staged construction of the project.

2.2 Design and performance criteria

The three ramp options under consideration have been developed and refined based on the design criteria set out for the project. These key requirements are summarised in **Table 2-1** and **Table 2-2**.

Table 2-1 General design criteria

Design item	Design development requirements
Traffic performance	Interchanges and intersections must be designed to provide a minimum Level of Service "C", in accordance with "Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis", for design year 2036 for the 100th highest hourly volumes."
Design vehicle	▪ Existing Pacific Highway / Old Coast Road South intersection: 25 metre B Double ▪ Intersections with Old Coast Road South / Letitia Close: 19 metre semi-trailer ▪ Intersections with North Macksville Ramps: 25 metre B Double ▪ Property access intersections: 19 metre semi-trailer
Pavement	Pavement types are designed to be consistent with the Warrell Creek to Nambucca Heads upgrade. Low noise pavement surfacing is proposed for the ramps including the ramp merge and diverge areas on all options. For improved design life and reduced maintenance costs, concrete pavement is proposed for roundabouts.
Exit ramps	Exit ramp layouts must allow for all deceleration to occur in the deceleration lane, with no deceleration taking place in the adjacent through lane.
Lighting	Lighting is not required on the upgraded highway but flag lighting (one or two strategically placed lamps) is required at the ramp junctions with local roads. Lighting must be provided on all roundabouts on local roads. A further requirements is that the design of lighting must ensure that light spillage into residential and other sensitive areas is avoided.
Utilities	A preliminary review of utilities in the vicinity of the ramps and related roadworks did not identify any major utilities that would be affected by the options.
Medium Cross-over access, and bus facilities	A combined median cross-over, emergency U-turn facility and heavy vehicle stopping bay is located at Chainage 54,000 under the approved layout. This would have broadly coincided with the proposed ramp merge and diverge locations on all three options, and in order to provide for the north facing ramps the facility will be relocated to Chainage 54,750, just north of Mattick Road. A bus bay is required in each direction on Old Coast Road near the intersection with Letitia Close.

Table 2-2 Local road and ramp geometric design criteria

Old Coast Road (south)	**Minimum Requirement**
Design speed:	60 km/h
Minimum number of lanes and widths:	2 x 3.5m
Minimum shoulder width:	1.0m
Stopping Sight Distance - reaction time (R_T):	1.5 sec
Stopping Sight Distance:	64m
Old Coast Road (south) bridge above upgraded highway	**Minimum Requirement**
Design speed:	60 km/h
Minimum number of lanes and widths:	2 x 3.5m
Minimum shoulder width (footway not required):	1.0m
Minimum vertical clearance above upgraded highway:	5.3m
Stopping Sight Distance - reaction time (R_T):	1.5 sec
Stopping Sight Distance:	64m
Letitia Close	**Minimum Requirement**
Design speed:	50 km/h
Minimum lane widths:	2 x 3.0m
Minimum nearside (outside) shoulder width:	0.5m
Stopping Sight Distance - reaction time (R_T):	1.5 sec
Stopping Sight Distance:	48m
Design Criteria - Ramps	**Minimum Requirement**
Design speed:	80 km/h
Minimum lane widths:	3.5m
Minimum nearside (outside) shoulder width:	2.0m
Minimum offside shoulder width:	1.0m
Target speed for trucks at start of 110m entry ramp merge:	75 km/h
Stopping Sight Distance - reaction time (R_T):	1.5 sec

2.3 Option descriptions

Three options were developed and these are outlined below. More detail on each option can be found in Section 2.2 of the Roads and Maritime North Macksville – North Facing Ramps Options Assessment Report in **Appendix B**.

2.3.1 Option 1

Option 1 (purple design in **Appendix A**) is closely aligned to the approved layout (yellow design) which includes realignment of the Old Coast Road to pass over the upgraded highway. Option 1 is a comparatively simple addition to the approved layout by adding north facing ramps which connect as simple T-intersections to the realigned Old Coast Road. At the new intersections priority is given to through traffic on the Old Coast Road.

The existing channelised intersection where Old Coast Road connects to the existing Pacific Highway would be retained. With the lower volume of traffic on the existing highway the existing layout with right and left turn lanes off the highway would meet capacity requirements.

2.3.2 Option 2

Option 2 (black design in **Appendix A**) is a relatively minor variation on Option 1 which aims at overcoming some of the alignment difficulties in Option 1. It still includes realignment of the Old Coast Road to pass over the upgraded highway, and the north facing ramps still connect to the realigned Old Coast Road. The main difference is that the Letitia Close and exit ramp intersections are combined as a roundabout east of the upgraded highway, allowing the alignment of the bridge over the upgraded highway to be straightened. The other change is that west of the upgraded highway the priority has been reversed, with access onto the northbound entry ramp given priority over traffic from Old Coast Road central.

The existing channelised intersection where Old Coast Road connects to the existing Pacific Highway would be retained. As with Option 1, the lower volume of traffic on the existing highway means that the existing layout with right and left turn lanes off the highway would meet capacity requirements.

2.3.3 Option 3

Option 3 (orange design in **Appendix A**) is quite different from Options 1 and 2. Rather than realigning the Old Coast Road onto a new bridge over the upgraded highway, a new connection for the Old Coast Road is provided on the west side of the upgraded highway. This connection also provides access between the existing Pacific Highway and the existing Old Coast Road to the north. The proposed treatment of this intersection is a priority T-junction with channelised right turn and left turn lanes on the highway.

On the eastern side of the ungraded highway the off-ramp connects to the redundant section of the Old Coast Road and an intersection allows for connectivity to Letitia Close to be retained. The existing intersection where the redundant section of the Old Coast Road connects to the existing Pacific Highway on the east would be retained with two lanes northbound and separate right and left turn lanes off the existing highway. Letitia Close would connect as a T-junction with priority given to traffic from the exit ramp.

While this option requires the construction of a new connecting road to the existing highway on the west side of the upgraded highway, close to the existing intersection on the east side, it avoids the need to construct a bridge to carry Old Coast Road over the upgraded highway.

3. Assessment of options

3.1 Road user safety

A Pre-construction Strategic Design Road Safety Audit (RSA) was carried out on the three ramp options, with the objective of identifying potential road safety risks with each option.

The Road Safety Audit Report identified potential safety issues for each option and then estimated the likely frequency of crashes arising from the safety issue as well as the likely severity of those crashes. A rating was then allocated to each safety issue based on the frequency and severity matrix in **Table 3-1**.

Table 3-1 Matrix of level of risk for each safety issue

		Frequency of crashes			
		Frequent	**Probable**	**Occasional**	**Improbable**
Severity of crashes	**Catastrophic**	Intolerable	Intolerable	Intolerable	High
	Serious	Intolerable	Intolerable	High	Medium
	Minor	Intolerable	High	Medium	Low
	Limited	High	Medium	Low	Low

It is normal for any safety audit to identify safety issues and this does not mean that the safety issues cannot be addressed in subsequent design refinements or that the design is inherently unsafe. Rather, the purpose of the strategic audit is to identify if there are relative differences in the safety of options and to ensure that issues are identified and addressed to the extent possible in subsequent stages of design.

In order to compare the relative safety of the options, the number of safety issues corresponding to each level of risk has been summed for each option as shown in **Table 3-2** below.

Table 3-2 Number of high, medium and low risk safety issues for each option

Risk Level	Option 1	Option 2	Option 3
High	1	3	2
Medium	8	6	7
Low	1	0	2
Total safety issues raised	10	9	11

There were no intolerable risks identified for any of the options. There were six high risk, 21 medium risk and three low risk safety issues identified for the options. One medium risk safety issue that was raised for all options is the proposed location of the median crossover facility which is about 500 metres north of the ramp merge and diverge. While this facility improves access for emergency vehicles, its location may encourage illegal and unsafe usage by unauthorised road users. A safety review will be required during the detail design stage.

Other risks that were identified included:

- Bus bay facility: The proposed bus bay facility, south of Letitia Close, may encourage pedestrians to walk on the road due to the discontinuous foot paths on either side of the roadway. This high level risk is applicable to Option 1 and 2
- Limited sight distance: A number of high and/or medium level limited sight distance risks were identified for all three options. Drivers at intersections that have insufficient sight distance may select unsafe gaps to turn, as they cannot see approaching traffic, potentially resulting in crashes with through traffic. The high level limited sight distance safety risks identified for Option 2 and 3 (there are no high level limited sight distance safety risks identified for Option 1) include:
  - Option 2: Vehicles on the southbound off-ramp, giving way at the roundabout, may have limited sight distance to vehicles from the west over the Old Coast Road bridge
  - Option 2: Drivers of vehicles on the existing Old Coast Road (west of the upgraded highway) waiting to turn right onto the realigned Old Coast Road may have limited sight distance to approaching vehicles on the realigned Old Coast Road (Chainage 53400) due to safety barriers and/or the curvature of the road
  - Option 3: Drivers of vehicles stopped on Letitia Close, waiting to turn left onto the Old Coast Road, may have limited sight distance to approaching vehicles from the southbound off-ramp
  - Option 3: The proposed 30 metre retaining wall for the upgraded highway may obscure sight distance at the existing Pacific Highway and realigned Old Coast Road intersection
- Heavy vehicles using the northbound on-ramp may not accelerate sufficiently to merge onto the main carriageway. This medium level risk applies to all three options.

3.2 Traffic assessment

This section of the report contains the findings from the assessment of the ramp options and SIDRA intersection analysis (SIDRA is software used for intersection modelling), using outputs from the traffic assessment presented within the *"Pacific Highway Upgrade, Warrell Creek to Urunga, Traffic Modelling Final Report"* dated May 2012 by SMEC on behalf of Roads and Maritime. This ramp traffic assessment is based on the same Transcad assignment model that was used for the Project EA.

3.2.1 Interchange traffic volume estimates

The process for determining traffic volumes for the purposes of preliminary assessment of the ramp options included:

- Reviewing preliminary outputs from sensitivity tests using the Transcad assignment model
- A check comparing modelled traffic volume estimates at the Bald Hill Road interchange ramps both with and without the north facing ramps, and comparing these to reported estimates at the north facing ramps at Bald Hill Road interchange
- Review by comparing modelled traffic volume estimates with the matrix demands between origins / destinations in proximity to the interchange.

Sensitivity tests were performed using the Transcad assignment model and the model was found to be capable of replicating the estimated volumes around the north facing ramps at North Macksville.

Using the methodology described above, traffic volumes on the main links have been estimated as shown in **Table 3-3**. These volumes are the outputs from the Transcad model that was shown to perform closest to the origin destination matrix, and to best correlate with the Bald Hill Interchange volumes and the sensitivity checks applied.

Table 3-3 2036 AADT Transcad model volume outputs

Location	Section	Direction	AADT* Approved layout without ramps			AADT* With north facing ramps		
			LV	HV	Total	LV	HV	Total
North Facing Ramps	On-ramp	Northbound	N/A	N/A	N/A	424	5	429
	Off-ramp	Southbound	N/A	N/A	N/A	391	55	446
Macksville Bridge		Northbound	2,104	110	2,215	2,371	114	2,485
		Southbound	1,738	158	1,896	1,962	192	2,154
Bald Hill Interchange	Off-ramp	Northbound	652	1	653	652	1	653
	On-ramp	Northbound	4,191	1,218	5,408	3,905	1,214	5,119
	Off-ramp	Southbound	5,717	903	6,620	5,478	870	6,348
	On-ramp	Southbound	288	5	293	288	5	293
Existing Highway	West of North Macksville Ramps	Northbound				1,903	44	1,947
		Northbound				1,503	106	1,609
	East of North Macksville Ramps	Southbound				1,479	39	1,518
		Southbound				1,112	51	1,163
New Highway	South of Upper Warrell Creek Interchange	Northbound	5,059	1,040	6,099	5,059	1,040	6,099
		Southbound	4,447	1,155	5,602	4,443	1,155	5,597
	Upper Warrell Creek Interchange to Bald Hill Interchange	Northbound	4,044	592	4,636	4,044	592	4,636
		Southbound	3,001	623	3,624	2,997	623	3,619
	Bald Hill Interchange (between Off and On-ramps)	Northbound	3,392	591	3,983	3,392	591	3,983
		Southbound	2,713	618	3,331	2,709	618	3,326
	Bald Hill - North Macksville Ramps	Northbound	7,583	1,809	9,391	7,297	1,805	9,102
		Southbound	8,430	1,521	9,951	8,187	1,487	9,674
	North of North Macksville Ramps	Northbound	7,583	1,809	9,391	7,721	1,810	9,531
		Southbound	8,430	1,521	9,951	8,578	1,542	10,120

* AADT: Annual Average Daily Traffic

For traffic capacity calculations the 100th Highest Hourly Volumes have been derived from the modelling as shown in the following **Table 3-4** below.

Table 3-4 2036 AADT and 100th highest hourly volumes

Road	Section	Direction	100th Highest Hourly Volumes		
			LV	HV	Total
North Facing Ramps	On-Ramp	Northbound	40	0	40
	Off-Ramp	Southbound	37	5	42
New Highway	Bald Hill to Macksville	Northbound	686	170	856
		Southbound	770	140	909
	North of North Macksville Ramps	Northbound	726	170	896
		Southbound	806	145	951
Existing Highway	West of North Macksville Ramps	Northbound	179	4	183
		Southbound	141	10	151
	East of North Macksville Ramps	Northbound	139	4	143
		Southbound	105	5	109

3.2.2 Traffic performance results

A traffic analysis has been carried out for each option. While some discrepancies were found in adapting the model to incorporate the ramps, the forecast volumes on the ramps are relatively low and would be unlikely to change significantly using a different traffic model. The forecast volumes are considered adequate for assessment of the options.

For the purposes of the traffic modelling the same ramp volumes have been used for all three options. This is considered to be an appropriate assumption as the position and functionality of the three ramp options are similar and when reviewed it was concluded that the volumes of the ramps for the three options would be similar.

3.2.2.1 Intersection analysis

Intersection analyses have been undertaken using Sidra. Level of Service (LoS) is a qualitative measure that is used to assess the traffic efficiency of a road or intersection. LoS ranges from 'LoS A' which generally indicates free flowing traffic conditions to 'LoS F' which typically indicates fully congested traffic conditions. The LoS was assessed for each intersection in each option. The results indicated that there would be a Los A at all intersections for all options.

3.2.2.2 Traffic assessment summary

The traffic assessment has shown that all intersections in all three options would perform at a high level of service with capacity to cater for significant increases in future traffic volumes. Forecast traffic volumes on the ramps would be very similar in all three options and in terms of traffic capacity there is no real difference between the three options.

3.2.3 Travel distances

The traffic analysis shows that the vast majority of traffic that would use the north facing ramps has an origin or destination west towards Macksville on the existing Pacific Highway.

Option 3 therefore would have a minor functional advantage since it provides a more direct route for northbound traffic between Macksville and the entry ramp. Northbound vehicles making this movement with Option 3 would save approximately 300 metres in travel distance compared to Options 1 or 2, where northbound vehicles must firstly pass under the upgraded highway then cross back over the upgraded highway again to access the entry ramp.

For southbound traffic from the exit ramp, there is little difference between the options although Option 3 has a slight advantage over the other options as it is the only one which provides priority to exit ramp traffic heading for the existing Pacific Highway.

However, Option 3 results in longer travel distance for buses using Old Coast Road to service Letitia Close as the bus would need to travel down to the new intersection with the existing highway (on the western side of the upgraded highway), travel east along the existing highway, then turn left into the section of the Old Coast Road that connects to Letitia Close, and the bus stop.

3.3 Noise impacts

3.3.1 Introduction

A noise assessment has been undertaken for the potential noise impacts from the three ramp options. This assessment was undertaken to assist in the selection of a preferred option for the ramps. This section of the report presents the approach and findings of the assessment.

This noise assessment of the ramp options is based on the same approach and methodology adopted for the approved layout in the Project EA.

3.3.2 Methodology

The three ramp options were incorporated into the Detail Design acoustic model (the "approved layout". The ramp options modelled are consistent with the ramp option layouts shown in **Appendix A**. For comparison purposes the noise levels for the approved layout without the ramps are also provided, based on the same mainline alignment. To allow for a more focussed and simple comparison, noise levels are only shown for the night-time criteria, as the assessment found that this is the critical period for assessing compliance with the noise criteria for this project.

3.3.3 Traffic volumes

Traffic volumes for local roads and the proposed ramps have been sourced from the 2026 traffic volumes. For the purposes of the noise modelling the AADT traffic volumes for the year 2026 were split into estimated daytime 15 hour and night-time 9 hour volumes using the same day/night splits that were adopted in the approved layout Project EA. Traffic volumes used for the night-time criteria assessment are shown in **Table 3-5**.

Table 3-5 2026 Traffic volumes used for the acoustic assessment

Road	Direction	Light Vehicles 10pm – 7am	Heavy Vehicles 10pm – 7am
New Highway - Bald Hill to North Macksville Ramps	Northbound	559	563
	Southbound	628	464
Main carriageway - North of North Macksville Ramps	Northbound	592	565
	Southbound	657	481
North Facing Ramps	Northbound	33	2
	Southbound	30	17
Old Coast Road (excluding ramp traffic)	Northbound	27	16
	Southbound	27	16
Letitia Close	Northbound	3	2
	Southbound	3	2
Existing highway - West of North of North Macksville Ramps	Northbound	178	15
	Southbound	141	35
Existing highway - East of North of North Macksville Ramps	Northbound	138	13
	Southbound	104	17

3.3.4 Results

Predicted noise levels for the approved layout without the ramps as well as for the three options are shown in **Figure 3-1**. To allow a focussed comparison, noise levels are only shown for buildings exceeding the critical night-time criteria of 50 dBLAeq,9hr.

The maximum increase in noise compared to the approved layout (which did not include any ramps at this location) is 2 dB(A).

3.3.5 Conclusion

All of the options would result in a slight increase in noise levels at nearby residences compared to the approved layout, but the maximum variation between the approved layout and any of the options is a maximum of 2 dB(A). This is not considered a significant variation in noise levels, since changes in noise level of less than 3 dB(A) are not able to be detected by most people.

Figure 3-1 Acoustic comparison of options

3.4 Other environmental considerations

The other environmental issues associated with the proposed options are:

- Native vegetation clearing
- Impacts on threatened flora and fauna and habitat
- Impacts on hollow bearing trees
- Impacts on Aboriginal and non-Aboriginal heritage.

Considering that air quality impacts of the approved layout were assessed in the Project EA as minor or negligible, the ramps with their relatively low traffic flows would have negligible impact on air quality and there would be no significant differences between options.

Each of the options has been assessed against the current environmental constraints mapping for the project. Figures showing each of the options and the environmental sensitive areas and constraints are included in **Appendix C**.

The sensitive area and constraints mapping shown in **Appendix C** was previously ground-truthed inside the approved project boundary during the Project EA. Additional ground-truthing has been carried out as necessary where the options extend outside the approved project boundary. The additional ground-truthing included the area between the project boundary and a 50 metre buffer measured from the footprint of the ramp options.

The additional flora and fauna ground truthing undertaken by GeoLink on 14 April 2015, confirmed that the current vegetation generally conforms to vegetation communities mapped as part of the Project EA. No additional hollow-bearing trees were detected within the study area and fauna habitats within the study area are considered to be generally low quality. No additional threatened flora species or listed Rare or Threatened Australian Plants (RoTAP species) were detected within the 50 metre buffer area.

The changes to vegetation communities that were identified by the additional ground truthing included:

- Modified vegetation community boundaries associated with Swamp Oak Forest Endangered Ecological Community (EEC) and Saltmarsh EEC
- An additional area of Swamp Forest EEC located to the north-east of the intersection of Old Coast Road and the existing Pacific Highway
- An additional area of Swamp Forest EEC located to the east of the upgraded highway and north of Letitia Close on private property.

These areas are shown in **Figure** 3-2.

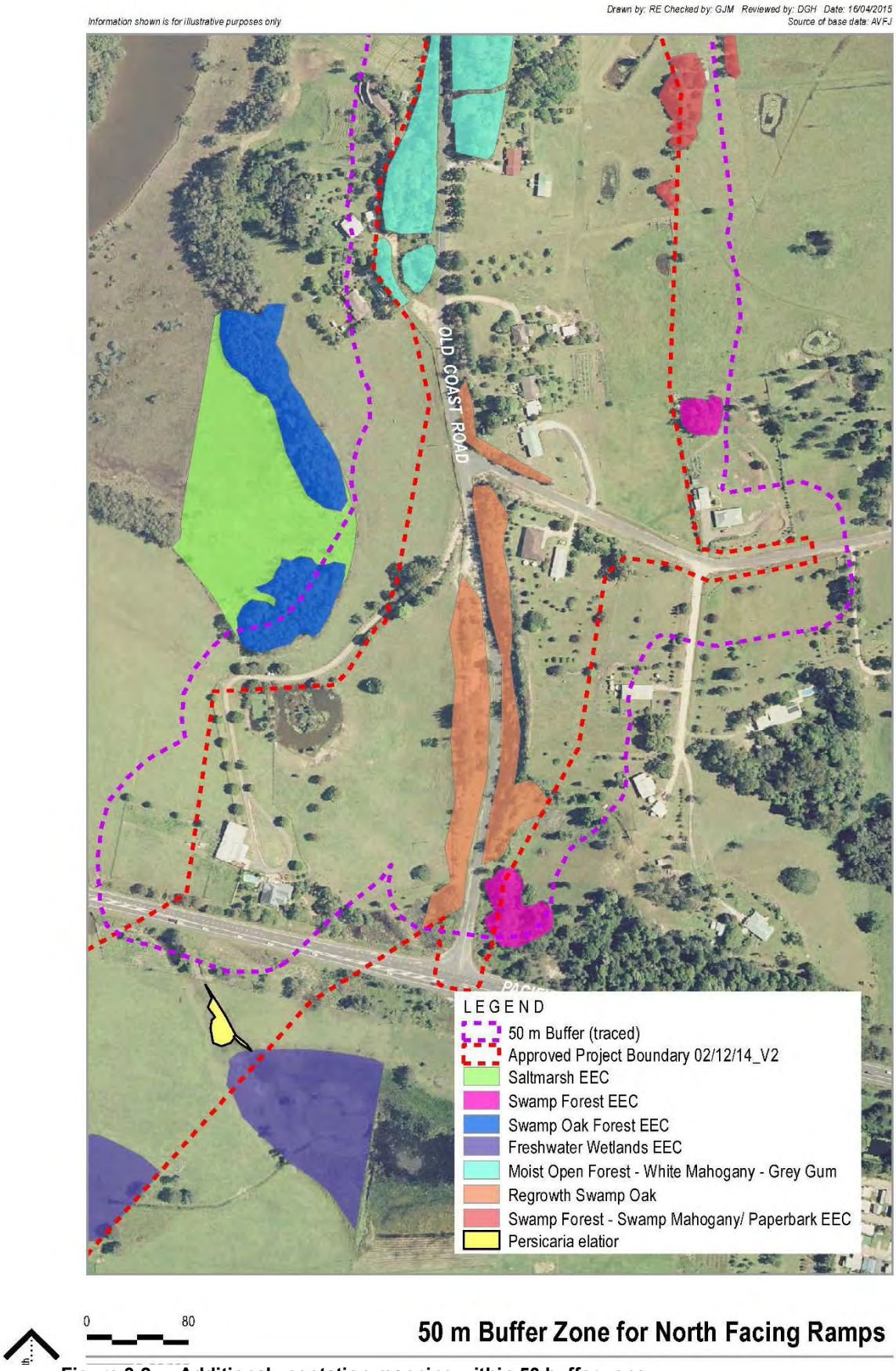


Figure 3-2 Additional vegetation mapping within 50 buffer zone

To assist with the assessment, the area of clearing of flora and fauna habitat required for each of the options has been calculated, assuming that clearing to accommodate all of the project infrastructure would extend 15 metres from the edge of the earthworks footprint. In **Table 3-6** clearing areas for each option have been compared against the EPBC Act approvals and the approved layout.

Table 3-6 Clearing area comparison with EPBC approval requirements for flora and fauna habitat

Habitat description	EPBC Act approval (ha) Note (1)	Approved layout with 15m buffer (ha) Note (2)	Option 1 with 15m buffer (ha) Note (2)	Option 2 with 15m buffer (ha) Note (2)	Option 3 with 15m buffer (ha) Note (2)
Slender Marsdenia/Clear Milkvine and Wooll's Tylophora/Cryptic Forest Twiner habitat	0.14	0.07	0.23	0.26	0.07
Koala habitat	0.90	1.24	1.67	2.06	0.86
Koala habitat (critical to survival)	0.81	1.18	1.54	1.95	0.75
Grey-headed Flying-fox habitat (foraging habitat critical to survival)	0.90	1.24	1.67	2.06	0.86
Spotted-tail Quoll habitat	0.90	1.24	1.67	2.06	0.86
Regent Honeyeater (*Anthochaera Phrygia*) and Swift Parrot (*Lathamus discolour*) wintering habitat, comprising dry sclerophyll forests containing Swamp Mahogany	0.00	0.00	0.06	0.06	0.07
Parsonsia dorrigoensis (Milky Silkpod) habitat	0.83	1.23	1.60	1.98	0.75

(1) Estimate of approved clearing under the EPBC approval based on Concept Design plus a 15m buffer

(2) Includes a 10% contingency allowance for design changes, water quality basins, drainage, utilities etc.

Similarly, the impacts on hollow bearing trees and *Marsdenia longiloba* (Slender Marsdenia) (listed as endangered under the Threatened Species Conservation Act 1995 and the EPBC Act) have been calculated, assuming that clearing to accommodate all of the project infrastructure would extend 15 metres from the edge of the earthworks footprint. The Slender Marsdenia plants are identified as being either indirectly impacted or retained in situ in the road reserve in the Threatened Flora Management Plan. **Table 3-7** below provides a comparison of the additional impacts.

Table 3-7 Other flora impacts

Vegetation type	EP&A Act Part 3A approval (ha) (1)	EPBC Act approval (ha) (2)	Approved layout with 15m buffer (ha)	Option 1 with 15m buffer (ha)	Option 2 with 15m buffer (ha)	Option 3 with 15m buffer (ha)
Number of Slender Marsdenia affected	1	1	2	3	3	2
Number of hollow bearing trees affected	6	9	12	23	26	13
TOTAL	7	10	14	26	29	15

(1) Estimate of approved clearing under the EP&A Act approval based on Concept Design plus a 10 metre buffer

(2) Estimate of approved clearing under the EPBC approval based on Concept Design plus a 15 metre buffer

An additional desktop cultural heritage due diligence assessment has also been carried out for the areas within the 50 metre buffer measured from the footprint of the ramp options. The assessment of the area affected by the north facing ramps identified that impacts to cultural heritage values are unlikely and that no further assessment is required.

The following sections provide an assessment of each option in terms of flora and fauna and heritage impacts.

3.4.1 Option 1

Compared to the EPBC Act approvals, Option 1 would require almost twice as much clearing of native fauna habitat. For example, Option 1 would require about 1.7 hectares of clearing of Koala habitat and Spotted-tail Quoll habitat, whilst the EPBC Act approval includes an estimated maximum of 0.9 hectares of habitat clearing for these species. Compared to the approved layout without the ramps, Option 1 would require about 35 per cent more native fauna habitat clearing.

Option 1 also requires clearing of two additional examples of the threatened flora species Slender Marsdenia and 14 additional hollow bearing trees compared to the EPBC Act approvals. Compared to the approved layout without the ramps, Option 1 would require clearing of one additional example of a threatened flora species and 11 additional hollow bearing trees.

Overall the impact of Option 1 on native vegetation clearing, on threatened flora and fauna and habitat and on hollow bearing trees would be more than the approved layout and Option 3, but less than Option 2.

There are no known Aboriginal heritage items or potential archaeological deposits impacted by this option.

Option 1 has no impact on non-Aboriginal heritage additional to that of the approved project.

3.4.2 Option 2

Compared to the EPBC Act approvals, Option 2 would require more than twice as much clearing of native fauna habitat. For example, Option 2 would require about 2.1 hectares of clearing of Koala habitat and Spotted-tail Quoll habitat, whilst the EPBC Act approval includes an estimated maximum of 0.9 hectares of habitat clearing for these species. Compared to the approved layout without the ramps, Option 2 would require about 65 per cent more native fauna habitat clearing.

Option 2 also requires clearing of two additional examples of the threatened flora species Slender Marsdenia and 17 additional hollow bearing trees compared to the EPBC Act approvals. Compared to the approved layout without the ramps, Option 2 would require clearing of one additional example of a threatened flora species and 14 additional hollow bearing trees.

Overall the impact of Option 2 on native vegetation clearing, on threatened flora and fauna and habitat and on hollow bearing trees would be more than the approved layout and Option 1 and 3.

There are no known Aboriginal heritage items or potential archaeological deposits impacted by this option.

Option 2 has no impact on non-Aboriginal heritage additional to that of the approved project.

3.4.3 Option 3

Compared to the EPBC Act approvals, Option 3 would require slightly less clearing of native fauna habitat. For example, Option 3 would require about 0.86 hectares of clearing of Koala

habitat and Spotted-tail Quoll habitat, whilst the EPBC Act approval includes an estimated maximum of 0.9 hectares of habitat clearing for these species. Compared to the approved layout without the ramps, Option 3 would require about 30 per cent less native fauna habitat clearing.

Option 3 also requires clearing of one additional example of the threatened flora species Slender Marsdenia and four additional hollow bearing trees compared to the EPBC Act approvals. Compared to the approved layout without the ramps, Option 3 would not require clearing of any additional examples of a threatened flora species but would affect one additional hollow bearing tree.

Overall the impact of Option 3 on native vegetation clearing, on threatened flora and fauna and habitat and on hollow bearing trees would be less than the approved layout and less than Options 1 and 2.

There are no known Aboriginal heritage items or potential archaeological deposits impacted by this option.

Option 3 has no impact on non-Aboriginal heritage additional to that of the approved project.

3.5 Water quality, erosion and sediment control

This section evaluates the impacts and requirements of the three options in terms of water quality and erosion and sediment control.

The key water quality consideration in this location is a SEPP 14 Wetland located approximately 100 metres to the west of the upgraded highway. While project requirements do not specifically require water quality control measures for local roads, including on and off-ramps, due to the proximity of the wetland it is proposed that all pavement runoff from the upgraded highway or local roads be treated before discharging into this SEPP 14 Wetland.

The drainage design of the upgraded highway includes a permanent water quality basin, named B 52.93, located on the western side of the upgraded highway at Chainage 53000 to treat, and provide spill containment, before road water runoff is released into the SEPP 14 Wetland. The approved layout also includes a clean water detention basin next to B 52.93 which is required to maintain the flood immunity of the property access track downstream and manage flows to the downstream wetland. In developing the options, consideration was given to their impact on the permanent and the temporary basins, as well as on the clean water detention basin.

Temporary erosion and sediment control for this project has been developed based on the Landcom publication Managing Urban Stormwater – Soils and Construction Volume 1 – 4th Edition (2004), commonly known as the Blue Book. Temporary basins have been specified for areas where average annual soil loss is greater than 150m^3/year. A set of progressive erosion and sediment control plans will be prepared on site to ensure that sediment runoff is managed to suit construction activity.

There is a temporary basin (B53.20) located on the western side of the upgraded highway at Chainage 53200 to capture and treat sediment runoff before it is discharged into the wetland. This basin would be affected by Option 3.

There are two temporary basins (B53.50 and B53.55) located on the eastern side of the upgraded highway near Chainage 53500 to capture and treat sediment runoff before it is discharged to the east. Each of the three options would impact on these temporary basins and sediment runoff may need to be controlled by moving these sediment basins outside the project boundary. Land outside the project boundary adjacent to these basins is owned by Roads and Maritime.

3.5.1 Option 1

Option 1 would not impact the permanent basin B52.93 or the adjacent clean water detention basin. Therefore the permanent water quality design of the upgraded highway would not need to be altered. Access to this basin would need to be provided in coordination with a new property access for an affected landholder.

3.5.2 Option 2

Option 2 would not impact the permanent basin B52.93 or the adjacent clean water detention basin. Therefore the permanent water quality design of the upgraded highway would not need to be altered. Access to the basin would need to be provided in coordination with a new property access for an affected landholder.

3.5.3 Option 3

Option 3 would directly affect the permanent basin B52.93 and the adjacent clean water detention basin. The proposed connection to Old Coast Road and the northbound on-ramp is located in line with the proposed basin location and therefore the drainage and water quality design would need to be changed.

An alternative water quality design in this location is constrained by the limited width to the project boundary and relatively steep natural topography in sections. Three potential water quality arrangements have been considered including:

1. Moving the basin to the east of the main alignment, upstream of the proposed culvert C53.02. It would be difficult to contain the basin earthworks here and it would be undesirable for it to discharge upstream of the culvert.

2. Diverting the flows away from the SEPP 14 Wetland to the sag at Chainage 53500 and therefore not requiring water quality treatment. This would involve a relatively significant diversion of catchment and change the upgraded highway drainage design.

3. Shifting the basin slightly further to the west of the proposed northbound on-ramp.

The third arrangement is proposed as this avoids the difficulties of the first two arrangements, however some additional land acquisition outside the project boundary would be required.

The clean water detention basin has been retained with Option 3 but needs to be shifted slightly to the west to be clear of the new access road to the entry ramp and Old Coast Road. Since alternative access to the adjacent property is available from the permanent basin access track, there is less need to reduce peak discharges to maintain the flood immunity of the existing track, but the clean water detention basin has been retained for environmental reasons in order to manage flows into the SEPP 14 Wetland. Further discussion on the resulting discharges into the SEPP 14 Wetland is provided in **Section 3.6** below.

Option 3 would also affect the location of the temporary basin B53.20 which captures and treats sediment prior to discharge in the SEPP 14 Wetland. If this basin were moved downstream of the site it would need to be placed on to private property, or alternatively if the area is managed suitably during construction, a temporary basin may not be required. The additional land acquisition is included in **Section 3.8**.

3.6 Flooding and hydrology

This Section evaluates the impacts and requirements of the three options in terms of hydrology and flooding.

Some backwater effects from the Nambucca River cause water to pond to the west of the upgraded highway during major regional events. There are two key flooding and hydrology considerations in comparing the ramp options:

- The flood immunity available with each option for access to the ramps and to Old Coast Road central
- Potential discharge to the SEPP 14 Wetland downstream of culvert C53.02 which could be sensitive to changes in flow rates. This culvert is linked to the permanent basin B52.93 and the associated clean water detention basin that is part of the approved layout without the ramps.

In terms of the first consideration, of flood immunity for access to the ramps and Old Coast Road, all options would provide the immunity required by the project and allow access in a 20 year flood event. All options would still be accessible in a 50 year event. The ramps and Old Coast Road central in Option 3 would remain accessible during a 100 year flood event while a small section of the existing Old Coast Road just north of the intersection with the existing highway would start to go under water in a 100 year flood event. In Options 1 and 2 this would start to restrict access to the ramps, Letitia Close and Old Coast Road central in anything above a 100 year event. For Option 3, only access to Letitia Close would be affected by a 100 year flood event.

In terms of the second consideration of discharge to the SEPP 14 Wetland the following **Table 3-8** summarises the flow rates and velocities discharging to the SEPP 14 Wetland, for the existing situation, the approved layout, and Options 1, 2 and 3.

Table 3-8 Discharge into SEPP 14 Wetland at culvert C 53.02 and permanent basin B 52.93

Case	5 year event		100 year event	
	Velocity (m/s)	Flow rate (m^3/s)	Velocity (m/s)	Flow (m^3/s)
Existing	2.03	0.092	2.31	0.154 (pipe) 0.201 (over road)
Approved layout, Options 1, 2 and 3	1.49	0.142	2.05	0.227*

* *This flow would occur both over the access road and through the pipe. The exact split would be likely to be similar to the split in the existing situation*

For the approved layout the permanent basin B52.93 is supplemented by a clean water detention basin which reduces peak flows into the wetland and allows the existing flood immunity of the access track between the basin and the SEPP 14 Wetland to be maintained. With these measures in place, **Table 3-8** shows that the approved layout would generally have lower discharge velocities and lower peak discharges than the existing situation.

Option 1 and Option 2 will not affect the upgraded highway and location of culvert C53.02, or the permanent basin B52.93 and clean water retention basin. Therefore these two options would also have generally lower discharge velocities and lower peak discharges to the SEPP 14 Wetland than the existing situation.

Similarly, Option 3 would have generally lower discharge velocities and lower peak discharges to the SEPP 14 Wetland than the existing situation since, as discussed in **Section 3.5**, it is proposed for Option 3 that both the permanent sedimentation basin B52.93 and the clean water detention basin would be relocated to the west.

All three options require a new culvert to drain the trapped area between the southbound exit ramp and the upgraded highway at Chainage 53450. Additionally Option 3 would require a new culvert to drain the area between the upgraded highway and northbound on-ramp. Bridge drainage requirements for Options 1 and 2 would not be required for Option 3.

A number of other adjustments to culverts and outlets would be required for each option. These changes are compared in **Table 3-9**.

Table 3-9 Culvert changes for Options 1, 2 and 3

Culvert	Option 1	Option 2	Option 3
C53.02	No change	No change	Extended about 25m downstream
C53.53	Extended about 10m	Extended about 10m	Relocated and extended about 30m
C53.74	Extend upstream. An additional inlet pit between the upgraded highway and northbound ramp may be needed.	Extended about 20m upstream	No change
C53.97	Extended by about 6m upstream	Extended about 10m upstream	No change
C53.31SR	No change	Relocated and reduced in length	Not required
C53.25SR	No change	Relocated but remain the same diameter and length	Not required

3.7 Earthworks quantities

Earthworks quantities have been calculated for the approved layout as well as for the three options, as shown in **Table 3-10** below. The quantities include earthworks for local roads and the ramps, but exclude the earthworks quantity for the upgraded highway as this quantity is the same in all cases.

Table 3-10 Earthworks quantities

Earthworks Volumes (m^3)	Approved layout (no ramps)	Option 1	Option 2	Option 3
Cut	43,501	61,564	61,410	90,411
Total Fill (excluding pavements and excluding SMZ)	29,735	85,907	63,102	39,824
Balance - shortage		24,343	1,692	
Balance - excess	13,766			50,587
Balance in relation to approved layout - shortage	0	38,109	15,458	
Balance in relation to approved layout - excess	0			36,821

Based on the above table, and allowing for the fact that the approved layout already factors in the anticipated excess of 13,800 cubic metres, the impact of each option on overall earthworks is as follows:

- Construction of Option 1 would require borrowing about 38,000 cubic metres
- Construction of Option 2 would require borrowing about 15,500 cubic metres
- Construction of Option 3 would require disposal of about 37,000 cubic metres.

A review of the option design layouts (**Appendix A**) have identified for Options 1 and 2 that widening of the cutting on the east side of the upgraded highway between Chainage 54100 and 54250 would provide the additional material required without affecting sensitive vegetation and while staying within the project boundary. For Option 3 suitable disposal areas that could accommodate the excess material without affecting sensitive vegetation and while staying within the project boundary have been identified.

3.8 Property impacts

This section describes the impact that each option would have on private land acquisition and access requirements of nearby properties. Additional impacts on land which has already been acquired by Roads and Maritime are not considered in this assessment.

For the purposes of comparison, property accesses have been designed with a 19m semi-trailer used as the design vehicle for each option. As the design progresses, the vehicle access requirements would be reviewed with the property owners.

To determine the property acquisition areas the following methodology was applied:

- Where the formation extends into private property, a six metres formation offset was applied to determine the acquisition required for the upgraded highway and local roads, and a three metre offset was adopted for local access and drainage works.
- Where the formation does not extend into private property, the lesser of a six metres formation offset or the offset to the property boundary was adopted to determine the amount (if any) of acquisition required.

Additional consideration has been provided where catch drains have been designed and extend beyond the six metres formation offset; this occurs for the approved layout and Option 1. The lesser of a one metres offset from the edge of the drain or the offset to the property boundary has been adopted to define the acquisition area in these instances.

Where temporary basins may be required outside the project boundary to manage sediment runoff, these have not been included in this assessment as they are not considered permanent works. Erosion and sediment control methodology will be at the discretion of the Contractor and the possibility of temporarily placing a sediment basin on an adjacent property would need to be agreed with the land owner.

Option 3 would require additional acquisition from one privately owned property, as shown in **Table 3-11** below. Options 1 and 2 would not require additional acquisition.

Table 3-11 Property adjustments

Lot and DP number	Required acquisition area (m^2) for:			
	Approved layout	Option 1	Option 2	Option 3
LOT 21 DP1186376	No additional impact	No additional impact	No additional impact	3243

3.9 Lighting

Lighting design and construction must comply with the requirements of relevant Authorities, including local councils, and consultation with these relevant Authorities and local councils is undertaken to ensure acceptance of the lighting design. Based on the SWTC requirements additional lighting is proposed as follows:

- Option 1:
  - Flag lighting at the off-ramp intersection with the realigned Old Coast Road
  - Flag lighting at the on-ramp intersection with the realigned Old Coast Road
  - Flag lighting at the Old Coast Road intersection with the existing Pacific Highway.
- Option 2:
  - Lighting at the roundabout connecting Letitia Close, the off-ramp, and the realigned Old Coast Road
  - Flag lighting at the on-ramp intersection with the realigned Old Coast Road
  - Flag lighting at the Old Coast Road intersection with the existing Pacific Highway.
- Option 3:
  - Flag lighting at the off-ramp intersection with Letitia Close
  - Flag lighting at the off-ramp intersection with the existing Pacific Highway
  - Flag lighting at the on-ramp intersection with Old Coast Road
  - Flag lighting at the on-ramp intersection with the existing Pacific Highway.

Flag lighting (one or two strategically placed lamps) is required at new intersections in Options 1, 2 and 3. Option 3 would require more lighting than Option 1 for the additional connection of the off ramp with the existing Pacific Highway. Option 2 would require the most lighting as in addition to flag lighting for two intersections, increased lighting is required for the roundabout.

3.10 Risk assessment

A Risk Workshop was held on 7 April 2015 to identify and rate risks associated with each of the ramp options. The outcome of the workshop was a risk management register which describes each risk and the controls and mitigation measures that might be required to address the risk. An initial risk rating was then determined for each identified risk based on the following risk matrix in **Table 3-12**.

Table 3-12 Risk matrix

		Estimated probability of risk occurring		
		LOW Less than 20%	**MEDIUM** 20-50%	**HIGH** 50-100%
Likely consequence if the risk eventuates	**HIGH** $1M plus; 3 months delay	MODERATE	MAJOR	MAJOR
	MEDIUM $300,000 - $1M	MINOR	MODERATE	MAJOR
	LOW Below $300,000	MINOR	MINOR	MODERATE

At the workshop a total of 55 risks were identified and rated. Most of the risks were common to all options but the workshop did identify a number of risks that were specific to individual options as summarised in **Table 3-13**.

Table 3-13 Number of option specific risks

	Option 1	Option 2	Option 3
MAJOR RISK	1	-	1
MODERATE RISK	4	4	6
MINOR RISK	1	4	5

The major risk item identified for Option 1 was that the Old Coast Road overbridge over the upgraded highway has quite complex geometry and requires widening and design refinements to meet the sight distance criteria.

The major risk item identified for Option 3 was there would be significant delay to construction resulting from property acquisition.

Moderate risks that were identified for the options included:

- Option 1 and Option 2:
  - Depth to required bearing material (for column and western abutment pad footings of the bridge) is deeper, resulting in increased width of excavation and longer column and/or deeper pad footing
  - Road alignment changes resulting in need to increase skew and/or increase span lengths and/or increase bridge width especially the eastern span
  - Stakeholder concerns with lighting at intersections due to increased light spill. Higher and closer intersections to residents will likely have a greater impact on residents
  - Risk of falls from height due to bridge construction
- Option 3:
  - Two intersections on the existing Pacific Highway are located close to each other which result in increased risk of accidents. Signage will be close to each other and could potentially result in confusion, especially for tourists, regarding which intersection to use

- Injury or death caused by pedestrian/vehicle illegally crossing the main carriageway to avoid walking/driving via the existing Pacific Highway
- Longer route for bus companies
- Underestimation of unsuitable soil material
- Proximity to SEPP 14 Wetland. The sedimentation and retention basins require relocation and are constrained by private property
- Design does not adequately address traffic staging requirements.

Overall, more risks were identified with Option 3 because compared to the other options it would involve more change compared to the approved layout.

4. Option assessment summary

The following **Table 4-1** summarises the findings of the assessment of Options 1, 2 and 3 that is described in **Section 3**. The table has been prepared to identify more clearly the main differences between the options, based on the information provided or referred to in this report.

Table 4-1 Option assessment summary table

	Option 1	Option 2	Option 3
Road user safety	1 high risk safety issue. 8 medium risk safety issues. 1 low risk safety issue.	3 high risk safety issues. 6 medium risk safety issues. 0 low risk safety issues.	2 high risk safety issues. 7 medium risk safety issues. 2 low risk safety issues.
Traffic assessment	Provision of the ramps improves travel time to/from Macksville and the north. However compared to Option 3, Option 1 would have slightly longer travel distance for traffic using the northbound entry ramp.	Provision of the ramps improves travel time to/from Macksville and the north. However compared to Option 3, Option 2 would have slightly longer travel distance for traffic using the northbound entry ramp.	Provision of the ramps improves travel time to/from Macksville and the north. Option 3 would have the shortest travel distance for traffic using the entry ramp but a longer travel distance for school buses using Old Coast Road to service Letitia Close.
Noise consideration	Increases of 1dB(A) in night-time noise levels at 2 dwellings compared to the approved layout and a reduction of 1dB(A) at 1 dwelling.	Increases of 1 dB(A) in night-time noise levels at 4 dwellings compared to the approved layout.	Increases of 1 dB(A) in night-time noise levels at five dwellings and 2dB(A) at one dwelling, compared to the approved layout.
Environmental consideration	Compared to the EPBC Act approvals, Option 1 requires less additional clearing of native fauna habitat than Option 2. For example, Option 1 requires 1.7 ha of clearing of Koala habitat. Option 1 requires clearing of 2 additional examples of a threatened flora species and 11 additional hollow bearing trees compared to the EPBC Act approvals.	Compared to the EPBC Act approvals, Option 2 requires the most additional clearing of native fauna habitat. For example, Option 2 requires 2.1 ha of clearing of Koala habitat. Option 2 requires clearing of 2 additional examples of a threatened flora species and 17 additional hollow bearing trees compared to the EPBC Act approvals.	Compared to the EPBC Act approvals, Option 3 requires slightly less clearing of native fauna habitat. For example, Option 3 requires 0.83 ha of clearing of Koala habitat. Option 3 requires clearing of 1 additional examples of a threatened flora species and 4 additional hollow bearing trees compared to the EPBC Act approvals.
Water quality and erosion and sediment control	The permanent water quality design of the upgraded highway would not need to be altered.	The permanent water quality design of the upgraded highway would not need to be altered.	Permanent basin B52.93 would need to be relocated onto private property. The clean water detention basin would need to be shifted slightly to the west. Temporary basin B53.20 would need to be relocated on to private property, or alternatively if the area is managed

	Option 1	Option 2	Option 3
			suitably, a temporary basin may not be required.
Flooding and hydrology consideration	Option 1 would require additional bridge drainage.	Option 2 would require additional bridge drainage.	Option 3 would require a new culvert to drain the area between the upgraded highway and northbound on-ramp.
Earthwork quantities	Construction of Option 1 would require borrowing an additional 38,000 m^3.	Construction of Option 2 would require borrowing an additional 15,500 m^3.	Construction of Option 3 would require disposal of an additional 37,000 m^3.
Property impacts	No additional private land acquisition compared to the approved layout.	No additional private land acquisition compared to the approved layout.	Requires acquisition of an additional 3243 m^2 from one property compared to the approved layout.
Lighting impacts	Option 1 would require flag lighting at new intersections. This is the option with the least lighting requirements.	Option 2 would require the most lighting. In addition to flag lighting for two intersections, lighting is required for the roundabout.	Option 3 would require more lighting than Option 1 due to the additional connection of the off-ramp with the existing Pacific Highway.
Risk assessment	1 high risk issue. 4 medium risk issues. 1 low risk issue.	0 high risk issues. 4 medium risk issues. 4 low risk issues.	1 high risk issues. 6 medium risk issues. 5 low risk issues.

5. Selection of the preferred option

5.1 Options assessment workshop

A detailed Options Development Report was prepared by Pacifico in consultation with Roads and Maritime. The three options presented then underwent an assessment by Roads and Maritime to test their performance against a range of agreed project objectives.

To determine the preferred option an Options Assessment Workshop, using a Value Management methodology, was convened on 20 May 2015 at the Pacific Highway Office at Grafton. The attendees are listed in the Roads and Maritime Options Assessment Report in **Appendix B**.

The agreed purpose of the workshop was to:

- Obtain an understanding of the project and the planning to date
- Identify, discuss and agree to criteria to be used to assess the options
- Review and then assess the options against the agreed criteria
- Draw conclusions, select a preferred option and agree to key actions arising.

5.2 Options assessment criteria

The purpose of the assessment was to differentiate between the options rather than undertake an absolute assessment of all project criteria for each option – so only those criteria that highlighted differences were considered in this assessment.

An assessment criteria to comparatively assess these differences was developed. The assessment criteria was divided into four key perspectives including: constructability and timing, functionality, community impacts and environmental impacts. Each criterion had a number of key descriptive aspects to help assess points of difference between the ramp options.

The agreed criteria are noted below in **Table 5-1** and following a group discussion the weighting for each criteria was agreed as indicated.

Table 5-1 Assessment criteria and weighting

Criteria	Descriptive Aspects	Weighting
Constructability & Timing	Program impacts and risks Staged construction of ramps Traffic / accessibility disruptions Bridge roadworks impacts (changes of scope / approved layout design)	35%
Functionality (Traffic Efficiency & user safety)	Attractiveness to users Impacts on travel times / road operations School bus Road user safety Road / bridge maintainers' safety	30%
Community Impacts	Additional land acquisition Local enterprises, shops and services Agribusinesses River / marine activities Emergency events Noise Light impacts on residences Headlight intrusion Visuals Severance	25%
Environmental Impacts	Water quality & flooding Flora & fauna Heritage	10%
Capital & Operating Costs*		

* Please note that this workshop only used the qualitative (non-price) criteria as preliminary estimated costs for the three options were similar and cost information was indicative only at the date of the workshop.

5.3 Summary of weighted criteria assessment

Scoring for each of the options (as show in **Table 5-2**) was undertaken relative to the approved layout. The scoring scale selected – from -5 to +5 was to acknowledge that some factors, for certain options had negative impacts rather than positive impacts compared to the approved layout.

These scores were also used as prompts to identify and propose any mitigation measures or improvements in the option – so that any assessment would be based on optimised options.

Table 5-2 Options assessment

Criteria	Descriptive Aspects	Weighting	Option 1		Option 2		Option 3	
Constructability & Timing	Program impacts & risks	35%	-1	This option will cause a minor delay to the overall project but can be managed by staging the construction.	-1	This option will cause a minor delay to the overall project but can be managed by staging the construction.	-5	Planning and approval risks with need to acquire more land for this option. Less complex construction program without a bridge for this option – especially for earthworks but needs some soft soil treatments and settling that would offset potential gains to the program.
	Staged construction of ramps		2	Construction of ramps can be staged as a bridge will be constructed over the highway.	2	Construction of ramps can be staged as a bridge will be constructed over the highway.	0	No opportunity to stage construction as a bridge will not be constructed.
	Traffic / accessibility disruptions		0	Minimal disruption to local traffic is expected with this option.	-1	Slightly more disruptive due to the construction of a roundabout at Letitia Close as this takes longer than a standard T intersection.	0	Minimal disruption to local traffic is expected with this option.
	Bridge and/or roadworks impacts (changes of scope / approved layout)		-3	This option needs 38,000 cubic metres of additional material to construct the embankments as compared to the approved layout.	-2	This option requires 15,000 cubic metres additional material to construct the embankments as compared to the approved layout.	-3	This option has a surplus of 36,800 material that would need to be disposed of as compared to the approved layout.
	Total Score		**-2**	**Weighted Score: -70**	**-2**	**Weighted Score: -70**	**-8**	**Weighted Score: -280**
	General Assessment Comments		The contract for the design and construction of this section of the highway has already been let – so the design and installation of the new ramps will involve negotiating a contract variation. There will be an impact on the construction program – to allow for design to be completed but also for planning approval from Department of Planning and the Environment. The timing of the ramps is ideally set to coincide with the opening of the motorway – not as a later addition – so they need to integrate with the bridge and roadworks. Options 1 and 2 are similar with the same weighted score. Options 1 and 2 performed substantially better than Option 3. Construction of Option 2 would be slightly more disruptive than Options 1 and 3 due to longer time required for construction of roundabout. Option 2 provides the best earthworks balance of the three options.					
Functionality (Traffic Efficiency & user safety)	Attractiveness to users	30%	4	Attractiveness to road users, same for all options.	4		4	
	Impacts on travel times / road operations		3	Impacts on travel times, same for all options.	3		3	
	School bus		1	Enhanced school bus facility provided with this option.	1	Enhanced school bus facility provided with this option.	-1	Only effect on school bus is option 3 – a longer route to collect Letitia close school children.
	Road user safety		-3	Layout of Option 1 has issues including adverse crossfall and poor coordination of curves on the off ramp that cannot be designed out. Three back to back curves at near minimum radii, tangent length between curves less than desirable minimum. Possible issues with the visibility of linemarking at the intersection of the off ramp and Old Coast Road.	-1	Roundabouts tend to have low-speed incidents, but more of them compared to other intersections. Better geometric layout than Option 1 with only one curve at minimum radius.	-4	Additional intersection with the old Pacific Highway is an increased safety risk.
	Road / bridge maintainers safety		-1	Normal risks associated with bridge maintenance.	-1	Normal risks associated with bridge maintenance.	1	No bridge to inspect and therefore safer.

Criteria	Descriptive Aspects	Weighting	Option 1		Option 2		Option 3	
	Total Score		**4**	**Weighted Score: +120**	**6**	**Weighted Score: +180**	**3**	**Weighted Score: +90**
	General Assessment Comments		Option 2 performed best for road safety and delivers a better road solution for functionality and more important long-term characteristics for road operations. Option 2 better caters for traffic growth as compared to option 1 – especially with a roundabout. Overall Option 1 performed better than Option 3 against functionality criteria.					
Community Impacts	Additional land acquisition	25%	0	No land acquisition needed	0	No land acquisition needed	-3	Additional land acquisition is required to allow for the proposed intersections with the Pacific highway and the Old Coast road.
	Local enterprises, shops and services		4	All options are good at attracting traffic to commercial interests in Macksville	4		4	
	Agribusinesses		0	No option affects agribusiness	0		0	
	River / marine activities		0	No option affects river or marine activities	0		0	
	Emergency events		3	All options improve accessibility for emergency events and incidents	3		3	
	Noise		-1	Will be some extra traffic noise due to increased traffic	-2	Slightly worse effects of noise from this option due to increased traffic and roundabout.	-1	Will be some extra traffic noise due to increased traffic.
	Light impacts on residences		-1	Only additional flag lighting required	-2	Lighting for the roundabout – because it is close to homes and it will have lights in an area where there is currently no lighting.	-2	Similar rating to option 2 re lighting impacts - Option 3 will have lighting around the intersections and the new bus bay, which is also closer to residences.
	Headlight intrusion		-1	Some headlight impact from the ramps and bend on Old Coast Road	-1	Some headlight impact from the ramps and roundabout.	0	Similar headlight impact to the approved project.
	Visuals		-1	Bridge has a negative impact on the appearance of the road	-1	Bridge has a negative impact on the appearance of the road	1	Improved appearance due to removal of the bridge
	Severance		0	There is no additional severance with this option.	0	There is no additional severance with this option.	-3	This option cuts Letitia Close from Old Coast Road.
	Total Score		**3**	**Weighted Score: +75**	**1**	**Weighted Score: +25**	**-1**	**Weighted Score: -25**
	General Assessment Comments		Noise modelling indicates no discernible change in noise impacts to receivers for all 3 options. There would need a doubling of traffic to create a 2 dB change in noise impact, which is the level that becomes discernible to the receivers. There will be some variation of noise during the different times of the day and increases when heavy vehicles use the ramps and intersections. A roundabout, as proposed in Option 2 is generally more noisy compared to a T-intersection and Options 1 & 2 may have traffic queuing – which generate braking and gear change noise. Option 2 with a roundabout better caters for traffic growth than options 1 or 3. Overall Option 1 performs best for community impacts followed by Option 2 and Option 3.					
Environmental Impacts	Water quality & flooding	10%	-1	More pavement area than the current approved project	-1	More pavement area than the current approved project	-2	This option has the most pavement area which increases runoff from pavement
	Flora & fauna		-2	Moderate clearing required	-3	Most clearing required	-1	Less clearing required
	Heritage		0	No impact on heritage	0	No impact on heritage	-1	Increased risk of finding a heritage item due to increased acquisition
	Total Score		**-3**	**Weighted Score: -30**	**-4**	**Weighted Score: -40**	**-4**	**Weighted Score: -40**

Criteria	Descriptive Aspects	Weighting	Option 1	Option 2	Option 3
	General Assessment Comments		No difference in flooding effects or management between the options. Water quality – all involve some extra pavement and required detention capacity. Option 3 marginally worse than the others due to additional pavement areas involved. Flora / fauna – all three impact larger areas and habitats – each results in a slightly different mix in what is being impacted. Need to go back to Commonwealth to outline the changes in the mix that the project will impact for the preferred option.		
Overall conclusions			The NSW Government has made the commitment to provide the ramps. Option 3 is not a viable strategy compared to the others – it scores significantly worse in all aspects of constructability and timing. Community expectations are important to address in the solution and its implementation strategy, including necessary consultation.		
TOTAL WEIGHTED SCORES			**+95**	**+95**	**-225**
Capital & Operating Costs[1]			Not considered in this assessment as task to develop costs and define any effects on operating costs not yet complete – a risk-based assessment of costs also needed here.		

[1] Please note that this workshop only used the qualitative (non-price) criteria as preliminary estimated costs for the three options were similar and cost information was indicative only at the date of the workshop. Cost estimates still needing some inclusions and exclusions to be defined. Cost estimates to be updated to include any agreed improvements and latest risk-based pricing.

5.4 Preferred option

The weighted assessment concluded that Option 1 and Option 2 both scored 95 and Option 3 scored a negative 225. Each option was scored relative to the approved layout and generally for each Criteria the results are:

- Constructability & Timing: Option 1 and 2 scored highest
- Functionality (Traffic Efficiency & user safety): Option 2 scored highest
- Community Impacts: Option 1 scored highest
- Environmental Impacts: Option 1 scored highest

As Option 1 and 2 scored equally in the assessment, the workshop then looked at each criteria and descriptive aspects in more detail to determine the preferred option. Option 2 was chosen as the preferred option as:

- It was assessed as better than Option 3 for the Constructability and Timing Criteria and equal to Option 1
- It was assessed as the best option for the Functionality Criteria (traffic efficiency and road user safety). In particular is was the preferred option as:
  - It scored highest in road user safety
  - It best caters for traffic growth and long term functionality
- It was assessed as having less Community Impacts than Option 3 but more noise and light impacts (due to the roundabout) than Option 1
- It was assessed as having less Environmental Impacts that Option 3 however it has slightly greater environmental impacts than Option 1 due to additional clearing of native vegetation.

In summary Option 2 was chosen as the preferred option as it is the safest option and improves functionality and road alignment, and is the best option for the long term performance of the north facing ramps.

6. Refinements of the preferred option

During the option assessment workshop a number of improvement opportunities were identified for the preferred option by workshop participants. Option 2 was compared to Option 1 and the criteria where Option 2 scored less were identified, these were:

- Traffic / accessibility disruptions
- Noise impacts
- Light impacts and intrusion
- Vegetation clearing

These criteria were examined and discussed in more detail and a number of specific opportunities and design refinements, that could be investigated and adopted in the design and construction phases, were identified for the preferred option. These opportunities and mitigation measures include:

- Extra earth mounds and screenings – would help to address headlight intrusion; eg use surplus soil to create a mound between the roundabout and residences
- Review the design alignment, including the skew angle of the bridge to reduce vegetation clearing
- Put plantings on top of the mounds to increase natural screening.

As part of the concept design development process these opportunities were investigated and a refined preferred option (see **Appendix D**) was designed. Preliminary property accesses were also considered and included in the refinement of the design. The refinements that were made included:

- Earth mounds between the roundabout and properties near Letitia Close to reduce noise and headlight intrusion were examined. However, due to limited area within the highway corridor, the height of the mound would not be sufficient to reduce impacts
- The bridge location was moved about 10 metres to the north and the skew angle increased from 15 degrees to 21 degrees. This allowed for the Old Coast Road, on the western side of bridge, to be realigned and reduce the vegetation clearing required for the Moist Open Forest vegetation community. This also moved the road further away from three residences on the western side of Old Coast Road reducing their noise impacts (compared to the Option 2 design). The change in skew angle in the bridge caused the location of the roundabout to move about 12 metres to the south east to maintain sight distance and achieve design criteria
- Moving the roundabout lowered and realigned the south section of Old Coast Road on the eastern side of the bridge. This increased the depth of the cutting between chainage 53000 and 53150, providing some needed additional material, however this does increase vegetation removal of the Regrowth Swamp Oak vegetation community in this area. There would be no change in noise impacts for nearby properties
- Plantings for the approved design were reviewed and these could be incorporated into the landscaping and urban design reports and further refined during detailed design.

7. What happens next

Since the north facing ramps at North Macksville are not currently included in the approved Warrell Creek to Nambucca Heads project, planning approval needs to be obtained before the ramps can be built.

The proposed process for obtaining the required approvals is as follows:

- A public display of the Preferred Options Report will be held, and public comments on the preferred option will be sought
- Public comments received on the refined preferred option will be considered and where appropriate further refinements would be made
- A concept design and environmental assessment will be prepared for the refined preferred option incorporating any relevant design refinements arising from public consultation. The environmental assessment will document potential environmental impacts of the ramps and the measures adopted to mitigate these impacts
- The refined concept design and environmental assessment would be submitted to the NSW Department of Planning and Environment for planning approval as part of a Modification Assessment Report under Section 75 W of the EP&A Act
- The modification would be displayed by the NSW Department of Planning and Environment for public comment. A Submissions Report would then be complied and the refined concept design and environmental assessment may be further refined if required to address feedback
- Following the NSW Department of Planning and Environment approval of the modification, construction can proceed subject to meeting any approval conditions.

References

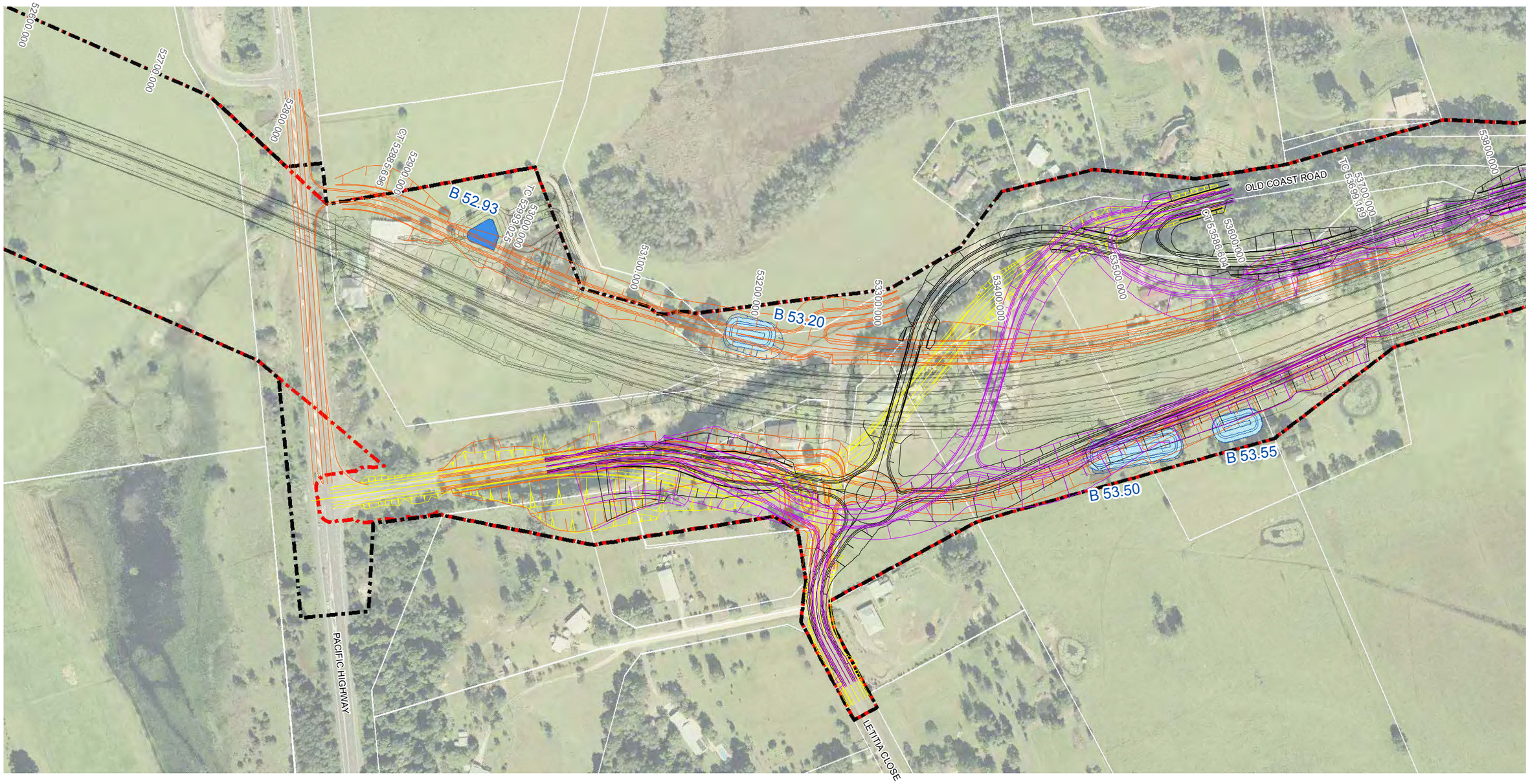
Austroads *Guide to Traffic Management Part 3: Traffic Studies and Analysis*

RMS 2012 *Pacific Highway Upgrade, Warrell Creek to Urunga, Traffic Modelling Final Report* May 2012, Roads and Maritime Services.

RMS 2010 *Warrell Creek to Urunga Pacific Highway upgrade Environmental Impact Assessment*, January 2010, Roads and Maritime Services.

Appendix A

North facing ramp design options



W:\Projects\Design\GIS\WC2NH_NR_POR_Combined.mxd\241993\19-08-15\Martin.Russell\Rev 0

Design options - Old Coast Rd South

- Concept design
- Option 1 ramps
- Option 2 ramps
- Option 3 ramps
- Proposed project boundary (16/06/2015)
- Approved Project boundary # (edited at Northern end)

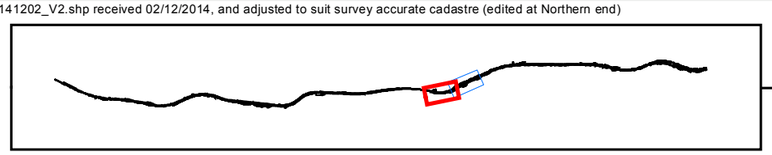
Stormwater management

- Drainage basin (Permanent)
- Drainage basin (Temporary)

 # denotes: Project boundary based on WC2NH_Approved_Project_Boundary_20141202_V2.shp received 02/12/2014, and adjusted to suit survey accurate cadastre (edited at Northern end)

1:3,000

0 50 100m

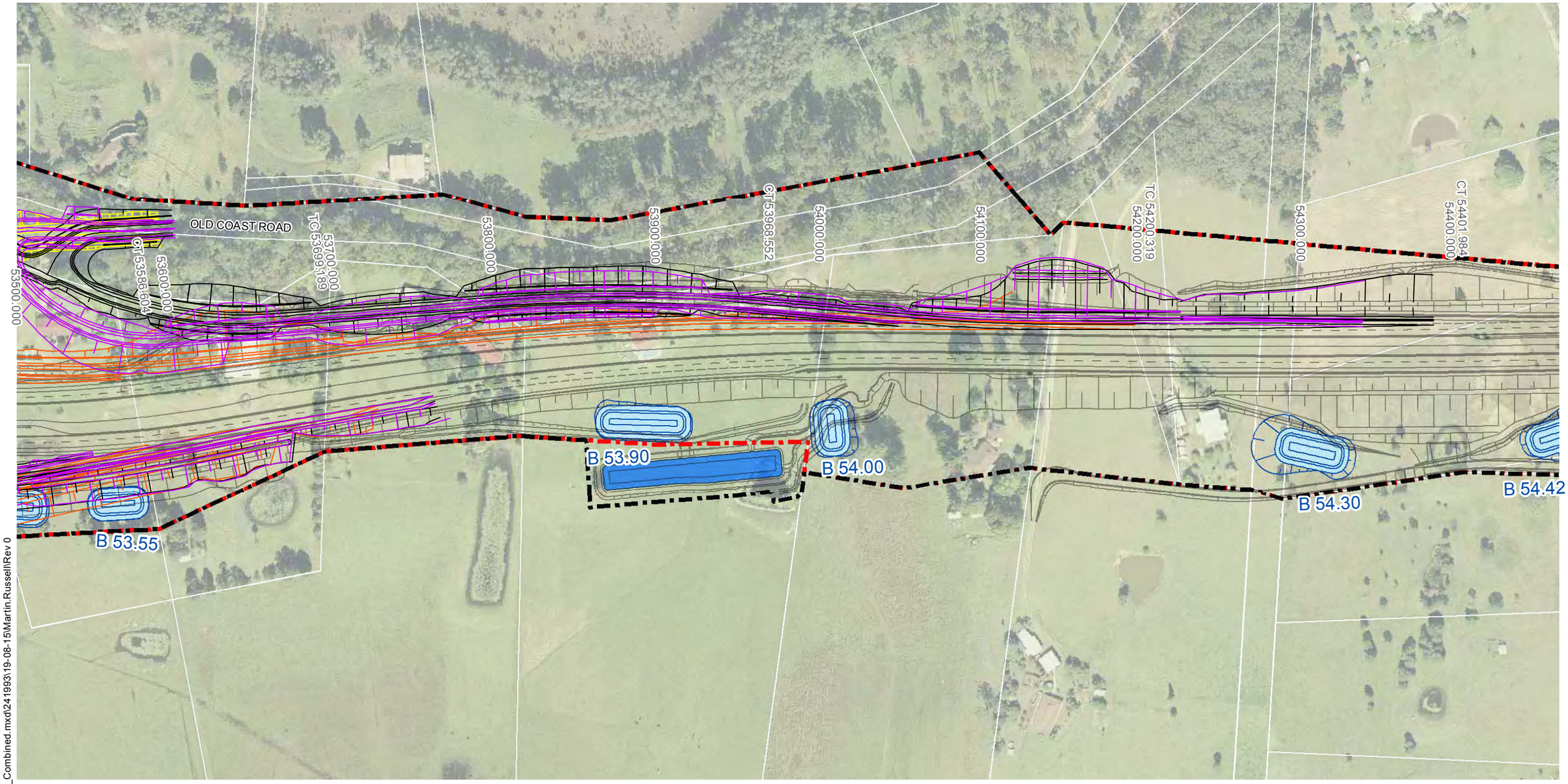


Note:

Projection: GDA 1994 MGA Zone 56
Source: RMS, AADJV, Geolink, Benwell

PACIFIC HIGHWAY UPGRADE **WC2NH**
North Facing Ramps at North Macksville – Preferred Option Report

FIGURE: Design Options
(Map 1 of 2)



Design options - Old Coast Rd South

- Concept design
- Option 1 ramps
- Option 2 ramps
- Option 3 ramps
- Proposed project boundary (16/06/2015)
- Approved Project boundary # (edited at Northern end)

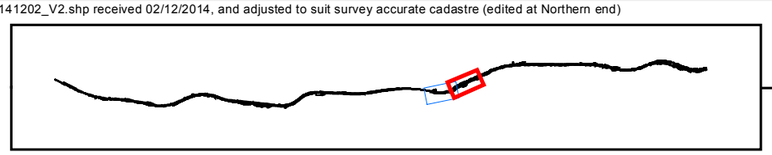
Stormwater management

- Drainage basin (Permanent)
- Drainage basin (Temporary)

 # denotes: Project boundary based on WC2NH_Approved_Project_Boundary_20141202_V2.shp received 02/12/2014, and adjusted to suit survey accurate cadastre (edited at Northern end)

1:2,500

0 50 100m



Note:

Projection: GDA 1994 MGA Zone 56

Source: RMS, AADJV, Geolink, Benwell

PACIFIC HIGHWAY UPGRADE **WC2NH**

North Facing Ramps at North Macksville – Preferred Option Report

FIGURE: Design Options (Map 2 of 2)

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Appendix B

Roads and Maritime North
Macksville – North Facing Ramps
Options Assessment

Pacific Highway upgrade – Warrell Creek to Nambucca Heads North Macksville ramps

Submissions report

March 2016

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Roads and Maritime Services
Pacific Highway upgrade – Warrell Creek to Nambucca Heads
North Macksville ramps

Submissions report
March 2016

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Document Control

Document description

Project	Warrell Creek to Nambucca Heads upgrade	
Document Title:	Warrell Creek to Nambucca Heads North Macksville Ramps – Submissions report	**Document No/Ref: WC2NH-DD00-GE00-RPT-0011**
General Description	Submissions report	

Document development

		Prepared by	**Reviewed by**	**Approved by**
Revision	**Date**	Sarah Webb	Mike Luger	
01	11 December 2015			

		Prepared by	**Reviewed by**	**Approved by**
Revision	**Date**	Sarah Webb	Mike Luger	
02	27 January 2016			

		Prepared by	**Reviewed by**	**Approved by**
Revision	**Date**	Sarah Webb	Mike Luger	
03	09 March 2016			

Issue summary

Revision	**Date**	**Issue description**	**Distribution**
01	11-12-2015	First Draft	RMS and AFJV review
02	27-01-2016	Final Draft	RMS and AFJV review
03	09-03-2016	Final Version	RMS and AFJV

Executive summary

This submissions report relates to submissions received from the potentially impacted residents and other interested stakeholders following the release of the 'Preferred Option Report' (September 2015) as part of the public display and consultation process for the Warrell Creek to Nambucca Heads North Macksville Ramps, and should be read in conjunction with that document.

The Preferred Option Report was placed on public display at five locations between 16 September to 12 October 2015 and submissions relating to the Pacific Highway Upgrade – Warrell Creek to Nambucca Heads North Macksville Ramps Project Proposal and the report, were received by Roads and Maritime Services (Roads and Maritime). The Submissions Report summarises community and stakeholder feedback on the Project Proposal as described in the 'Preferred Option Report'. The responses received included positive support for the proposed project; community concerns and the Project responses to those concerns (Chapter 2); refinements to the Project Proposal (Chapter 3) and commitments to the community in order to mitigate perceived Project impacts (Chapter 4).

A total of 144 submissions were received in response to the display of the Preferred Option Report. The submissions were comprised of one government agency submission and 143 submissions from the community.

Of the 144 submissions received 137 (95%) were positive submissions written in support of the Project. These included a submission from the Rotary Club of Macksville and a large cross-section of the local business community and individuals. 110 of the positive submissions received were 'form letters' expressing support for the Project.

The following points summarise the content of submissions in support of the Project:

- Quicker access and connections to Macksville
- Reduced commute time for local workers, reducing fuel and maintenance costs
- Opportunities to increase tourism and commerce
- Allows for tourists to access and leave the town quickly, therefore providing incentive as a town to stop and revive in on long trips
- Improved response times for emergency vehicles
- More opportunities for town growth.

Seven of the 144 submissions received raised concerns about the Project. Each of these submissions was considered by Roads and Maritime in order to understand the concerns being raised. The concerns raised in each submission have been extracted and collated, and corresponding responses to the concerns have been provided. Where similar concerns have been raised in different submissions, only one response has been provided.

From the 144 submissions, five main categories were identified regarding the North Macksville Ramps. These include:

- Project development process
- Design change suggestions
- Landscape and visual amenity
- Community consultation
- Noise and vibration.

The comments received were considered by the project team and where appropriate further refinements were made to the design. These refinements include:

- Realignment of Old Coast Road immediately west of the highway upgrade to maximise the distance from private properties, minimise vegetation clearing, and maximise revegetation areas
- The realignment of Letitia Close and relocation of the roundabout to the north to improve road safety and provide space for a visual mound near the south eastern corner of the roundabout
- An additional section of visual screening along the southbound off-ramp to reduce the potential impacts of headlight intrusion
- Addition of a vegetated visual mound on Letitia Close near the south east corner of the roundabout to reduce the potential impacts of headlight intrusion
- Increased shoulder width on Old Coast Road to accommodate cyclists
- Selection of specialised road lighting to reduce potential light spill into adjacent properties
- Relocation of the school bus stop into Letitia Close. This provides a safer location as the bus stop is separated from through traffic on Old Coast Road.
- Refinements to Old Coast Road pavement surface to reduce road traffic noise.
- Upgrading of the existing intersection of the Pacific Highway and Old Coast Road.

A more detailed description of the refinements is available in **Chapter 3**.

The following report explains the rationale for the public display of the Preferred Option Report and sets out the timeframe and locations for the display.

The report describes the methodology used for examining and responding to the submissions. The submissions received are discussed in detail and, where concerns have been raised, responses describing how the Project team intends to mitigate any perceived environmental and social impacts have been provided.

Proposed design refinements and mitigation measures have been identified.

The report concludes with a summary of commitments to the community to address any potential environmental or social impacts.

Contents

Tables

Appendices

1 Introduction and background

1.1 Purpose

This submissions report relates to the 144 submissions received from the Preferred Option Report (September 2015) prepared for the Pacific Highway Upgrade - Warrell Creek to Nambucca Heads North Macksville Ramps, and should be read in conjunction with that document.

The Preferred Option Report was placed on public display between 16 September and 12 October 2015 and submissions relating to the proposal and the Preferred Option Report were received by Roads and Maritime Services (Road and Maritime). This submissions report summarises the concerns raised and provides responses to each concern (**Chapter 2**), refinements made to the design since the display of the Preferred Option Report (**Chapter 3**), and lists the commitments made (**Chapter 4**).

1.2 The Preferred Option

Roads and Maritime completed an environmental assessment of the Warrell Creek to Urunga Pacific Highway upgrade (the Project EA) in January 2010. This project was designated critical infrastructure, under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act) and was formally approved by the Department of Planning and Environment on 19 July 2011.

Roads and Maritime has engaged Pacifico, an Acciona and Ferrovial Joint Venture, to design and build the 20 kilometre Warrell Creek to Nambucca Heads section of the Pacific Highway upgrade (the Approved Project).

In response to representations from Nambucca Shire Council and the Macksville Chamber of Commerce, ramps are proposed at North Macksville. The proposed ramps would include a northbound on-ramp onto the highway, a southbound off-ramp from the highway and a median cross-over facility to enable emergency vehicles (including ambulances stationed at North Macksville) to travel both north and south on the highway.

Since these ramps are not currently included in the Approved Project, planning approval will need to be obtained before being built.

Three options for the layout of the North Macksville Ramps and their connections to the road network were investigated and developed as documented in Preferred Option Report. An Options Assessment workshop was held by Roads and Maritime to compare and assess the three options using a Value Management methodology, from this Option 2 was selected as the Preferred Option.

During the Options Assessment workshop a number of improvement opportunities were identified and refinements were made to the design.

A more detailed description of the Preferred Option and the refinements made to the design is available in the Preferred Option Report.

1.3 Preferred Option Report display

Roads and Maritime prepared a Preferred Option Report to present and describe the three short-listed ramp options, report on potential impacts, compare the options, and outline how the Preferred Option was selected.

The display of the proposal was announced at two regular community information sessions that were held for the Approved Project. The proposal and display period was announced and the Preferred Option was explained and discussed. The first information session was held at the Pacifico Site Office on 16 September 2015 from 6pm to 8.30pm. The second information session was held at the Nambucca Community and Arts Centre on 17 September from 6pm to 8pm.

The Preferred Option Report was displayed between 16 September and 12 October 2015 at five locations, as detailed in **Table 1.1**. The Preferred Option Report and a project Community Update

were placed on the Roads and Maritime website (rms.nsw.gov.au/pacific) and made available for download. The exhibition locations and website link were advertised in:

- Bellingen Courier Sun
- Coffs Coast Advocate
- Nambucca Guardian News.

A community drop-in session was held to provide information on the proposed North Macksville Ramps on 6 October 2015 from 4pm to 7pm at the Macksville Senior Citizen Centre. The project team was available at the community drop-in session to answer questions and receive feedback.

Table 1.1 : Display locations

Display location	Address
Pacifico Site Office	124 Albert Drive, Macksville
Macksville Senior Citizen's Centre	39 Princess Street, Macksville
Macksville Library	41 Princess Street, Macksville
Nambucca Heads Library	23 Ridge Street, Nambucca Heads
Nambucca Community and Arts Centre	19 Ridge Street, Nambucca Heads

2 Response to the submissions

Roads and Maritime received 144 submissions, accepted up until 18 October 2015. Of the 144 submissions received 137 (95%) were positive submissions written in support of the Project. These included a submission from the Rotary Club of Macksville. A member of the community took the initiative to design a 'positive form letter' which was circulated for use by the general public; 110 of the positive submissions received by were 'form letters' expressing support for the Project.

Support for the project as described in the submissions pertained to:

- Quicker access and connections to Macksville
- Reduced commute time for local workers, reducing fuel and maintenance costs
- Opportunities to increase tourism and commerce
- Allows for tourists to access and leave the town quickly, therefore providing incentive as a town to stop and revive in on long trips
- Improved response times for emergency vehicles
- More opportunities for town growth.

Seven (5%) of the 144 submissions received raised concerns about the Project. Each of these submissions was considered by suitably qualified staff from Roads and Maritime in order to understand the concerns being raised.

Table 2.1 below lists a summary of the respondents and each respondent's allocated submission number. The table also indicates where the concerns from each submission have been addressed in **Chapter 2** of this report.

Table 2.1 : Summary of respondents

Respondent	Submission No.	Concerns raised / positive feedback	Report section where concern is addressed
Individual /Business	1-2,4-9, 11-21, 23, 25-29, 32-36, 38-47, 49-50, 53-65, 67-72, 74-75, 77, 80, 82, 84-93, 95, 98-102, 104, 107-111, 113-114, 116-120, 122-126, 128-129, 131, 133-134, 138-143	Positive feedback form letter	2.10
Individual	3, 10, 22, 24, 31, 37, 48, 52, 66, 76, 78, 81, 83, 94, 96, 97, 105-106, 115, 121, 132, 137, 144	Positive feedback supporting the project	2.10
Individual	30	Design change suggestions Landscape and visual amenity Community consultation Noise and vibration Land use and property Other concerns	2.3 2.4 2.5 2.6 2.7 2.9
Individual	51	Design change suggestions Positive feedback	2.3 2.10

Respondent	Submission No.	Concerns raised / positive feedback	Report section where concern is addressed
Rotary Club of Macksville	73	Positive feedback supporting the project	2.10
Individual	79	Project development process Design change suggestions Landscape and visual amenity Noise and vibration Safety	2.2 2.3 2.4 2.6 2.8
Individual	103	Project development process Design change suggestions Landscape and visual amenity Noise and vibration Land use and property	2.2 2.3 2.4 2.6 2.7
Individual	112	Project development process Design change suggestions Positive feedback	2.2 2.3 2.10
Individual	127	Design change suggestions	2.3
Individual	130	Design change suggestions	2.3
Individual	135	Project development process Design change suggestions Landscape and visual amenity Community consultation Safety	2.2 2.3 2.4 2.5 2.8
Individual	136	Design change suggestions Positive feedback	2.3 2.10

A full list of the submissions can be found in **Appendix A**.

2.1 Overview of issues raised

A total of 144 submissions were received in response to the display of the Preferred Option Report comprising one government agency and 143 from the community.

Each submission has been examined individually to understand the concerns being raised. The concerns raised in each submission have been extracted and collated, and corresponding responses to the concerns have been provided. Where similar concerns have been raised in different submissions, only one response has been provided. The concerns raised and Roads and Maritime response to these concerns forms the basis of this chapter.

95% supported the Preferred Option, 4% of the submissions received did not support the Preferred Option, 1% did not state an opinion either way.

The main concerns raised about the North Macksville Ramps included:

- Project development process (**Section 2.2**)
- Design change suggestions (**Section 2.3**)
- Landscape and visual amenity (**Section 2.4**)
- Community consultation (**Section 2.5**)
- Noise and vibration (**Section 2.6**).

96% of responses were received via email. 4% were responses received on the day of the community drop-in session or received via post or phone call.

76% of responses received were positive feedback form letters.

The following nine sections describe the concerns raised and provide responses.

2.2 Project development process

2.2.1 Design process

Submission number(s)

79, 103.

Issue description

In summary, the respondent(s) raised the following concerns:

1. Questioned the project design process that led to the location of the ramps options.
2. The respondent disliked all the options and wants to know why options in other locations were not considered and was a cost a factor?
3. Why were the options developed by Pacifico?
4. The respondent would like to see the 100% design.

Response

1. and 2. The ramps are located as close to Macksville as possible to provide effective and efficient access for motorists wishing to travel to or from Macksville. The location of the ramps will reduce the travel distance and time for ambulance access to Macksville District Hospital.

   The area near Letitia Close provides the least overall impact for ramps between Nambucca Heads and Macksville. Ramp locations further to the north will also increase impact to residents adjacent to Old Coast Road and Mattick Road, while ramp locations to the south of Letitia Close would require construction of embankments on the flood plain which would increase the flooding impacts in Macksville and have a substantial cost and construction time impact. Other locations for the ramps may have further impacts such as additional property acquisition, additional road construction requirements and additional environmental impacts. When all these issues are balanced, the area near Letitia Close is the best location for the addition of the ramps.

   The area near Letitia Close also provides good utilisation of the infrastructure required for the proposed local road network. If the ramps were moved further to the north all vehicles using the ramps would need to pass through the area near Letitia Close and the southern end of Old Coast Road.

   Potential interchange options were developed for review, from which three were selected for further investigation. The development of options and the selection of the Preferred Option took into account a broad range of factors including safety, community, noise, visual, other amenity and property impacts, construction staging, cultural heritage, ecological values, flooding and geotechnical conditions.

   Estimated costs for the three options were similar. Cost was not a factor in the selection of the Preferred Option.

3. Pacifico are the design and construct contractors appointed by Roads and Maritime to deliver the Warrell Creek to Nambucca Heads section of the Pacific Highway upgrade project. Roads and Maritime engaged Pacifico to assist in the development and assessment of the North Macksville Ramps options.
4. The project team will contact the respondent to provide a copy of the 100% design when it is available. In addition to this, the latest information and construction plans are available at the Warrell Creek to Nambucca Heads project site office at Warrell Creek. Residents may also contact the Project Team on 1800 074 588.

2.2.2 Options development

Submission number(s)

79, 135.

Issue description

In summary, the respondent(s) raised the following concerns:

1. How were community factors considered in the options selection process?
2. What is the dollar value you have placed on the quality of life of the residents of Letitia Close and surrounds?
3. How does Option 2 improve travel time to Macksville?
4. How does Option 2 provide greater traffic efficiency and cater for future growth?
5. No scale drawings were displayed.

Response

1. and 2. The development of options and the selection of the Preferred Option took into account a broad range of factors including safety, community, noise, visual, other amenity and property impacts, construction staging, cultural heritage, ecological values, flooding and geotechnical conditions. The Preferred Option was selected as it was assessed to perform best across a wide range of criteria.

   As outlined in chapter five of the Preferred Option Report (September 2015) community factors were considered during the Options Assessment Workshop. A weighting of 25 per cent was allocated to community impacts for the comparison of the three options. The community factors considered included land acquisition, local enterprise, agribusiness, river/marine activities, emergency events, noise, light impacts, headlight intrusion, visual impacts and severance of land. Further details of this assessment are provided in the Preferred Option Report.

   The incremental impacts on social amenity associated with the addition of the ramps are addressed in Section 6 of the Modification Environmental Assessment.

   Estimated costs for the three options were similar. Cost was not a factor in the selection of the Preferred Option.

3. All three options developed for further assessment improve travel times, and therefore traffic efficiency, for vehicles travelling between Coffs Harbour and Macksville. The ramps allow traffic to exit directly at Macksville instead of exiting at Nambucca Heads and needing to travel along the existing Pacific Highway through Macksville, including some low speed environments. The upgraded Pacific Highway, with the ramps, is a more direct route than using the existing Pacific Highway.
4. The more direct route to Macksville supports future growth of businesses in the town resulting from additional visitors that might not otherwise visit Macksville. The ramps respond to requests from the Macksville Chamber of Commerce and Nambucca Shire Council.
5. Appendix A of the Preferred Option Report included the design drawings of all three options considered. The project team also had the detailed design plans for viewing at the drop in session that was held in Macksville on 6 October. In addition to this, the latest information and construction plans are available at the Warrell Creek to Nambucca Heads project site office at Warrell Creek. Residents may also contact the Project Team on 1800 074 588.

2.2.3 Approvals

Submission number(s)

79, 135.

Issue description

In summary, the respondent(s) raised the following concerns:

1. Concerned about the decision process and can my letter be passed on to the decision making body?
2. What options do residents have if data used for assessments (eg traffic, noise, lights and air pollution) is incorrect and impacts are greater than planned for?
3. Concerned no cost/benefit study has been undertaken. Concerned these ramps are a waste of public money.

Response

1. The refined concept design and Modification environmental assessment will be submitted to the NSW Department of Planning and Environment for approval.

   The environmental assessment documents the potential environmental impacts of the ramps and the measures adopted to mitigate these impacts. The environmental assessment includes a summary of the submissions received in response to the display of the preferred option report and the responses to the issues that were raised.

   Roads and Maritime are the proponent for the Warrell Creek to Urunga upgrade. Roads and Maritime have identified the preferred option to meet the requirements for the North Macksville Ramps. As described in the Preferred Option Report, the three options were compared using a Value Management methodology. From this, Option 2 was selected by Roads and Maritime as the preferred option.

   Public comments received on the Preferred Option Report have been considered and where appropriate further refinements to the preferred option have been made (**Section** 3).

   At its discretion the NSW Department of Planning and Environment may display the environmental assessment for further public comment. If the environmental assessment is displayed, a report on the submissions received would be prepared and the design and environmental assessment may be further refined if required to address feedback.

   If approved the ramps are proposed to be built as part of the Warrell Creek to Nambucca Heads upgrade project.

2. Roads and Maritime have endeavoured to ensure that data used for the environmental assessments was relevant and up to date when it was prepared. Roads and Maritime would also consider further design refinements or ameliorative measures if operational impacts are greater than predicted.

   The project conditions of approval require Roads and Maritime to undertake operational noise monitoring within 12 months of the opening of the project to highway traffic. In accordance with the Roads and Maritime Environmental Noise Management Manual, should any residence have noise impacts of 2 dB(A) more than the predictions, then Roads and Maritime will consult with affected property owners to determine any reasonable and feasible mitigation measures for any additional operational impacts.

   As part of the Approved Project air quality impacts were assessed in Chapter 19 of the environmental assessment. The proposal would not measurably increase these impacts which are well below the National Environment Protection Council goals.

3. North facing ramps are proposed at North Macksville, in response to representations from Nambucca Shire Council and the Macksville Chamber of Commerce.

The addition of the ramps at North Macksville together with the currently approved interchange at Bald Hill Road will allow motorists to take advantage of the facilities at Macksville, in either the northbound or southbound direction. Motorists will be able to rest and take advantage of the shops, service stations and other facilities before travelling on their journey.

2.2.4 Other concerns

Submission number(s)

112, 135.

Issue description

In summary, the respondent(s) raised the following concerns:

1. Suggestion that Australia should have a road policy that includes on and off ramps for every town that is within two kilometres of new highways.
2. States their neighbourhood has been impacted by construction. Concerned they have not been offered compensation.
3. Concerned that their amenity has been destroyed. Wants compensation for this.
4. Clarification required regarding the text “Bridge over the upgraded highway for Old Coast Road”.

Response

1. The suggestion is noted. The addition of the ramps at North Macksville together with the currently approved interchange at Bald Hill Road will allow motorists to take advantage of the facilities at Macksville, in either the northbound or southbound direction. Motorists will be able to rest and take advantage of the shops, service stations and other facilities before travelling on their journey.
2. and 3. Roads and Maritime are committed to reducing project impacts through mitigation measures that were identified in the Approved EA and the Submissions and Preferred Project Report for the Approved Project.

   The development of options and the selection of the Preferred Option took into account a broad range of factors including safety, community, noise, visual, other amenity and property impacts, construction staging, cultural heritage, ecological values, flooding and geotechnical conditions.
4. An overpass bridge for Old Coast Road is part of the Approved Project. The proposed bridge is required to retain continuity of the local road network. Option 3 did not have a bridge over the proposed highway at Letitia Close and has an additional intersection with the existing Pacific Highway on the western side of the proposed highway alignment to retain access to Old Coast Road.

2.3 Design change suggestions

2.3.1 Location of ramps

Submission number(s)

51, 79, 103, 112, 135, 136.

Issue description

In summary, the respondent(s) raised the following concerns:

1. Why are there no on/off ramps on both southbound and northbound lanes similarly to the Bellingen/Bald Hill one?

2. The respondent does not object to the North Macksville Ramps project but objects to the placement and design.
3. The respondent suggests that a hybrid design, which combines the Option 3 on-ramp with the sound bound version of Option 2, would have better outcomes for noise, headlight intrusion, Vehicle Kilometres Travelled (VKT), pollution and fuel usage.
4. The respondent suggests moving the ramps to River Street/Gumma Road and including both on and off ramps at this location.
5. The respondent suggests moving the ramps 1-2 kilometres north towards Mattick Road.
6. Will ample signage be provided for the location of the ramps?

Response

1. Traffic data analysis that was undertaken for the options development indicates that on and off ramps in both directions (four ramps) are not required. As a result and to reduce impacts to the nearby residents only north facing ramps (two ramps) are proposed.

   The Bald Hill interchange has ramps in both directions due to its close access to the Macksville industrial area. This allows access without driving through the Macksville Central Business District.

   The North Macksville ramps allow traffic to join or leave the highway directly at Macksville instead of at Nambucca Heads and needing to travel along the existing Pacific Highway to Macksville, in a lower speed environment. The upgraded Pacific Highway, with the ramps, is a more direct route than using the existing Pacific Highway.

   The more direct route to Macksville supports future growth of businesses in the town resulting from additional visitors that might not otherwise visit Macksville. The ramps respond to requests from the Macksville Chamber of Commerce and Nambucca Shire Council.
2. It is noted that the respondent agrees to the North Macksville Ramps project in principle however objects to the location and design.
3. The hybrid design would increase the length of the bridge over the upgraded highway which would further alter the alignment of Old Coast Road and Letitia Close. This would potentially increase biodiversity, noise, visual amenity and water quality impacts. The hybrid design would also require additional property acquisition and an additional intersection with the existing Pacific Highway, which is not desirable from a road safety viewpoint.
4. A preliminary review of the relocation has determined that due to the proximity of River Street/Gumma Road to the Nambucca River, the flood plain and the upgraded highway bridge, on and off ramps to this area is not feasible.
5. The ramps are located as close to Macksville as possible to provide effective and efficient access for motorists wishing to travel to or from Macksville. The location of the ramps will reduce the travel distance and time for ambulance access to Macksville District Hospital. Ramp locations further to the north will also increase impact to residents adjacent to Old Coast Road and Mattick Road
6. A signage strategy that complies with Roads and Maritime signage guidelines will be developed for the project. Roads and Maritime will consult with key stakeholders in order to maximise the benefits of constructing the ramps.

2.3.2 Bus stop location

Submission number(s)

79, 127, 135.

Issue Description

In summary, the respondent(s) raised the following concerns:

1. The respondent is concerned about the bus stop arrangements for Letitia Close children and sees safety issues for small children walking beside an on/off ramp in close proximity to traffic including trucks.
2. The respondent is concerned about safety in regards to the bus stop and access for drop off and pick up. Also concerned about pedestrian access and local traffic performing illegal U-turns after dropping off and picking up children.
3. Concerns about safety regarding the design of the bus stop, increased traffic and children crossing the upgraded Old Coast Road. Concerned that two lanes of traffic will be accelerating towards the bus stop.
4. Concerned about safety of the current bus stop during construction.

Response

1. to 3. After consultation with residents and the local bus company, the bus stop has been relocated into Letitia Close. This provides a safer location as the bus stop is separated from through traffic on Old Coast Road.
4. The current bus stop for school students living on Letitia Close was relocated to within the cul-de-sac on 17 August 2015. The change of location for the bus pickup area from its previous location on the edge of Old Coast Road was initiated following consultation with local parents and the bus company. Letitia Close was deemed the safest location for school students given that it is not a through road for traffic.

2.3.3 Existing highway intersection

Submission number(s)

130,135.

Issue description

In summary, the respondent(s) raised the following concerns:

1. How will Old Coast Road tie into the existing highway? Concerned about the safety of the intersection. Are the traffic forecasts used in the assessments too low? The respondent suggests that a roundabout would be suitable for this intersection.
2. The respondent is concerned about the safety of the existing design of the Old Coast Road/existing highway intersection and is concerned this will continue to be unsafe.

Response

1. and 2. The Approved Project and proposed ramps comply with the Pacific Highway upgrade design safety standards. The traffic assessment that was undertaken as part of the options assessment indicated that the existing intersection layout is appropriate for the expected traffic volumes and would be retained.

   The design of this existing intersection was done in accordance with the appropriate standards and was subject to a Road Safety Audit.

   The design of this intersection will be further refined as part of the detailed design of the proposed works.

2.3.4 Other concerns

Submission number(s)

30, 79, 103.

Issue description

In summary, the respondent(s) raised the following issues:

1. Can the powerlines (on the western side of the upgraded highway) be buried underground so that more vegetation can be kept and additional vegetation planted to create a buffer
2. What are the provision for pedestrians and cyclists?
3. Will a low noise pavement be installed?

Response

1. The power line running perpendicular to the Upgraded Highway in an east west direction will be constructed underground. This will minimise clearing of existing vegetation and maximise potential for vegetation regrowth.
2. The design has been refined to provide enhanced pedestrian and cyclist facilities by increasing the width of the shoulder on Old Coast Road, including the overbridge, from one metre to two metres. A pedestrian / cyclist path has been provided on the south western corner of the proposed roundabout to provide connectivity from the two metre wide shoulder on Old Coast Road South to the two metre shoulder along the overbridge.
3. A low noise pavement is proposed for the North Macksville ramps. The spray seal pavement that was assessed as part of the Approved Project has been changed to a dense grade asphalt pavement. This pavement extends north from the intersection of Old Coast Road with the Existing Pacific Highway to the roundabout, on Old Coast Road. The roundabout is proposed to have a concrete surface. Additionally, the dense grade asphalt pavement extends west from the western side of the bridge to the north-bound on-ramp. The ramps pavement remains unchanged with low noise pavement.

2.4 Landscape and visual amenity

2.4.1 Light intrusion

Submission number(s)

30, 79, 103, 135.

Issue description

In summary, the respondent(s) raised the following concerns:

1. Concerned about street light intrusion. Concerned that light spill will impact on amenity and interfere with sleep.
2. Concerned about head light intrusion.
3. What mitigation measures will be implemented to minimise headlight intrusion for residents? Respondents request that blinds be provided to all nearby residences.

Response

1. It is acknowledged that these areas are currently unlit and there will be an increase in night time light levels compared to the Approved Project. Flag lighting is required at the intersection of the realigned Old Coast Road and on-ramp and the roundabout intersection of the realigned Old Coast Road, Letitia Close and off-ramp. The lighting has been designed to minimise light spill into adjacent residences.

2. The design has been refined to minimise headlight intrusion for residents by:
    - Relocating the power line underground to allow regrowth of vegetation
    - Shifting the alignment of Old Coast Road further away from the adjacent properties to the west to maximise the area of retained vegetation and minimise the impact in the area

    If necessary, additional options can be investigated after the opening of the highway for traffic.
3. Modelling has predicted that headlight intrusion may affect one residence closer to the roundabout. Roads and Maritime will consult with the property owner to determine suitable measures to mitigate the increased headlight intrusion.

2.4.2 Amenity

Submission number(s)

30, 79, 135.

Issue description

In summary, the respondent(s) raised the following concerns:

1. The respondent is concerned about the proximity of the Preferred Option to their property. Can protection be provided to minimise impacts on the amenity of residents?
2. Concerned by amenity loss due to closeness of traffic to Letitia Close properties.
3. The respondent is concerned that vegetation clearing and traffic growth will reduce privacy.

Response

1. and 2. The increased volume of traffic and change in rural ambience is acknowledged. Roads and Maritime are committed to minimising the impacts on property owners where practicable.

    Detailed measures are outlined in Section 6.5 of the Modification Environmental Assessment. The mitigation measures include visual mounds and tree plantings at various locations.
3. The area of vegetation clearing will be minimised. The increased volume of traffic and change in rural ambience is acknowledged. The landscaping plans for this area will be modified to include a visual screen to the SE of the roundabout which will reduce the impact on amenity.

2.5 Community consultation

Submission number(s)

30, 79, 135.

Issue description

In summary, the respondent(s) raised the following concerns:

1. The respondent is concerned that the Roads and Maritime “Community Charter” has not been followed. Will the Community Charter be adopted?
2. The respondent is concerned that community feedback has no impact and is ignored by Roads and Maritime. The respondent wants to know what their rights are throughout this procedure.
3. The respondent is concerned that Roads and Maritime have not collaborated with residents and concerned that contractors are visiting properties without prior notice.
4. The respondent is concerned by lack of correspondence from Roads and Maritime with the individual. The submission gives a specific example.

5. The respondent is concerned that Roads and Maritime has not listened to the community about the location of the school bus and has failed to take action.
6. Will Roads and Maritime make any changes to the design because of community consultation?
7. The way in which the Preferred Option was presented at a meeting on the 16 September at the Project Office was not clear or helpful.
8. The respondent wants to be kept informed as project progresses.

Response

1. The Roads and Maritime Customer Charter (as outlined by the submission) was developed in 2011 and articulates the commitments made by the Roads and Maritime to ensure that customers and stakeholders are considered at the centre of every service provided.

   Community consultation is taken very seriously during the project development process and the Customer Charter was further refined for undertaking community and stakeholder engagement activities. The Roads and Maritime community and stakeholder engagement goals are to:

   - Enhance its transparency and public accountability
   - Ensure that its decision-making is inclusive of diverse community ideas and opinions
   - Ensure that its strategic planning, project development, and service delivery meets the balance of community needs and expectations
   - Create a more efficient Roads and Maritime based on collaborative decision-making and enhanced public trust.

   The Approved Project Community Involvement Plan (CIP), available on the Approved Project website, describes how community and stakeholder involvement will be managed during the construction of the project.

   Building on Roads and Maritime policies, the CIP recognises and will endeavour to meet all reasonable needs and desires of the community and stakeholders. Its principles in relation to community involvement are:

   - The CIP acknowledges the project team members are visitors to the community for the duration of the works. Personnel will be required and encouraged to respect the needs and workings of the local residents and business community
   - The CIP acknowledges the community should receive early advice of activities and that early notification will ensure progress of works minimises uncertainty and disruption and fosters confidence among community members
   - Personal and targeted consultation with local residents, landowners, businesses and stakeholders will enable relationships to be built between all parties, thus providing the foundation for good working relationships and resolution of matters of concern
   - Proactive management of design (where applicable), construction, traffic management or other emerging issues will build on these foundations, maximising a reputation of reliability through prompt resolution of issues and minimising escalation of issues
   - Support for the safe and efficient delivery of the project with minimal disruption to the community.
2. Roads and Maritime Services is committed to actively engaging with community members and other stakeholders.The Approved Project has shown commitment to this by developing its community and stakeholder engagement goals and the Approved Project Community Involvement Plan. The proposal has also adopted these commitments.

Roads and Maritime have made refinements to the concept design as a result of community consultation. During detailed design further refinements would be investigated and made if appropriate. Refinements include:

- Realignment of Old Coast Road bridge approach and the road immediately west of the upgraded highway to maximise the distance from private properties, minimise vegetation clearance, and maximise revegetation areas
- The realignment of Letitia Close to improve the safety at the roundabout
- An additional section of visual screening along the southbound off-ramp to reduce the impacts of headlight intrusion
- Addition of a vegetated visual mound on Letitia Close near the south east corner of the roundabout to reduce the impacts of headlight intrusion
- Increased shoulder width on Old Coast Road to accommodate cyclists
- Selection of specialised road lighting to reduce light spillage into adjacent properties
- Relocation of the school bus stop into Letitia Close
- Refinements to Old Coast Road pavement surface to reduce noise.

3. Roads and Maritime and its contractor has had ongoing consultation with local residents regarding the proposal and the Approved Project. The specific examples given by the respondent have been previously investigated and discussed with the resident.
4. Roads and Maritime consults with the community using a variety of means. Project updates are provided at every community information session. Project communications include letterbox drops and media releases, traffic, SMS and email alerts, community updates and responses to phone calls and meetings with residents. The needs of the community in relation to the amount of consultation vary, however there are many opportunities to discuss issues with the project team including by phoning the community line on 1800 074 588, by email at community@afjv.com.au or by visiting the Community Display Centre at Albert Drive, Warrell Creek. The letter referred to in the submission was forwarded to the respondent on 30 September 2015.
5. Following consultation with residents and the local bus company during the construction phase of the project, arrangements were made as of 17 August 2015 to pick up and set down children in Letitia Close.

   After further consultation with residents and the local bus company, arrangements have been made as part of the design refinement process to permanently relocate the bus stop into Letitia Close. This provides a safer location as the bus stop is separated from through-traffic on Old Coast Road.
6. Roads and Maritime are committed to undertaking community and stakeholder engagement and the project has followed the community and stakeholder engagement goals of:

   - Enhance its transparency and public accountability
   - Ensure that its decision-making is inclusive of diverse community ideas and opinions
   - Ensure that its strategic planning, project development, and service delivery meets the balance of community needs and expectations
   - Create a more efficient Roads and Maritime based on collaborative decision-making and enhanced public trust.

   As identified in this report Roads and Maritime have made refinements to the concept design as a result of community consultation, Refinements include:

- Realignment of Old Coast Road immediately west of the highway upgrade to maximise the distance from private properties, minimise vegetation clearance, and maximise revegetation areas
- The realignment of Letitia Close to improve the safety at the roundabout
- An additional section of visual screening along the southbound off-ramp to reduce the impacts of headlight intrusion
- Addition of a vegetated visual mound on Letitia Close near the south east corner of the roundabout to reduce the impacts of headlight intrusion
- Increased shoulder width on Old Coast Road to accommodate cyclists
- Selection of specialised road lighting to reduce light spillage into adjacent properties
- Relocation of the school bus stop into Letitia Close
- Refinements to Old Coast Road pavement surface to reduce noise.

7. This community consultation feedback has been noted and lessons learnt will be discussed and actioned by project staff.

   The display of the Preferred Option Report was briefly announced at the regular community information session held for the Approved Project at the Pacifico Site Office on 16 September. During the community information session the arrangements for a community drop-in session, to discuss the ramp options in detail, were advised to the community. Alternate arrangements for providing information and receiving feedback were made with individuals who were not able to attend the community drop-in session. Roads and Maritime met with the respondent prior to the community drop-in session on 6 October.

8. The project team will contact the respondent to provide regular updates. The respondent has been included on the project contact database. In addition to this, the latest information and construction plans are available at the Warrell Creek to Nambucca Heads project site office at Warrell Creek. Residents may also contact the Project Team on 1800 074 588.

2.6 Noise and vibration

Submission number(s)

30, 79.

Issue description

In summary, the respondent(s) raised the following concerns:

1. Concerned about an increase in traffic noise will have an effect on local properties. Is the data accurate and valid? Has an increased volume of traffic been looked at? Has the emotional impacts been considered
2. Concerned about noise by heavy vehicles
3. The respondent has indicated that properties near the Macksville Bridge have suffered for years with traffic noise and accidents. The respondent feels that this will move to the North Macksville Ramps and with increased traffic volumes causing noise, fumes, and potential loss of life and destruction of property.
4. Concerned that gradient of ramps will increase noise.
5. What impacts will the ramps and roundabout have on the noise for the resident? How does this impact the model that was undertaken for the upgraded highway?
6. What noise mitigation will we receive to restore amenity to levels prior to the upgraded highway?

Response

1. Noise modelling predicts that the addition of the north facing ramps will not change the predicted noise levels of the Approved Project by more than one decibel compared to the Approved Project at all residences. These predictions use the 2026 forecast traffic data from the updated traffic modelling that was developed as part of the ramp options assessment. It is acknowledged that the Approved Project as well as the increased traffic on Old Coast Road will change the amenity in the immediate vicinity. Residences that are eligible for noise treatment will be offered at residence treatments to reduce the impact of road traffic noise. The usual treatments offered are air conditioning and/or improved glazing, doors and seals.
2. The effect of heavy vehicles has been considered in the noise predictions. Where the ramps are closer to residents the down-grade of the northbound on ramp will assist acceleration while the climbing grade of the southbound off ramp will assist with deceleration and therefore reduce noise. The proposed highway speed limit in this area will be 110km/hr for light vehicles; however the heavy vehicles will be limited to 100km/hr as per the current speed limit legislation.
3. The highway upgrade, including the proposed North Macksville Ramps, has been designed to increase the safety of road users. Independent road safety audits are carried out during the design development of the ramp designs. The designers must consider and address all safety issues and requirements relating to safety during construction, operation and maintenance in the development and production of the Design Documentation. The highway upgrade and North Macksville Ramps will be designed to current standards which are much safer than the standards that applied when the Macksville Bridge was designed.

   The adjacent resident's safety is considered during the detailed design development. Where errant vehicles are a concern, appropriate means of controlling these vehicles within the road corridor are incorporated in the design, e.g. safety barriers.

   A noise assessment has been undertaken for the potential noise impacts from the three ramp options. This assessment was undertaken to assist in the selection of the preferred option for the ramps. The maximum increase in noise compared to the approved layout for the surrounding properties is 1dB(A). This is not considered a significant variation in noise level, since changes in noise level of 2dB(A) or less are not able to be detected by most people.

   The ramps are generally located within the previously acquired highway corridor. Additional acquisition was limited to one property.

   The inclusion of the North Macksville Ramps is supported by sections of the community including Nambucca Shire Council and the Macksville Chamber of Commerce.
4. Where the ramps are closer to residents the down-grade of the northbound on ramp will assist acceleration while the climbing grade of the southbound off ramp will assist with deceleration and therefore reduce noise.
5. Noise modelling predicts that the addition of the North Macksville Ramps will not change the predicted noise levels of the Approved Project by more than one decibel compared to the Approved Project at all residences. These predictions use the 2026 forecast traffic data from the updated traffic modelling that was developed as part of the ramp options assessment.
6. The project team is currently working with eligible residents, including the respondent, to develop at-house noise treatments for their residences. The usual treatments offered are air conditioning and/or improved glazing, doors and seals.

2.7 Land use and property

Submission number(s)

30, 103.

Issue description

In summary, the respondent(s) raised the following concerns:

1. Has the proposal considered the future population growth of the area?
2. Concerned that access will impact on trees and the environment. The respondent requests minimal vegetation clearing.
3. Respondents have asked for that sufficient level area be provided next to the property access for letter boxes and bins.
4. Can the respondents new property access be moved towards the east so that more mature trees can be retained.

Response

1. The future expansion of the population is not expected to be affected negatively by the addition of the North Macksville Ramps. The addition of the ramps will better cater for traffic growth for any increased development in the area. A traffic capacity analysis has been carried out and based on the expected traffic volumes all intersections associated with the ramps have the highest level of service (Level of Service A). This means that the ramps and the associated intersections have a significant capacity for additional traffic that may be generated from residential development in the surrounding area.
2. It is expected that some trees will need to be cleared as part of the works to construct the access.
3. The project team will consult with the affected property owners to agree on a suitable area for letter boxes and bins that meets the requirements of relevant service providers.
4. It is expected that some trees will need to be cleared as part of the works to construct the access. The proposed access design has been refined to minimise the clearing of trees as much as possible while still providing a safe access.

2.8 Safety

Submission number(s)

79, 135.

Issue description

In summary, the respondent(s) raised the following concerns:

1. Concerned that the same safety issues that occurred at Macksville Bridge will occur at the North Macksville Ramps.
2. Concerned about safety in regards to speeding vehicles on local roads.
3. Concerned that there will be an increase in risk for accidents due to increase in vehicles and the proposed roundabout.
4. Concerns about the current construction activities and safety with accessing their property

Response

1. The Approved Project, including the proposed North Macksville Ramps has been designed to meet the road safety requirements that apply to Pacific Highway Upgrade projects. The road is designed to comply with the standards and guidelines adopted by the project. The design

process includes review by independent consultants who are specialised in the area of road design including safety in design. Independent road safety audits were carried out during the design development.

The adjacent residents' safety is considered during the detailed design development. Intersection designs and driveway accesses that intersect with the local roads are checked during the design to ensure that they comply with the design guidelines. The safety of motorists and surrounding residents is considered with the alignments selected. Where necessary, road safety barriers are installed to provide improved safety outcomes for both motorists and adjacent residents.

2. The Approved Project and proposed ramps comply with stringent design safety standards. Letitia Close and Old Coast Road South are to be signposted at 50 km/h and 60 km/h, respectively. These speed limits are enforceable in the same manner as speed limits at any other location on the project.
3. The Approved Project, including the proposed North Macksville Ramps has been designed to increase the safety of road users. Independent road safety audits are carried out during the design development of the ramp designs. The designer must consider and address all safety issues and requirements relating to safety during construction, operation and maintenance in the development and production of the Design Documentation.
4. The issues raised in this submission are not related to the proposal.

   The current construction activities are part of the Approved Project and the issues raised have been investigated and actioned by the project team.

2.9 Other concerns

Submission number(s)

30, 79.

Issue description

In summary, the respondent(s) raised the following issues:

1. The respondent is concerned about an increase in exhaust fumes.
2. The respondent is concerned about bush restoration.
3. The respondent is concerned about safety with increased snake sightings on their property. How is this addressed and by who? Has the Red-bellied black snake been considered like endangered grasses?

Response

1. As part of the Approved Project air quality impacts were assessed in Chapter 19 of the Approved EA. The proposal would not measurably increase these impacts which are well below the National Environment Protection Council goals.
2. The design of the ramps has been refined to minimise the area of vegetation clearing. The landscaping plans for this area will be modified to include suitable revegetation and landscaping for the area affected by the addition of the ramps.
3. Increased snake sightings generally occur during the spring and summer months as the temperature increases. Snakes seen on properties should not be approached. WIRES or your local vet can be contacted for further advice.

   Roads and Maritime endeavours to minimise the impacts of the project on native plants and animals. Many native animals are protected by legislation however as the Red-bellied black snake (*Pseudechis porphyriacus*) is not currently listed as threatened or endangered in State

or Federal legislation No specific management provisions have been made for it in the proposal or Approved Project.

2.10 Positive feedback

Submission number(s)

Positive submissions numbers: 3, 10, 22, 24, 31, 37, 48, 52, 66, 76, 78, 81, 83, 94, 96, 97, 105-106, 115, 121, 132, 137, 144.

Positive form letter submissions numbers: 1-2,4-9, 11-21, 23, 25-29, 32-36, 38-47, 49-50, 53, 55-65, 67-72, 74-75, 77, 80, 82, 84-93, 95, 98-102, 104, 107-111, 113-114, 116-120, 122-126, 128-129, 131, 133-134, 138-143.

Issue description

1. Different respondent(s) raised different reasons for their support. The following issues were raised:
   - Quicker access and connections to Macksville
   - Reduced commute time for local workers, reducing fuel and maintenance costs
   - Opportunities to increase tourism and commerce
   - Allows for tourists to access and leave the town quickly, therefore providing incentive as a town to stop and revive in on long trips
   - Improved response times for emergency vehicles
   - More opportunities for town growth.

Response

1. We thank you for your comments and your support for the proposal is acknowledged.

3 Refinements to the Preferred Option

As identified in this report, Roads and Maritime have made refinements to the concept design as a result of community consultation. These refinements include:

- Realignment of Old Coast Road bridge approach and the road immediately west of the upgraded highway to maximise the distance from private properties, minimise vegetation clearing, and maximise revegetation areas
- The realignment of Letitia Close to improve the safety at the roundabout
- An additional section of visual screening along the southbound off-ramp to reduce the impacts of headlight intrusion
- Addition of a vegetated visual mound on Letitia Close near the south east corner of the roundabout to reduce the impacts of headlight intrusion
- Increased shoulder width on Old Coast Road to accommodate cyclists
- Selection of specialised road lighting to reduce light spillage into adjacent properties
- Relocation of the school bus stop into Letitia Close
- Refinements to Old Coast Road pavement surface to reduce noise.

3.1 Realignment of Old Coast Road and overbridge

The Old Coast Road overbridge was realigned and straightened across the upgraded highway to:

- Improve safety by reducing the need for curve widening of the overbridge and improving the site line on approach to the overbridge from the south
- Reduce the cost of the overbridge by reducing the span of the girders and reducing the total overbridge deck area.

The changes to the overbridge allowed for the realignment of Old Coast Road on the western side of the Upgraded Highway. The realignment was refined to maximise the distance of the road from private properties, reduce the vegetation clearing required for the Moist Open Forest vegetation community and to maximise areas for revegetation.

3.2 Realignment of Letitia Close

The currently approved T-intersection of the Old Coast Road and Letitia Close would be modified to a roundabout. The minor realignment of Letitia Close where it joins the roundabout would improve the sight distance and approach angle for traffic entering the roundabout.

Four additional lights (one light is currently approved) and signage relating to the roundabout and ramps would also be installed at the intersection. Current pedestrian and cyclist facilities would be upgraded to provide access for crossing Old Coast Road on the southern side of the roundabout and Letitia Close.

3.3 Visual screening

Two additional visual barriers would be included to reduce headlight intrusion.

This proposal modifies about 200 meters of the vegetated visual mound on the east side of the Upgraded Highway that is north of Letitia Close between chainage 53,435 and 53,650 that was described in the Approved Project. This modification lifts the mound at the southern end to provide two metre screening. An additional visual barrier would connect to the southern end of the modified vegetated visual mound to provide continuous two metre screening along the entirety of the eastern side of the off-ramp. This additional visual barrier may allow for vegetation to be planted on top in some areas to increase the height of the visual barrier.

A second vegetated visual mound would be included on the southern side of the roundabout on the corner of Letitia Close and Old Coast Road to reduce the impacts of headlight intrusion.

3.4 Increased shoulder width

The design has been refined to provide enhanced cyclist facilities by increasing the width of the shoulder on Old Coast Road, including the overbridge, from one metre to two metres. A pedestrian / cyclist path has been provided on the south western corner of the proposed roundabout to provide connectivity from the two metre wide shoulder on Old Coast Road South to the two metre shoulder along the overbridge.

3.5 Lighting

Flag lighting is required at the intersection of the realigned Old Coast Road and on-ramp and the roundabout intersection of the realigned Old Coast Road, Letitia Close and off-ramp. The lighting has been designed to minimise light spill into adjacent residences.

One mast light is required at the intersection of the realigned Old Coast Road and on-ramp. Four mast lights (in addition to the one currently approved) are required at the roundabout. Aeroscreen luminaires will be installed to minimise light spill into the adjacent properties.

The design has been refined to minimise headlight intrusion for residents by:

- Relocating the power underground to allow regrowth of vegetation
- Shifting the alignment of Old Coast Road further away from the adjacent properties to the west to maximise the area of retained vegetation and minimise the impact in the area.

Headlight intrusion for residents to the east of the Upgraded Highway would be minimised by:

- An additional vegetated visual mound on the southern side of the roundabout at the corner of Letitia Close and Old Coast Road
- Extension of an approved vegetated visual mound by addition of a visual barrier along the southbound off-ramp.

Modelling has predicted that headlight intrusion may affect one residence closer to the roundabout. Roads and Maritime will consult with the property owner to determine suitable measures to mitigate the increased headlight intrusion.

3.6 Bus stop relocation

The current bus stop for school students living on Letitia Close was relocated to within the cul-de-sac on 17 August 2015. The change of location for the bus pickup area from its previous location on the edge of Old Coast Road was initiated following consultation with local parents and the bus company. Letitia Close was deemed the safest location for school students given that it is not a through road.

After consultation with residents and the local bus company, it has been agreed to permanently locate the bus stop in Letitia Close. This provides a safer location as the bus stop is separated from through traffic on Old Coast Road.

3.7 Old Coast Road Pavement

A low noise pavement is proposed for the North Macksville ramps. The spray seal pavement that was assessed as part of the Approved Project has been changed to a dense grade asphalt pavement. This pavement extends north from the intersection of Old Coast Road with the Existing Pacific Highway to the roundabout, on Old Coast Road. The

roundabout is proposed to have a concrete surface. Additionally, the dense grade asphalt pavement extends west from the western side of the bridge to the north-bound on-ramp. The ramps pavement remains unchanged with low noise pavement.

4 Commitments

After consideration of the concerns raised in the submissions and changes to the proposal, refinements have been made to the design and a number of management and mitigation measures have been revised.

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

The Construction Environmental Management Plan (CEMP) would be updated to describe commitments identified. These plans will provide a framework for establishing how environmental measures will be implemented and the party with which the responsibility lies for their implementation.

4.1 Summary of commitments

These commitments would minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The commitments are summarised in **Table 4.1**.

Table 4.1 : Summary of commitments

No.	Impact	Commitment	Timing
1	Community Consultation	The project team will contact the resident to provide regular updates. The respondent has been included on the project contact database.	Pre-construction
2	Land use and Property	The project team will consult with the affected property owners to agree on a suitable area for letter boxes and bins that meets the requirements of relevant service providers.	Pre-construction
3	Project development process	A signage strategy that complies with Roads and Maritime signage guidelines will be developed for the project. Roads and Maritime will consult with key stakeholders in order to maximise the benefits of constructing the ramps.	Detailed Design
4	Project development process	The project team will contact the resident to provide a copy of the 100% design when it is available.	After completion of detailed design. Pre-construction
5	Project Design	The local bus stop would be moved and permanently located in Letitia Close.	Pre-construction
6	Project Design	Visual screening provided includes: • An additional vegetated visual mound on the southern side of the roundabout at the corner of Letitia Close and Old Coast Road • Extension of an approved vegetated visual mound by addition of a visual barrier along the southbound off-ramp (chainage 53,425 to 53,650).	Detailed Design
7	Project Design	Increase shoulder width on Old Coast Road and overbridge from 1m to 2m.	Detailed Design
8	Project Design	The lighting designs will be directional to minimise light pollution. Lighting will be located and designed to not shine directly into any residences. Aeroscreen luminaires will be installed to minimise light spillage into the adjacent properties.	Detailed Design
9	Project Design	Sections of pavement on Old Coast Road will be changed from a spray seal pavement to a dense grade asphalt pavement.	Detailed Design
10	Project Design	The power line running perpendicular to the Upgraded Highway in an east west direction will be replace with an underground powerline.	Detailed Design
11	Project Design	Areas of vegetation clearing will be minimised if possible. The landscaping plans will be modified, if required, to include suitable revegetation and landscaping	Detailed Design
12	Project Design	Property access designs would be refined to minimise vegetation clearing and tree removal.	Detailed Design
13	Noise and Vibration	The project team will continue to work with eligible residents to develop at-house noise treatments for their residences.	Pre-construction

5 References

Roads and Maritime Services 2010, *Warrell Creek to Urunga Pacific Highway upgrade Environmental Assessment*, January, Sydney.

Roads and Maritime Services 2012 *Pacific Highway Upgrade, Warrell Creek to Urunga, Traffic Modelling Final Report*, May, Sydney.

Roads and Maritime Services 2015 *Warrell Creek to Nambucca Heads Operational noise modelling and assessment*, March Sydney.

Roads and Maritime Services 2015 *Warrell Creek to Nambucca Heads North Facing Ramps at North Macksville – Preferred option report*, September, Sydney.

Appendix A

List of submissions

Table 5.1 : Full list of submissions

Respondent	Submission No.	Issues raised
Individual	1	Positive feedback form letter
Individual	2	Positive feedback form letter
Individual	3	Positive feedback supporting the project
Business	4	Positive feedback form letter
Individual	5	Positive feedback form letter
Business	6	Positive feedback form letter
Individual	7	Positive feedback form letter
Individual	8	Positive feedback form letter
Individual	9	Positive feedback form letter
Individual	10	Positive feedback supporting the project
Individual	11	Positive feedback form letter
Individual	12	Positive feedback form letter
Individual	13	Positive feedback form letter
Business	14	Positive feedback form letter
Individual	15	Positive feedback form letter
Business	16	Positive feedback form letter
Business	17	Positive feedback form letter
Individual	18	Positive feedback form letter
Business	19	Positive feedback form letter
Business	20	Positive feedback form letter
Business	21	Positive feedback form letter
Individual	22	Positive feedback supporting the project
Individual	23	Positive feedback form letter
Individual	24	Positive feedback supporting the project
Business	25	Positive feedback form letter
Business	26	Positive feedback form letter
Business	27	Positive feedback form letter
Business	28	Positive feedback form letter
Business	29	Positive feedback form letter
Individual	30	Landscape and visual amenity, Noise and vibration, Air quality, Design change, Land use and property, Community consultation
Individual	31	Positive feedback supporting the project
Business	32	Positive feedback form letter
Individual	33	Positive feedback form letter
Individual	34	Positive feedback form letter
Business	35	Positive feedback form letter

Respondent	Submission No.	Issues raised
Individual	36	Positive feedback form letter
Individual	37	Positive feedback supporting the project
Individual	38	Positive feedback form letter
Individual	39	Positive feedback form letter
Individual	40	Positive feedback form letter
Individual	41	Positive feedback form letter
Business	42	Positive feedback form letter
Individual	43	Positive feedback form letter
Business	44	Positive feedback form letter
Individual	45	Positive feedback form letter
Business	46	Positive feedback form letter
Individual	47	Positive feedback form letter
Individual	48	Positive feedback supporting the project
Individual	49	Positive feedback form letter
Business	50	Positive feedback form letter
Individual	51	Positive feedback Design change
Individual	52	Positive feedback supporting the project
Business	53	Positive feedback form letter
Individual	54	Positive feedback supporting the project
Individual	55	Positive feedback form letter
Individual	56	Positive feedback form letter
Individual	57	Positive feedback form letter
Business	58	Positive feedback form letter
Individual	59	Positive feedback form letter
Individual	60	Positive feedback form letter
Individual	61	Positive feedback form letter
Individual	62	Positive feedback form letter
Business	63	Positive feedback form letter
Individual	64	Positive feedback form letter
Individual	65	Positive feedback form letter
Individual	66	Positive feedback supporting the project
Individual	67	Positive feedback form letter
Individual	68	Positive feedback form letter
Individual	69	Positive feedback form letter
Business	70	Positive feedback form letter
Individual	71	Positive feedback form letter
Individual	72	Positive feedback form letter
Rotary Club of Macksville	73	Positive feedback supporting the project
Business	74	Positive feedback form letter
Business	75	Positive feedback form letter
Individual	76	Positive feedback supporting the project

Respondent	Submission No.	Issues raised
Individual	77	Positive feedback form letter
Individual	78	Positive feedback supporting the project
Individual	79	Biodiversity, Landscape and visual amenity, Noise and vibration, Design change, Community consultation, Safety, Project development
Business	80	Positive feedback form letter
Individual	81	Positive feedback supporting the project
Individual	82	Positive feedback form letter
Business	83	Positive feedback supporting the project
Business	84	Positive feedback form letter
Individual	85	Positive feedback form letter
Individual	86	Positive feedback form letter
Business	87	Positive feedback form letter
Business	88	Positive feedback form letter
Individual	89	Positive feedback form letter
Individual	90	Positive feedback form letter
Individual	91	Positive feedback form letter
Individual	92	Positive feedback form letter
Individual	93	Positive feedback form letter
Business	94	Positive feedback supporting the project
Individual	95	Positive feedback form letter
Individual	96	Positive feedback supporting the project
Individual	97	Positive feedback supporting the project
Individual	98	Positive feedback form letter
Business	99	Positive feedback form letter
Business	100	Positive feedback form letter
Business	101	Positive feedback form letter
Business	102	Positive feedback form letter
Individual	103	Landscape and visual amenity, Design change, Land use and property
Individual	104	Positive feedback form letter
Individual	105	Positive feedback supporting the project
Individual	106	Positive feedback supporting the project
Business	107	Positive feedback form letter
Business	108	Positive feedback form letter
Individual	109	Positive feedback form letter
Individual	110	Positive feedback form letter
Individual	111	Positive feedback form letter
Individual	112	Design change, Project development
Individual	113	Positive feedback form letter
Business	114	Positive feedback form letter
Business	115	Positive feedback supporting the project

Respondent	Submission No.	Issues raised
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Individual	117	Positive feedback form letter
Business	118	Positive feedback form letter
Business	119	Positive feedback form letter
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Business	121	Positive feedback supporting the project
Business	122	Positive feedback form letter
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Individual	124	Positive feedback form letter
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Individual	127	Design change
Individual	128	Positive feedback form letter
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Business	132	Positive feedback supporting the project
Business	133	Positive feedback form letter
Business	134	Positive feedback form letter
Individual	135	Landscape and visual amenity, Noise and vibration, Design change, Community consultation, Safety, Project development
Individual	136	Positive feedback, Traffic and transport
Individual	137	Positive feedback supporting the project
Business	138	Positive feedback form letter
Individual	139	Positive feedback form letter
Individual	140	Positive feedback form letter
Individual	141	Positive feedback form letter
Business	142	Positive feedback form letter
Individual	143	Positive feedback form letter
Individual	144	Positive feedback supporting the project

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PACIFIC HIGHWAY UPGRADE – WARRELL CREEK TO NAMBUCCA HEADS

North Facing Ramps at North Macksville - Options Assessment Report

MAY 2015

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Contents

1. Workshop report

1.1 Background

The addition of two north facing ramps at North Macksville to the Warrell Creek to Nambucca Heads Pacific Highway Upgrade project, created the need to examine alternatives as to how the ramps could be incorporated to ensure that a range of project objectives are best realised.

An Options Report was therefore prepared by the design and construction consortia (Pacifico - an Acciona and Ferrovial joint venture) in consultation with Roads and Maritime Services.

The options presented in that report needed to undergo an assessment by Roads and Maritime to test their performance against a range of agreed project objectives.

An Options Assessment workshop using a Value Management methodology was convened on Wednesday 20 May 2015 at the Pacific Highway Office at Grafton. The attendees at the meeting were:

Chris Clark – Senior Project Manager

Bob Higgins – General Manager, Pacific Highway (part)

Jim Campbell – Principal Manager, Major Projects

Rachel Sadler – Communications Officer

Luke Fluechter – Resident Engineer

David Ledlin – Pacific Highway, Environment Manager

Chris Wicks – Environment Officer

Chris Vickery – Lead Road Designer

Matthew Francisco – Assistant Resident Engineer

Mark Neasbey – Facilitator ACVM

Only limited relevant extracts from the Options Report, which were pertinent to the options assessment, are included in this report.

1.2 Workshop objectives and activities

The agreed purpose of the workshop was to:

- Obtain a understanding of the project and the planning to date
- Table and agree criteria to be used to assess the options
- Review and then assess the options against the agreed criteria
- Draw conclusions, select a preferred option and agree key actions arising.

1.3 Summary of the workshop outcomes

It was concluded that:

- Option 2 is the preferred option. The identified mitigation measures should be considered further in the design and construction solution and implemented where reasonable.
- Option 2 is the most appropriate basis for consulting the community to explain the option and how it addresses the government's and community's expectations and seek relevant feedback comments.
- Option 2 would involve some variations to environmental effects that may need to be presented to the Federal and State Governments for relevant planning endorsements.

2. Project information and options descriptions

The information presented in this section is a summary of the information shared by the workshop participants about the options.

2.1 Purpose of the project

Roads and Maritime engaged Pacifico (an Acciona and Ferrovial joint venture) to design and build the 20 kilometre Warrell Creek to Nambucca Heads Pacific Highway upgrade. The project involves upgrading the highway to a four lane divided road between the Allgomera deviation, south of Warrell Creek and Nambucca Heads, just south of the railway line.

In response to representations from Nambucca Shire Council and the Macksville Chamber of Commerce, north facing ramps are proposed at North Macksville. This is in addition to the approved interchanges at Warrell Creek and at Bald Hill Road south of Macksville. The proposed ramps would include a northbound on-ramp onto the highway, a southbound off-ramp from the highway and a median crossover facility to enable emergency vehicles (including ambulances stationed at North Macksville) to travel both north and south on the highway.

Inclusion of the north facing ramps and median crossover brings a number of advantages to the Warrell Creek to Nambucca Heads Pacific Highway upgrade, including:

- The ramps would improve connectivity between Macksville and areas to the north, and in particular connectivity between Macksville and Nambucca Heads
- While Macksville is not identified by Roads and Maritime as a Service Centre, addition of the north-facing ramps and appropriate signage would, in conjunction with the Bald Hill Road interchange to the south, allow both northbound and southbound vehicles using the upgraded highway to stop at Macksville with only a short diversion
- The ramps would allow greater utilisation of the infrastructure investment in the section of the Warrell Creek to Nambucca Heads upgrade between Macksville and the Nambucca Heads interchange, about 10 km to the north. By adding the north facing ramps at Macksville, more vehicles will be able to take advantage of safer and faster travel on the upgraded highway to the north
- The ramps would improve access to and from Macksville for emergency services and reduce response times. The northbound entry ramp, in conjunction with the proposed emergency vehicle cross-carriageway access just north of Mattick Road, would provide improved access to a major incident on the upgraded highway south of the Nambucca River

Since these ramps are not currently included in the approved Warrell Creek to Nambucca Heads project, planning approval will need to be obtained before the ramps are built.

Three options for the layout of the north facing ramps and their connections to the road network have been developed following an initial assessment with Roads and Maritime.

Following selection of the preferred option, an assessment of the potential environmental impacts of the preferred location of the ramps and proposed measures to mitigate these impacts will be prepared. The environmental assessment will then be displayed for public comment before planning approval for the proposal is sought.

2.2 Ramp design considerations

Key considerations in the design of the ramps include:

- Traffic performance – a minimum Level of Service “C” for 2036 for the 100th highest hourly volumes
- Geometric design:
  - entry ramps - target truck speed at the end of the ramp of 75 km/h
  - exit ramp - all deceleration to occur in the deceleration lane
- Design Vehicle - allowance for 25m B-Double – to travel between the existing Pacific Highway and the new ramps and though movements at intermediate intersections

- Pavements – Consistent with other Pacific Highway upgrade projects including the use of concrete for roundabouts
- Ultimate layout to accommodate future additional lane in each direction.

2.3 Options descriptions

Three north facing ramp options were developed and the description of each option is outlined below.

2.3.1 Option 1

Option 1 is closely aligned to the approved layout of works for the Project, which includes realignment of the Old Coast Road to pass above the upgraded highway. Option 1 is a comparatively simple addition to the approved layout by adding north facing ramps, which connect as simple T-intersections to the realigned Old Coast Road. At the new intersections priority is given to through traffic on the Old Coast Road.

The existing channelised intersection where Old Coast Road connects to the existing Pacific Highway would be retained. With the lower volume of traffic on the existing highway the existing layout with two lanes northbound and separate right and left turn lanes off the highway would meet capacity requirements.

Diversion of Old Coast Road (MCD0)

The diversion of the Old Coast Road (MCD0) starts about 150 metres north of the existing Pacific Highway on the east side of the main carriageways and extends for about 660 metres before reconnecting to the existing Old Coast Road on the west side of the main carriageways. The horizontal geometry of the diversion does not fully conform to the Project Scope of Works and Technical Criteria (SWTC) requirements:

- Curve radii on the Old Coast Road diversion, from the start of the diversion near the existing highway, are +125m, -105m, +105m and then -340m, with 3% superelevation provided on all curves. The radius of 105 metres is the minimum permitted with 3% superelevation for the design speed of 60 km/h
- The length of tangent between the +125m and -105m radii curves (Ch150 – 180) is 29.3m, which is less than the 60 metres desirable minimum (length required is equal to V) and less than the normal minimum of 0.6V or 36 metres
- The eight metre length of tangent between the +105m and -340m radii curves (Ch584 – 592) is substantially less than the 60 metre desirable minimum
- The length of the horizontal curve from Ch 54 to 152 (98 metres) is marginally below the desirable minimum horizontal curve length of 100 metres.

Geometry issues are further considered where necessary in the road safety audit of the options.

Old Coast Road Bridge over main carriageways

The realigned roadway passes above the main carriageways on a skewed bridge, which is 62 metres long and has one lane plus a minimum one metre wide shoulder in each direction. The bridge itself is unchanged and retains the same horizontal alignment as in the approved design, with the proposed form of the bridge being a two span bridge with twin 1600 deep precast U-girders supported at the abutments and by twin piers in the median.

The tight horizontal geometry as noted above does create some difficulties with the bridge.

The horizontal curve on the east side of the main carriageway extends onto the bridge, and the result is that curve widening and sight line widening is required. The minimum bridge width would be nine metres comprising 2 x 3.5 metre lanes and 2 x 1.0 metre shoulders.

The bridge width as designed varies from 10.2 to 10.7 metres to meet the curve widening requirements and to provide sight lines past the nearside bridge barrier for northbound traffic approaching from the eastern side. It is also noted that the 3% superelevation for the horizontal curve which extends onto the east end of the bridge has been continued across the full length of the bridge to avoid the added complexity of a superelevation transition on the bridge.

Letitia Close T-intersection

The T-intersection with Letitia Close remains unchanged as a simple priority junction. It is located on the outside of a minimum radius horizontal curve. As per SWTC requirements, bus bays/stops are provided in each direction on the realigned Old Coast Road just south of Letitia Close. The design vehicle for turns at the intersection is a 19m semi-trailer.

Southbound exit ramp (MCD1)

The southbound exit ramp (MCD1) comprises a 110 metre long parallel diverge with a further distance of about 300 metres from the linemarking nose to the T-junction where the exit ramp connects to the realigned Old Coast Road.

Option 1 retains the visual mound on the east side as required by the SWTC. With the ramp in place the mound extends from chainage 160 to 320, with the ramp itself effectively extending the mound where it is on fill as it climbs to Old Coast Road.

Most of the ramp beyond the physical nose is climbing at 4.8%, which will assist in deceleration. The ramp fully meets the SWTC guidelines in terms of rate of deceleration but there are some safety issues approaching Old Coast Road:

- Due to the need to match the longitudinal grade on the realigned Old Coast Road there is adverse cross-fall on the 115 metre radius curve that connects the exit ramp. With adverse cross-fall the design speed is about 40 km/h. The adverse cross-fall is undesirable in a braking area and on reverse curves with no tangent between. The safety audit identified the risk as low, however further design development will determine whether it is possible to reduce the risk by introducing superelevation of the first part of the curve
- Due to the need to match the superelevation on the realigned Old Coast Road there is a crest curve just before the intersection. This crest curve hides the intersection layout and pavement markings from the approaching driver. Adopting a shorter crest curve would improve visibility
- The ramp intersection is located on a minimum radius horizontal curve on the realigned Old Coast Road.

The intersection itself with the realigned Old Coast Road is a simple T-junction and traffic from the ramp would be able to turn left or right into Old Coast Road. Due to the comparatively low volumes, no acceleration lanes are proposed. The design vehicle for turns at the intersection is a 25m B-Double.

Northbound entry ramp (MCD2)

The northbound entry ramp (MCD2) has a total length of 876 metres from the intersection with the realigned Old Coast Road to the end of the 110 metre merge taper. Most of the length from the intersection to the physical nose is on a 0.8% down grade, which assists with acceleration.

Typically the cross section of the ramps consists of a 3.5 metre lane with a two metre left hand side shoulder and a one metre right hand side shoulder.

At the northern end of the ramp Option 1 retains the visual mound on the west side as required by the SWTC. The position of the mound is adjusted slightly between Chainage (Ch) 760 and 876 to accommodate the ramp. North of Ch 876 the mound matches the mound in the approved project.

The length of the entry ramp in Option 1 is in accordance with advice from Roads and Maritime, which was to achieve a truck speed of 75 km/h at the start of the 110 metre merge length. The actual speed would be about 74 km/h, with about 100 metre extra length required to achieve 75 km/h. To fully meet the SWTC guidelines which require a truck speed of 85 km/h to be reached at the start of the 110 metre merge length would not be practicable as it would require over one kilometre of additional lane.

The proposed treatment of the intersection with the realigned Old Coast Road at the start of the ramp is a T-junction with a channelised right turn for northbound traffic on Old Coast Road to turn onto the ramp. Due to the comparatively low traffic volumes, a shortened right turn lane is proposed.

It is noted that for the design hourly turning volume of about 40 vehicles per hour, a channelised right-turn would not be required.

The channelised right turn would be safer, especially considering that the intersection is located on a minimum radius curve (R105 metres), and the treatment of this intersection should be reviewed if Option 1 is selected as the preferred option.

The design vehicle for turns at the intersection is a 25m B-Double.

2.3.2 Option 2

Option 2 is a relatively minor variation on Option 1, which aims at overcoming some of the alignment difficulties inherent in Option 1. It still includes realignment of the Old Coast Road to pass above the upgraded highway, and the north facing ramps still connect to the realigned Old Coast Road. The main difference is that the Letitia Close and exit ramp intersections are combined as a roundabout on the east side, allowing the alignment of the bridge over the main carriageways to be straightened.

The other change is that on the west side the priority has been reversed, with access onto the northbound entry ramp given priority over traffic from Old Coast Road central.

The existing channelised intersection where Old Coast Road connects to the existing Pacific Highway would be retained. As with Option 1, the lower volume of traffic on the existing highway means that the existing layout with two lanes northbound and separate right and left turn lanes off the highway would meet capacity requirements.

Diversion of Old Coast Road (MCD0 and MCD2)

The diversion of the Old Coast Road (MCD0 and MCD2) still starts about 150 metres north of the existing Pacific Highway on the east side of the main carriageways and extends for about 660 metres before reconnecting to the existing Old Coast Road central on the west side of the main carriageways. The existing Old Coast Road central connects as a T-junction to Old Coast Road south and its continuation as the entry ramp. The total length of the diversion of Old Coast Road is almost identical to Option 1 but the geometry is somewhat improved:

- Apart from negotiating the intersections, the curve radii are increased, with one 200 metre radius curve on the east side but a minimum 105 metre radius curve remains on the west side
- The roundabout will control speeds and allows a straight connection for the bridge across the main carriageways and through a 105 metre radius right hand before entering the on-ramp northbound.

Old Coast Road Bridge over main carriageways

The realigned roadway passes above the main carriageways on a bridge at a slightly reduced skew compared to Option 1 and located about 70 metres to the south. The bridge form would remain the same as in the approved layout and Option 1, with the proposed form of the bridge still a two span bridge with twin 1600mm deep precast U-girders supported at the abutments and by twin piers in the median.

The length of the bridge would be similar to that in the approved layout and in Option 1. The skew angle (15 degrees) is slightly less than the 21 degree skew of the approved layout and Option 1, but the bridge clearance is increased because the main carriageways are in deeper cut at the revised bridge location. The main advantage of the roundabout is that the bridge can be straight and should not require curve widening or widening for sight lines. Preliminary reviews suggest that the bridge is far enough from the roundabout that the bridge parapets should not affect sight triangles for the roundabout.

Pending detailed design it has been assumed that the Option 2 bridge would be 62 metres long, the same as in the approved layout and Option 1, however the deck area is less because the width would be a constant nine metres comprising 2 x 3.5 metre lanes and 2 x 1.0 metre shoulders.

Letitia Close and roundabout

The T-intersection with Letitia Close in the approved project and in Option 1 is replaced in Option 2 by a connection to the new roundabout. A minor realignment of Letitia Close would be required to connect it to the new roundabout, which provides safe and convenient access to Letitia Close from all directions. The proposed roundabout has an 11 metre radius central island and a 20 metre radius inscribed circle, and is designed for B-Double access to and from the ramps.

Bus bays/stops are provided in each direction on the realigned Old Coast Road just south of the roundabout.

Southbound exit ramp (MCD1)

The Option 2 southbound exit ramp (MCD1) comprises a 110 metre long parallel diverge with a further distance of about 350 metres from the linemarking nose to the roundabout where the exit ramp connects to the Old Coast Road roundabout.

Option 2 retains the visual mound on the east side as required by the SWTC. With the ramp in place the mound extends from Ch 170 to 390, with the ramp itself effectively extending the mound where it is on fill as it climbs to the Old Coast Road roundabout.

Most of the ramp beyond the physical nose is climbing at 4.0%, which will assist in deceleration. The ramp fully meets the SWTC guidelines in terms of rate of deceleration and the roundabout approach has improved visibility and safety compared to Option 1.

Northbound entry ramp (MCD3)

The northbound entry ramp (MCD3) has a total length of 870 metres from the intersection with the realigned Old Coast Road to the end of the 110 metre merge taper. Most of the length from the intersection to the physical nose is on a 0.9% down grade which will assist with acceleration.

Typically the cross section of the ramps consists of a 3.5 metre lane with a two metre left hand side shoulder and a one metre right hand side shoulder.

At the northern end of the ramp Option 2 retains the visual mound on the west side as required by the SWTC. The position of the mound is adjusted slightly between Ch 1040 and 1200 to accommodate the ramp. North of Ch 1200 the mound matches the mound in the approved project.

The length of the entry ramp in Option 2 is in accordance with advice from Roads and Maritime, which was to achieve a truck speed of 75 km/h at the start of the 110 metre merge length. The actual speed achieved using Figure 9.11 of Appendix 9 of the SWTC would be about 75 km/h for the majority of trucks, which would approach from the Old Pacific Highway and have priority as they enter the ramp. On the west side of the upgrade, the central portion of the existing Old Coast Road connects as a T-junction to realigned Old Coast Road south and its continuation as the entry ramp.

The proposed treatment of this intersection is a priority controlled T-junction with priority given to northbound entry ramp traffic over southbound traffic from Old Coast Road central.

Due to the comparatively low turning traffic volumes, no channelised left turn lane is shown. The design hourly turning volume of about 29 vehicles per hour and low through volume (42 vehicles per hour) do not warrant a channelised left turn.

However, a channelised left turn would be safer, especially considering that the intersection is located at the start of the onramp where vehicles may be travelling at higher speeds and/or accelerating, this can be developed further during detailed design.

The design vehicle for turns at the intersection with Old Coast Road is a 19m semi-trailer.

2.3.3 Option 3

Option 3 is quite different from Options 1 and 2. Rather than realigning the Old Coast Road onto a new bridge above the carriageway, a new connection for the Old Coast Road is provided on the west side of the main carriageways. This connection provides a two-way link between the existing Pacific Highway and the existing Old Coast Road to the north.

Connectivity to Letitia Close is retained by maintaining the redundant section of the Old Coast Road to the east of the main carriageways.

With these connections to the existing Pacific Highway available on both sides of the main carriageways, the north facing ramps can be added on each side north of the Letitia Close and Old Coast Road central connections.

While this option requires the construction of a new connecting road on the west side of the existing highway, it avoids the need to construct a bridge to carry Old Coast Road above the main carriageways.

The existing channelised intersection where the redundant section of the Old Coast Road connects to the existing Pacific Highway would be retained. As with the other options the lower volume of traffic on the existing highway means that the existing layout with two lanes northbound and separate right and left turn lanes off the highway would meet capacity requirements.

Letitia Close and exit ramp connection

The realignment of the redundant section of the Old Coast Road is similar to Option 1 but is located closer to the main carriageway. The cross section adopted for the realignment consists of a 2 x 3.5 metre lanes with a one metre shoulder on each side. The extent of works is approximately 300 metres to intersect with Letitia Close and the exit ramp. Letitia Close still connects as a T-junction with priority given to traffic from the exit ramp.

All northbound vehicles from the existing Pacific Highway would be required to turn right into Letitia Close, and the right turn is channelised to direct vehicles accordingly and minimise the risk of vehicles inadvertently entering the exit ramp. No Entry signage would be required at the exit ramp connection. The design vehicle for turns at the intersection is a 19m semitrailer.

One potential issue with the arrangement shown is that Safe Intersection Sight Distance looking towards the exit ramp is restricted by the safety barrier on the inside of the exit ramp curve, and further assessment would be required if this option is selected.

To meet the SWTC requirements a bus stop facility is proposed in this location to service Letitia Close. Unlike Options 1 and 2 however, this option does not provide a continuation across the proposed Pacific Highway so the bus bays/stops have been combined into a bus turnaround facility at the new intersection. This facility could also be used by other vehicles when necessary as a U-turn facility. The channelised right turn arrangement shown would make it easier for buses to use the bus loop that has been provided to allow buses to return to the existing Pacific Highway. If Option 3 is selected then further discussions would need to be held with the bus operator(s) to confirm the proposed layout.

The design shows a short left turn lane into Letitia Close for southbound vehicles on the exit ramp but due to the low volume of left turning traffic (one vehicle per hour) the separate lane would not be warranted.

It is recommended that the need for this left turn lane should be further reviewed if Option 3 is selected as the preferred option.

Southbound exit ramp (MCD1)

The Option 3 southbound exit ramp (MCD1) comprises a 110 metre long parallel diverge with a further distance of about 370 metres from the linemarking nose to the T-junction with Letitia Close.

Option 3 retains the visual mound on the east side as required by the SWTC. With the ramp in place the mound extends from Ch 540 to 710, with the ramp itself effectively extending the mound where it is on fill as it climbs to the Letitia Close intersection.

The latter part of the ramp is climbing at 4.0%, which will assist in deceleration. The ramp fully meets the SWTC guidelines in terms of rate of deceleration and visibility to the ramp terminal junction.

Realignment of Old Coast Road (MCN0)

The realignment of the Old Coast Road (MCN0) starts just west of where the main carriageways pass above the existing Pacific Highway on the Nambucca River bridge structures. The realignment is about 400 metres long and requires cuts and fills of up to about seven metres.

The cross section adopted for the realignment consists of a 2 x 3.5 metre lanes with a one metre shoulder on each side.

Sections of the Old Coast Road realignment are within 25 metres of the edge line of the main carriageway and are therefore likely to require planting or screens to minimise headlight glare.

At the southern end a new intersection would be provided off the existing Pacific Highway just to the west of the main carriageways and about 80 metres east of the Nursery Road intersection, which is on the other side of the highway. The proposed treatment of the intersection of the realigned Old Coast Road with the existing Pacific Highway is a priority T-Junction with channelised right turn and left turn lanes on the highway. The left turn lane into the realigned Old Coast Road is warranted, by the volume of left turning traffic.

While the volume of right turn traffic from the highway into the realigned Old Coast Road is very low, a short right turn lane has been proposed for safety and consistency with intersection treatments on the existing Pacific Highway in the vicinity. It is recommended that the layout of this intersection should be further reviewed if Option 3 is selected as the preferred option.

Due to the proximity of the new carriageways and bridge abutments, it is likely that a retaining wall up to about 40 metres long (MCN0 chainage 30 to 70 approx.) and 4 metres high will be required to keep fill from the main carriageways at the Nambucca River bridge abutment from extending onto the realigned Old Coast Road. Without this wall it is likely that the realigned Old Coast Road would have to be shifted further west and additional property acquisition would be required.

At the northern end a new intersection would be provided to connect the realigned Old Coast Road south with Old Coast Road central and the start of the one-way entry ramp. The proposed treatment of the intersection is for the through movement onto the entry ramp to have priority while Old Coast Road central is realigned slightly to connect as a T-junction. A short left turn lane into Old Coast Road central is shown even though it is not warranted by the volume (29 vehicles per hour) of left turning traffic.

The short left turn lane has been shown for safety reasons considering that through vehicles will be accelerating in anticipation of the start of the entry ramp. It is recommended that the layout of this intersection and the need for this left turn lane should be further reviewed if Option 3 is selected as the preferred option. The design vehicle for turns at the intersection is a 19m semi-trailer.

No provision has been made for bus bays/stops on the realigned Old Coast Road on the west side of the main carriageways as this is not a requirement of the SWTC. Provision for buses has been made at Letitia Close on the east side of the main carriageways.

Northbound entry ramp (MCD3)

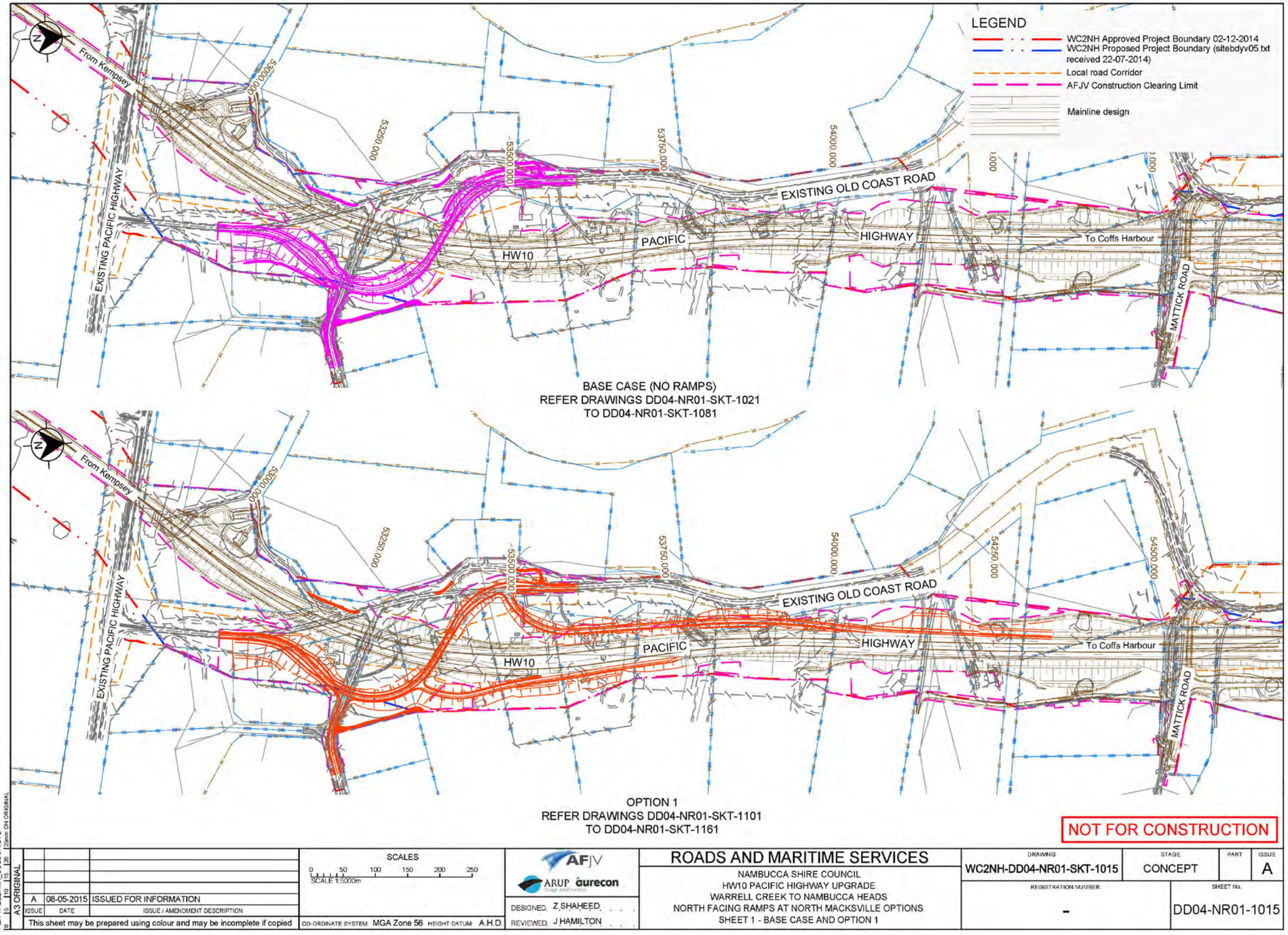
The northbound entry ramp (MCD3) has a total length of 940 metres from the intersection with the realigned Old Coast Road central to the end of the 110 metre merge taper. From the start of the ramp the grade climbs for 100 metres at about +2% to a crest, then falls at -3.5% for 200 metres to a low point, then climbs again at about +1% for the remainder.

The length of the entry ramp in Option 3 is broadly in accordance with advice from Roads and Maritime, which was to achieve a truck speed of 75 km/h at the start of the 110 metre merge length. The actual speed achieved using Figure 9.11 of Appendix 9 of the SWTC would be about 73 km/h for the majority of trucks which would approach from the Old Pacific Highway and have priority as they enter the ramp. For a truck turning the left from Old Coast Road, the truck speed achieved would be about 69 km/h. To fully meet the SWTC guidelines of 85 km/h for trucks from the Old Pacific Highway would not be practicable as it would require over 1km of additional lane.

Another difficulty with the entry ramp is that the merge area is poorly positioned at the end of a left hand curve on the main carriageway. This makes it more difficult for an entering driver on the ramp to see approaching vehicles on the highway, and to judge the length of approaching multi-combination vehicles. This difficulty has been addressed by extending the length of the merge area from the minimum 120 metres (four seconds of travel time). The actual length provided with the Option 3 layout is about 450 metres, equivalent to about 15 seconds of travel time. Given that the horizontal curve ends just before the merge starts this extended parallel lane provides drivers of entering vehicles more time to view vehicles in the adjacent lane, select a gap and merge safely, and is considered a safe arrangement.

The northern end of the Option 3 ramp ends just before the visual mound on the west side that is required by the SWTC. The mound would not be affected.

2.4 Ramp options designs



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AFJV
ARUP aurecon

DESIGNED: Z.SHAHEED
REVIEWED: J HAMILTON

ROADS AND MARITIME SERVICES

NAMBUCCA SHIRE COUNCIL
HW10 PACIFIC HIGHWAY UPGRADE
WARRELL CREEK TO NAMBUCCA HEADS
NORTH FACING RAMPS AT NORTH MACKSVILLE OPTIONS
SHEET 1 - BASE CASE AND OPTION 1

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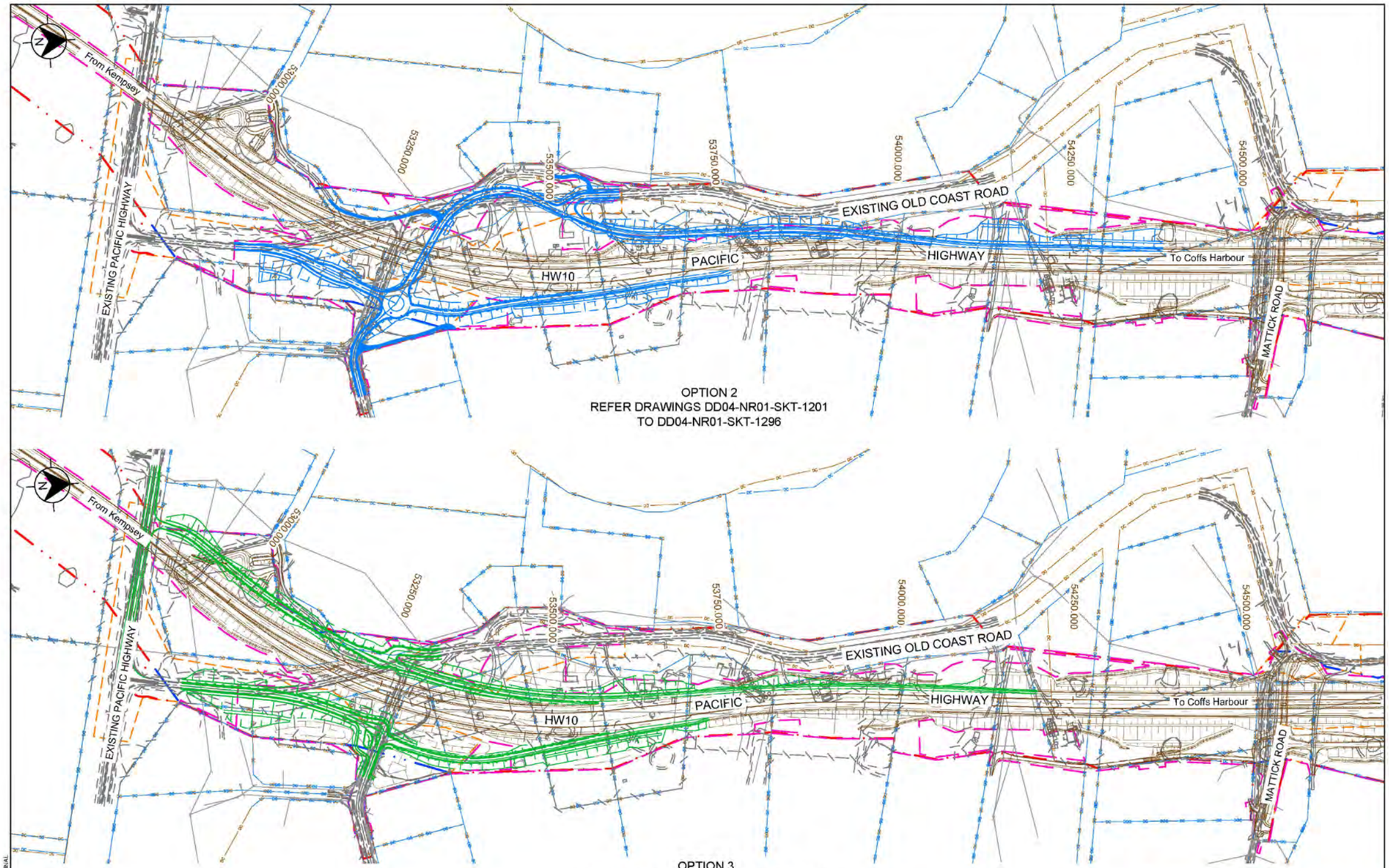

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SCALE 1:5000m

CO-ORDINATE SYSTEM: MGA Zone 56 HEIGHT DATUM: A.H.D.

AFJV
ARUP aurecon
DESIGNED: Z.SHAHEED
REVIEWED: J.HAMILTON

ROADS AND MARITIME SERVICES

NAMBUCCA SHIRE COUNCIL
HW10 PACIFIC HIGHWAY UPGRADE
WARRELL CREEK TO NAMBUCCA HEADS
NORTH FACING RAMPS AT NORTH MACKSVILLE OPTIONS
SHEET 2 - OPTIONS 2 AND 3

DRAWING	STAGE	PART	ISSUE
WC2NH-DD04-NR01-SKT-1016	CONCEPT		A

REGISTRATION NUMBER: -

SHEET No.: DD04-NR01-1016

3. Options assessment criteria

The purpose of the assessment was to differentiate between the options rather than undertake an absolute assessment of all project criteria for each option – so only those criteria that highlighted differences were considered in this particular assessment.

The agreed criteria are noted below in **Table 3-1** and following group discussion a weighting was agreed as indicated.

Table 3-1 Assessment criteria and weighting

Criteria	Descriptive Aspects	Weighting
Constructability & Timing	Program impacts and risks	35%
	Staged construction of ramps	
	Traffic / accessibility disruptions	
	Bridge roadworks impacts (changes of scope / approved layout design)	
Functionality (Traffic Efficiency & user safety)	Attractiveness to users	30%
	Impacts on travel times / road operations	
	School bus	
	Road user safety	
	Road / bridge maintainers' safety	
Community Impacts	Additional land acquisition	25%
	Local enterprises, shops and services	
	Agribusinesses	
	River / marine activities	
	Emergency events	
	Noise	
	Light impacts on residences	
	Headlight intrusion	
	Visuals	
	Severance	
Environmental Impacts	Water quality & flooding	10%
	Flora & fauna	
	Heritage	
Capital & Operating Costs*		

Scoring for each of the options is relative to the approved layout which is the highway upgrade without the north facing ramps at North Macksville.

The scoring scale selected – from -5 to +5 was to acknowledge that some factors, for certain options had negative impacts rather than positive impacts compared to the approved layout.

These were used as prompts to identify and propose any mitigation measures or improvements in the option – so that any assessment would be based on optimised options.

4. Options assessment

Criteria	Descriptive Aspects	Weighting	Option 1		Option 2		Option 3	
Constructability & Timing	Program impacts & risks	35%	-1	This option will cause a minor delay to the overall project but can be managed by staging the construction.	-1	This option will cause a minor delay to the overall project but can be managed by staging the construction.	-5	Planning and approval risks with need to acquire more land for this option. Less complex construction program without a bridge for this option – especially for earthworks but needs some soft soil treatments and settling that would offset potential gains to the program.
	Staged construction of ramps		2	Construction of ramps can be staged as a bridge will be constructed over the highway.	2	Construction of ramps can be staged as a bridge will be constructed over the highway.	0	No opportunity to stage construction as a bridge will not be constructed.
	Traffic / accessibility disruptions		0	Minimal disruption to local traffic is expected with this option.	-1	Slightly more disruptive due to the construction of a roundabout at Letitia Close as this takes longer than a standard T intersection.	0	Minimal disruption to local traffic is expected with this option.
	Bridge and/or roadworks impacts (changes of scope / approved layout)		-3	This option needs 38,000 cubic metres of additional material to construct the embankments as compared to the approved layout.	-2	This option requires 15,000 cubic metres additional material to construct the embankments as compared to the approved layout.	-3	This option has a surplus of 36,800 material that would need to be disposed of as compared to the approved layout.
	Total Score		**-2**	**Weighted Score: -70**	**-2**	**Weighted Score: -70**	**-8**	**Weighted Score: -280**
	General Assessment Comments		The contract for the design and construction of this section of the highway has already been let – so the design and installation of the new ramps will involve negotiating a contract variation. There will be an impact on the construction program – to allow for design to be completed but also for planning approval from Department of Planning and the Environment. The timing of the ramps is ideally set to coincide with the opening of the motorway – not as a later addition – so they need to integrate with the bridge and roadworks. Options 1 and 2 are similar with the same weighted score. Options 1 and 2 performed substantially better than Option 3. Construction of Option 2 would be slightly more disruptive than Options 1 and 3 due to longer time required for construction of roundabout. Option 2 provides the best earthworks balance of the three options.					
Functionality (Traffic Efficiency & user safety)	Attractiveness to users	30%	4	Attractiveness to road users, same for all options.	4		4	
	Impacts on travel times / road operations		3	Impacts on travel times, same for all options.	3		3	
	School bus		1	Enhanced school bus facility provided with this option.	1	Enhanced school bus facility provided with this option.	-1	Only effect on school bus is option 3 – a longer route to collect Letitia close school children.
	Road user safety		-3	Layout of Option 1 has issues including adverse crossfall and poor coordination of curves on the off ramp that cannot be designed out. Three back to back curves at near minimum radii, tangent length between curves less than desirable minimum. Possible issues with the visibility of linemarking at the intersection of the off ramp and Old Coast Road.	-1	Roundabouts tend to have low-speed incidents, but more of them compared to other intersections. Better geometric layout than Option 1 with only one curve at minimum radius.	-4	Additional intersection with the old Pacific Highway is an increased safety risk.
	Road / bridge maintainers safety		-1	Normal risks associated with bridge maintenance.	-1	Normal risks associated with bridge maintenance.	1	No bridge to inspect and therefore safer.
	Total Score		**4**	**Weighted Score: +120**	**6**	**Weighted Score: +180**	**3**	**Weighted Score: +90**

Criteria	Descriptive Aspects	Weighting	Option 1		Option 2		Option 3	
	General Assessment Comments		Option 2 performed best for road safety and delivers a better road solution for functionality and more important long-term characteristics for road operations. Option 2 better caters for traffic growth as compared to option 1 – especially with a roundabout. Overall Option 1 performed better than Option 3 against functionality criteria.					
Community Impacts	Additional land acquisition	25%	0	No land acquisition needed	0	No land acquisition needed	-3	Additional land acquisition is required to allow for the proposed intersections with the Pacific highway and the Old Coast road.
	Local enterprises, shops and services		4	All options are good at attracting traffic to commercial interests in Macksville	4		4	
	Agribusinesses		0	No option affects agribusiness	0		0	
	River / marine activities		0	No option affects river or marine activities	0		0	
	Emergency events		3	All options improve accessibility for emergency events and incidents	3		3	
	Noise		-1	Will be some extra traffic noise due to increased traffic	-2	Slightly worse effects of noise from this option due to increased traffic and roundabout.	-1	Will be some extra traffic noise due to increased traffic.
	Light impacts on residences		-1	Only additional flag lighting required	-2	Lighting for the roundabout – because it is close to homes and it will have lights in an area where there is currently no lighting.	-2	Similar rating to option 2 re lighting impacts - Option 3 will have lighting around the intersections and the new bus bay, which is also closer to residences.
	Headlight intrusion		-1	Some headlight impact from the ramps and bend on Old Coast Road	-1	Some headlight impact from the ramps and roundabout.	0	Similar headlight impact to the approved project.
	Visuals		-1	Bridge has a negative impact on the appearance of the road	-1	Bridge has a negative impact on the appearance of the road	1	Improved appearance due to removal of the bridge
	Severance		0	There is no additional severance with this option.	0	There is no additional severance with this option.	-3	This option cuts Letitia Close from Old Coast Road.
	Total Score		**3**	**Weighted Score: +75**	**1**	**Weighted Score: +25**	**-1**	**Weighted Score: -25**
	General Assessment Comments		Noise modelling indicates no discernible change in noise impacts to receivers for all 3 options. There would need a doubling of traffic to create a 2 dB change in noise impact, which is the level that becomes discernible to the receivers. There will be some variation of noise during the different times of the day and increases when heavy vehicles use the ramps and intersections. A roundabout, as proposed in Option 2 is generally more noisy compared to a T-intersection and Options 1 & 2 may have traffic queuing – which generate braking and gear change noise. Option 2 with a roundabout better caters for traffic growth than options 1 or 3. Overall Option 1 performs best for community impacts followed by Option 2 and Option 3.					
Environmental Impacts	Water quality & flooding	10%	-1	More pavement area than the current approved project	-1	More pavement area than the current approved project	-2	This option has the most pavement area which increases runoff from pavement
	Flora & fauna		-2	Moderate clearing required	-3	Most clearing required	-1	Less clearing required
	Heritage		0	No impact on heritage	0	No impact on heritage	-1	Increased risk of finding a heritage item due to increased acquisition
	Total Score		**-3**	**Weighted Score: -30**	**-4**	**Weighted Score: -40**	**-4**	**Weighted Score: -40**
	General Assessment Comments		No difference in flooding effects or management between the options. Water quality – all involve some extra pavement and required detention capacity. Option 3 marginally worse than the others due to additional pavement areas involved. Flora / fauna – all three impact larger areas and habitats – each results in a slightly different mix in what is being impacted. Need to go back to Commonwealth to outline the changes in the mix that the project will impact for the preferred option.					

Criteria	Descriptive Aspects	Weighting	Option 1	Option 2	Option 3
Overall conclusions			The NSW Government has made the commitment to provide the ramps. Option 3 is not a viable strategy compared to the others – it scores significantly worse in all aspects of constructability and timing. Community expectations are important to address in the solution and its implementation strategy, including necessary consultation.		
TOTAL WEIGHTED SCORES			**+95**	**+95**	**-225**
Capital & Operating Costs1			Not considered in this assessment as task to develop costs and define any effects on operating costs not yet complete – a risk-based assessment of costs also needed here.		

[1] Please note that this workshop only used the qualitative (non-price) criteria as preliminary estimated costs for the three options were similar and cost information was indicative only at the date of the workshop. Cost estimates still needing some inclusions and exclusions to be defined. Cost estimates to be updated to include any agreed improvements and latest risk-based pricing.

5. Assessment conclusions

5.1 Preferred option

As Option 1 and 2 scored equally in the assessment, the workshop then looked at each criteria and descriptive aspect of these two options in more detail to determine the preferred option. Option 2 was chosen as the preferred option as:

- It was assessed as better than Option 3 for the Constructability and Timing Criteria and equal to Option 1
- It was assessed as the best option for the Functionality Criteria (traffic efficiency and road user safety). In particular is was the preferred option as:
  - It scored highest in road user safety
  - It best caters for traffic growth and long term functionality
- It was assessed as having less Community Impacts than Option 3 but more noise and light impacts (due to the roundabout) than Option 1
- It was assessed as having less Environmental Impacts that Option 3 however it has slightly greater environmental impacts than Option 1 due to additional clearing of native vegetation.

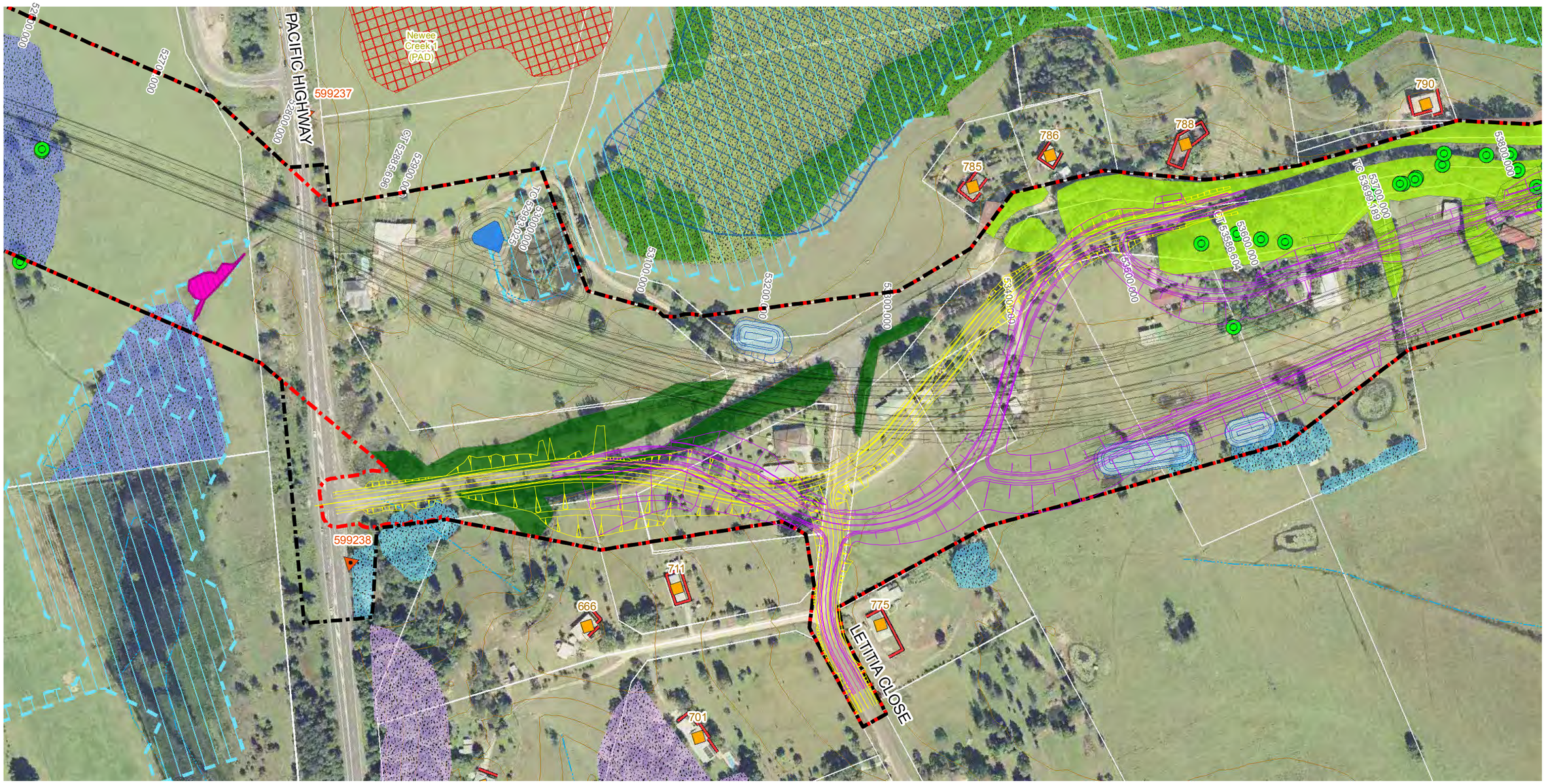
In summary Option 2 was chosen as the preferred option as it is the safest option and improves functionality and road alignment, and is the best option for the long term performance of the ramps.

During the workshop a number of improvement opportunities were identified, these could be adopted in the design and construction phases to reduce impacts. These improvement opportunities include:

- Earth mounds and screenings – would help to address headlight intrusion; e.g. use surplus soil to create a mound between the roundabout and residences. Also in the area between highway and the ramp, if possible
- Review options to minimise vegetation impacts
- Review road design to increase the skew of the bridge
- Plantings on top of the mounds to increase natural screening.

Appendix C

Sensitive area plans



Concept design
Option 1 ramps
Proposed project boundary (16/06/2015)
Approved Project boundary # (edited at Northern end)
5m contours
20yr ARI flood
Natural drainage
SEPP14 wetland

Stormwater management
Drainage basin (Permanent)
Drainage basin (Temporary)

Heritage
Archaeological PAD/Site

Acoustic
Facade treatments to noise receivers
Sensitive noise receiver

Vegetation Community (EEC)
Freshwater Wetlands (EEC)
Swamp Forest - Swamp Mahogany/ Paperbark EEC
Swamp Oak Forest (EEC)
Saltmarsh EEC

Vegetation Community
Moist Open Forest - White Mahogany - Grey Gum
Regrowth Swamp Oak

Hollow-bearing tree/Habitat tree
Microbat roost site/habitat
Persicaria elatior

 # denotes: Project boundary based on WC2NH_Approved_Project_Boundary_20141202_V2.shp received 02/12/2014, and adjusted to suit survey accurate cadastre (edited at Northern end)

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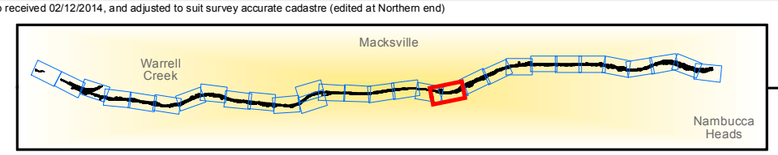

PACIFIC HIGHWAY UPGRADE **WC2NH**
North Facing Ramps at North Macksville – Preferred Option Report

Projection: GDA 1994 MGA Zone 56
Source: AFJV, RMS, AADJV, Geolink, Benwell

FIGURE: Option 1
Sensitive Area Plans (Map 1 of 2)

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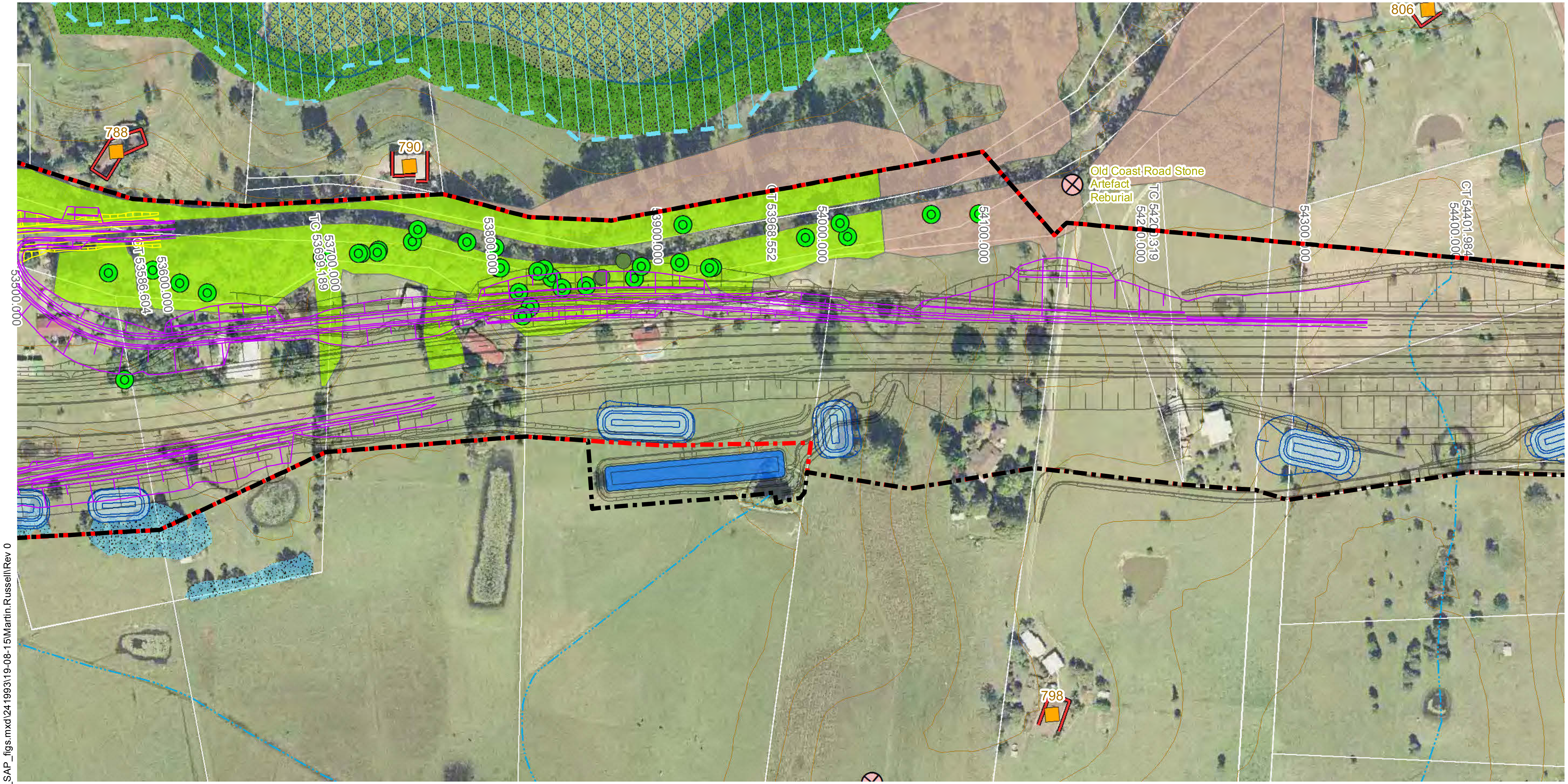

Concept design
Option 1 ramps
Proposed project boundary (16/06/2015)
Approved Project boundary # (edited at Northern end)
5m contours
20yr ARI flood
Natural drainage
SEPP14 wetland

Stormwater management
Drainage basin (Permanent)
Drainage basin (Temporary)

Heritage
Archaeological PAD/Site
WC2NH_Identified_points_edit

Acoustic
Facade treatments to noise receivers
Sensitive noise receiver

Vegetation Community (EEC)
Swamp Forest - Swamp Mahogany/ Paperbark EEC

Vegetation Community
Moist Open Forest - White Mahogany - Grey Gum
Open Forest - Blackbutt
Marsdenia longiloba
Hollow-bearing tree/Habitat tree

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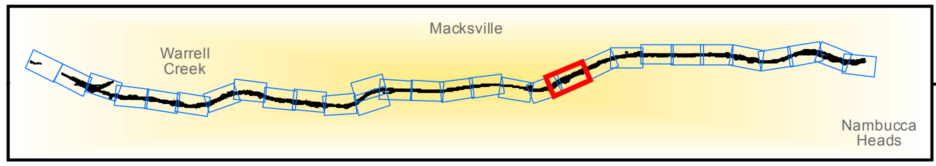
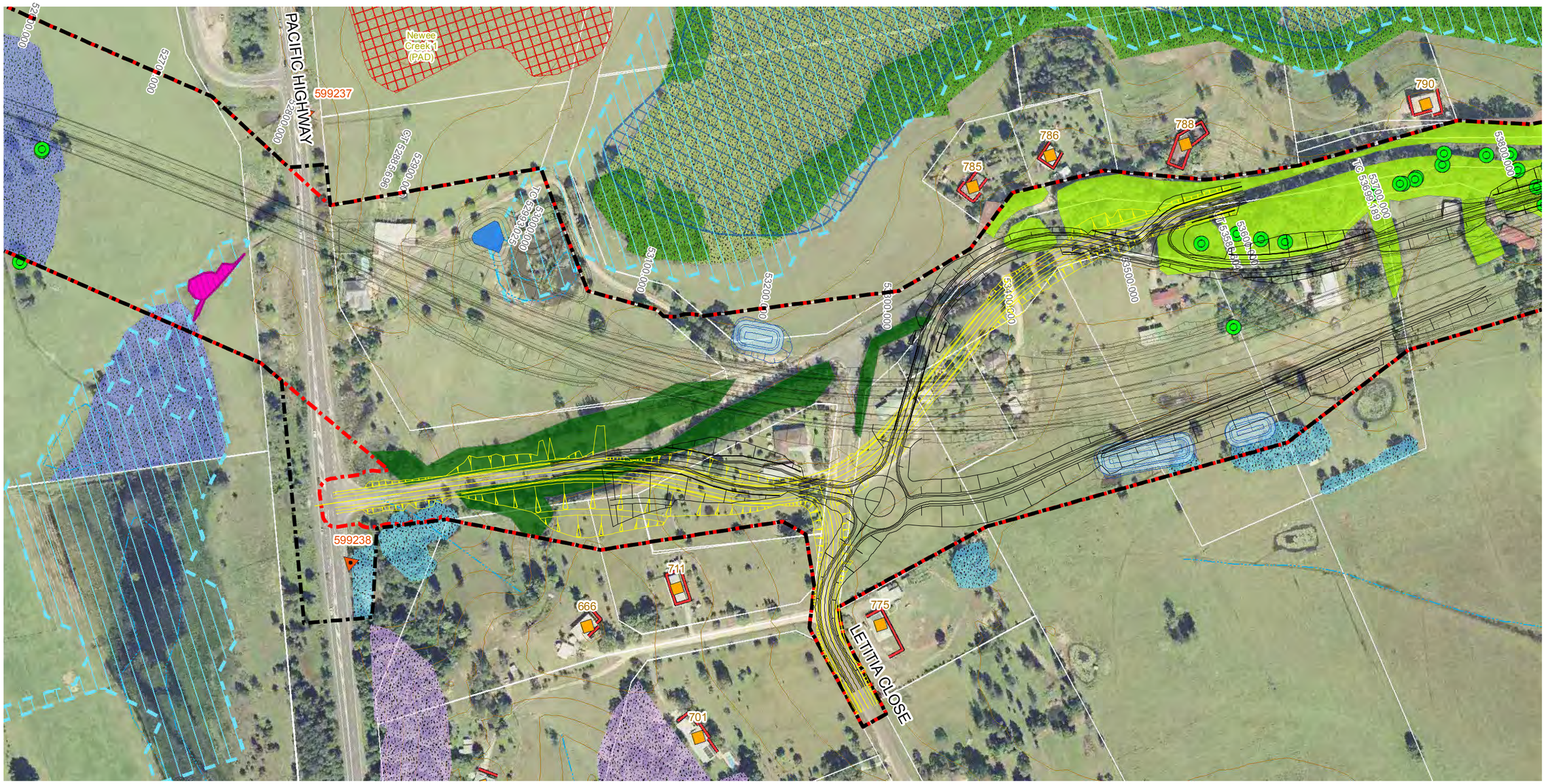


PACIFIC HIGHWAY UPGRADE **WC2NH**
North Facing Ramps at North Macksville – Preferred Option Report

Projection: GDA 1994 MGA Zone 56
Source: AFJV, RMS, AADJV, Geolink, Benwell

FIGURE: Option 1
Sensitive Area Plans (Map 2 of 2)



Concept design
Option 2 ramps
Proposed project boundary (16/06/2015)
Approved Project boundary # (edited at Northern end)
5m contours
20yr ARI flood
Natural drainage
SEPP14 wetland

Stormwater management
Drainage basin (Permanent)
Drainage basin (Temporary)

Heritage
Archaeological PAD/Site

Acoustic
Facade treatments to noise receivers
Sensitive noise receiver

Vegetation Community (EEC)
Freshwater Wetlands (EEC)
Swamp Forest - Swamp Mahogany/ Paperbark EEC
Swamp Oak Forest (EEC)
Saltmarsh EEC

Vegetation Community
Moist Open Forest - White Mahogany - Grey Gum
Regrowth Swamp Oak

Hollow-bearing tree/Habitat tree
Microbat roost site/habitat
Persicaria elatior

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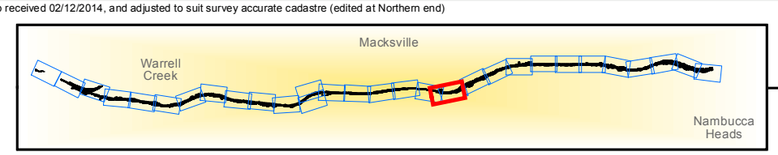

PACIFIC HIGHWAY UPGRADE **WC2NH**
North Facing Ramps at North Macksville – Preferred Option Report

Projection: GDA 1994 MGA Zone 56
Source: AFJV, RMS, AADJV, Geolink, Benwell

FIGURE: Option 2
Sensitive Area Plans (Map 1 of 2)

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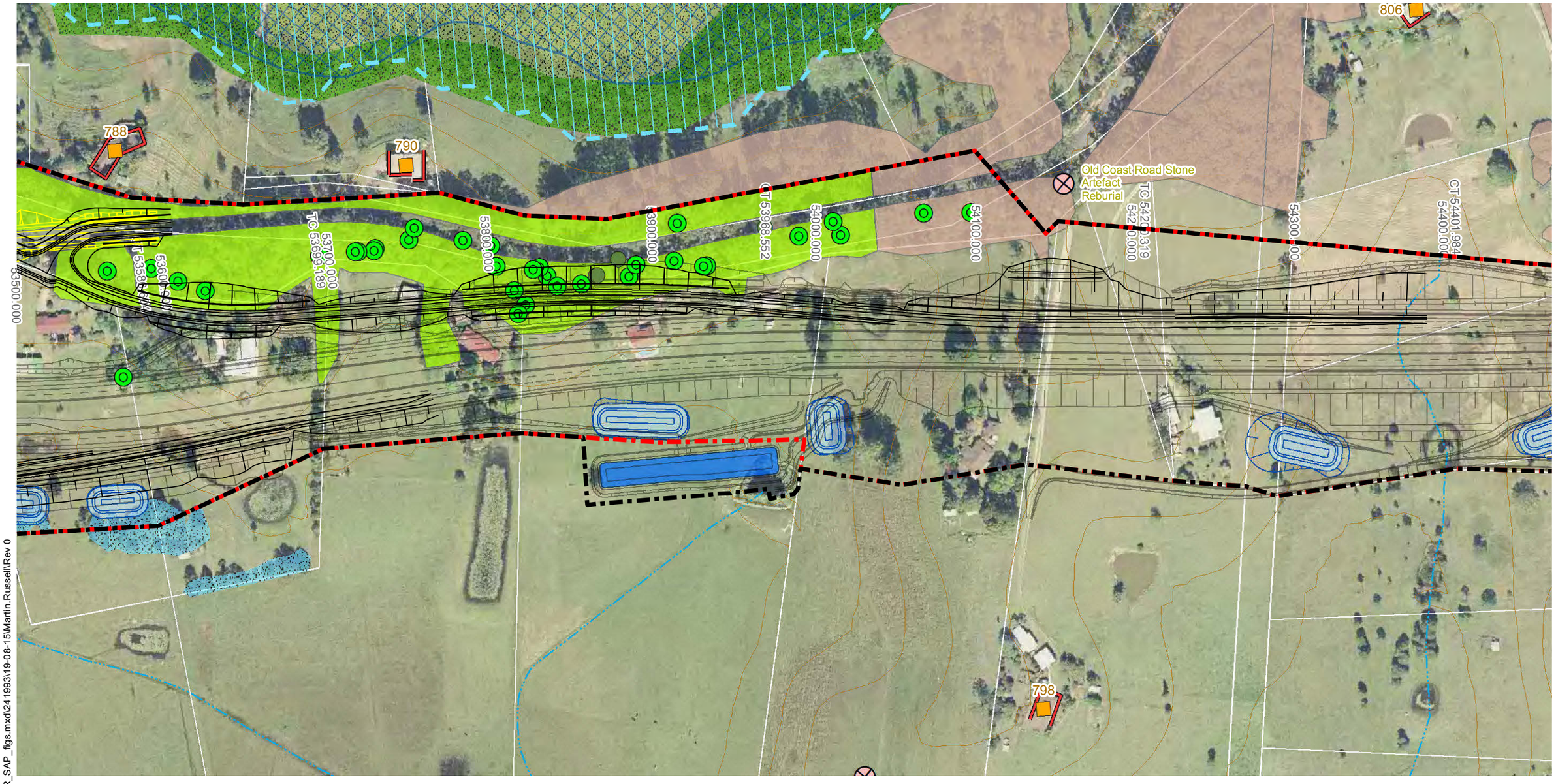

Concept design
Option 2 ramps
Proposed project boundary (16/06/2015)
Approved Project boundary # (edited at Northern end)
5m contours
20yr ARI flood
Natural drainage
SEPP14 wetland

Stormwater management
Drainage basin (Permanent)
Drainage basin (Temporary)

Heritage
Archaeological PAD/Site
WC2NH_Identified_points_edit

Acoustic
Facade treatments to noise receivers
Sensitive noise receiver

Vegetation Community (EEC)
Swamp Forest - Swamp Mahogany/ Paperbark EEC

Vegetation Community
Moist Open Forest - White Mahogany - Grey Gum
Open Forest - Blackbutt
Marsdenia longiloba
Hollow-bearing tree/Habitat tree

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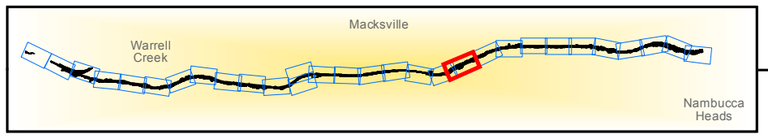

Projection: GDA 1994 MGA Zone 56
Source: AFJV, RMS, AADJV, Geolink, Benwell

PACIFIC HIGHWAY UPGRADE **WC2NH**
North Facing Ramps at North Macksville – Preferred Option Report

FIGURE: Option 2
Sensitive Area Plans (Map 2 of 2)

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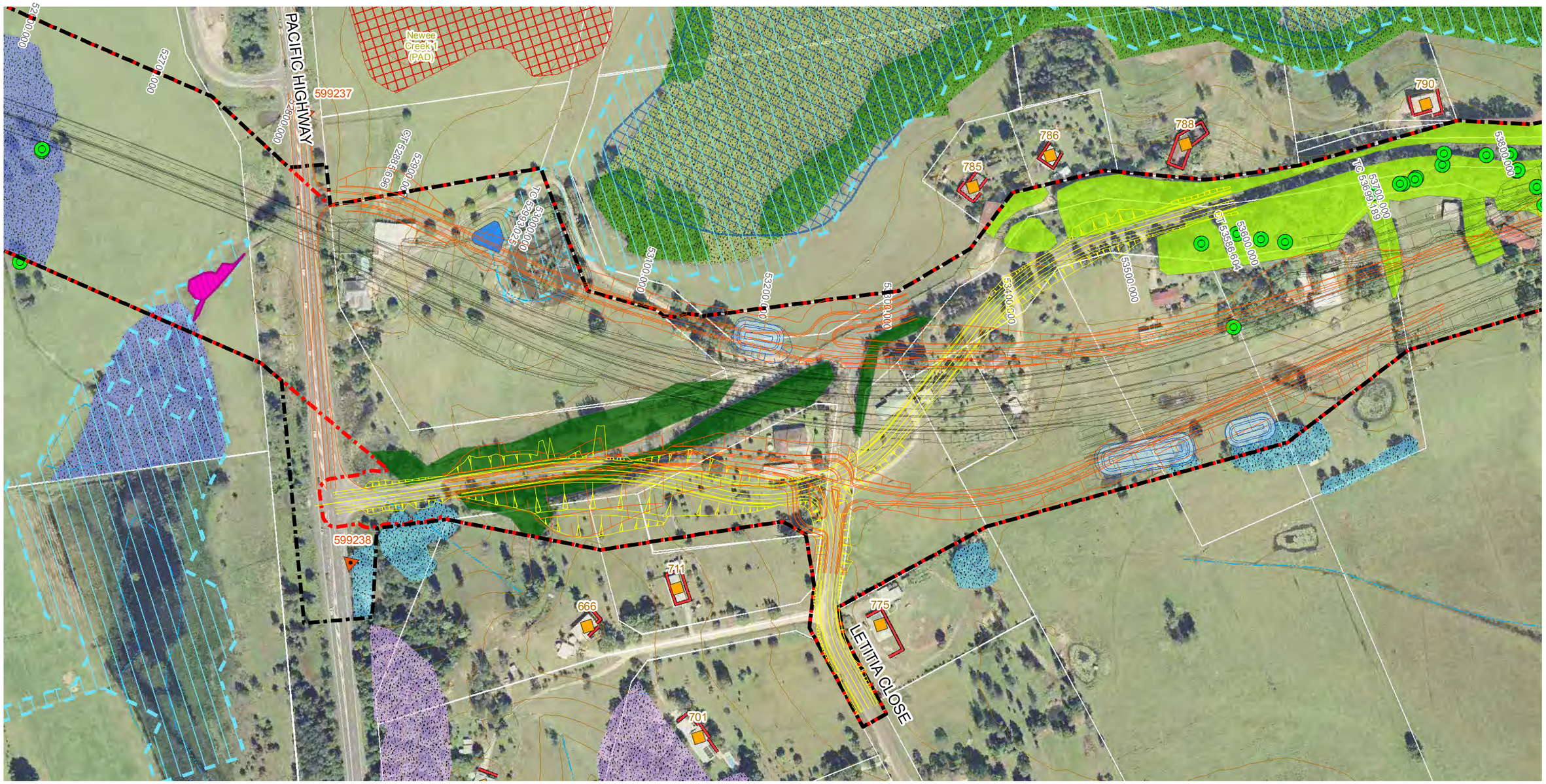

Concept design
Option 3 ramps
Proposed project boundary (16/06/2015)
Approved Project boundary # (edited at Northern end)
5m contours
20yr ARI flood
Natural drainage
SEPP14 wetland

Stormwater management
Drainage basin (Permanent)
Drainage basin (Temporary)

Heritage
Archaeological PAD/Site

Acoustic
Facade treatments to noise receivers
Sensitive noise receiver

Vegetation Community (EEC)
Freshwater Wetlands (EEC)
Swamp Forest - Swamp Mahogany/ Paperbark EEC
Swamp Oak Forest (EEC)
Saltmarsh EEC

Vegetation Community
Moist Open Forest - White Mahogany - Grey Gum
Regrowth Swamp Oak

Hollow-bearing tree/Habitat tree
Microbat roost site/habitat
Persicaria elatior

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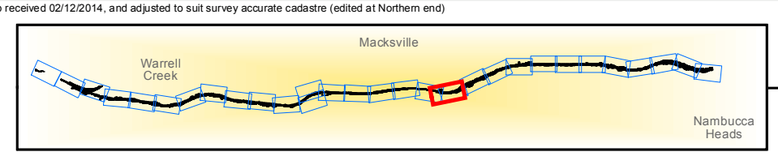

PACIFIC HIGHWAY UPGRADE **WC2NH**
North Facing Ramps at North Macksville – Preferred Option Report

Projection: GDA 1994 MGA Zone 56
Source: AFJV, RMS, AADJV, Geolink, Benwell

FIGURE: Option 3
Sensitive Area Plans (Map 1 of 2)

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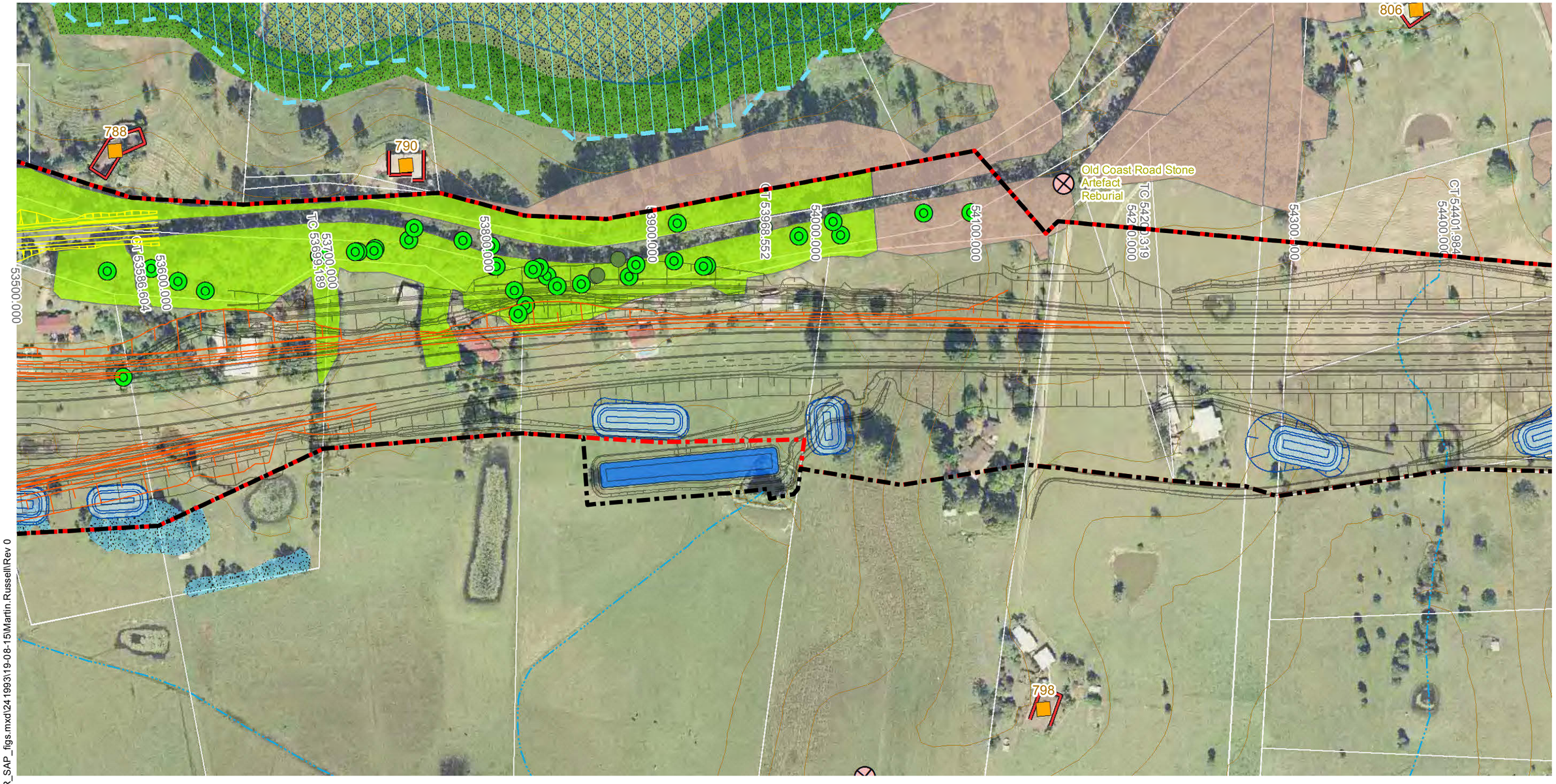

Concept design
Option 3 ramps
Proposed project boundary (16/06/2015)
Approved Project boundary # (edited at Northern end)
5m contours
20yr ARI flood
Natural drainage
SEPP14 wetland

Stormwater management
Drainage basin (Permanent)
Drainage basin (Temporary)

Heritage
Archaeological PAD/Site
WC2NH_Identified_points_edit

Acoustic
Facade treatments to noise receivers
Sensitive noise receiver

Vegetation Community (EEC)
Swamp Forest - Swamp Mahogany/ Paperbark EEC

Vegetation Community
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Open Forest - Blackbutt
Marsdenia longiloba
Hollow-bearing tree/Habitat tree

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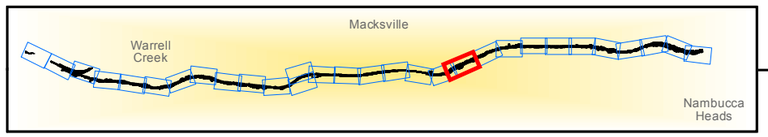

Projection: GDA 1994 MGA Zone 56
Source: AFJV, RMS, AADJV, Geolink, Benwell

PACIFIC HIGHWAY UPGRADE **WC2NH**
North Facing Ramps at North Macksville – Preferred Option Report

FIGURE: Option 3
Sensitive Area Plans (Map 2 of 2)

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Appendix D

Refined preferred option design

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PACIFIC HIGHWAY

LETITIA CLOSE

Newee Creek 1 (PAD)

599237

599238

790

788

786

785

775

711

701

666

- Option 2 (refined design)
- Option 2 ramps (from Options Development Phase)
- Proposed project boundary (16/06/2015)
- Approved Project boundary # (edited at Northern end)
- 5m contours
- 20yr ARI flood
- Natural drainage
- SEPP14 wetland

Stormwater management
- Drainage basin (Permanent)
- Drainage basin (Temporary)

Heritage
- Archaeological PAD/Site

Acoustic
- Facade treatments to noise receivers
- Sensitive noise receiver

Vegetation Community (EEC)
- Freshwater Wetlands (EEC)
- Swamp Forest - Swamp Mahogany/ Paperbark EEC
- Swamp Oak Forest (EEC)
- Saltmarsh EEC

Vegetation Community
- Moist Open Forest - White Mahogany - Grey Gum
- Regrowth Swamp Oak
- Hollow-bearing tree/Habitat tree

- Microbat roost site/habitat
- Persicaria elatior

 # denotes: Project boundary based on WC2NH_Approved_Project_Boundary_20141202_V2.shp received 02/12/2014, and adjusted to suit survey accurate cadastre (edited at Northern end)

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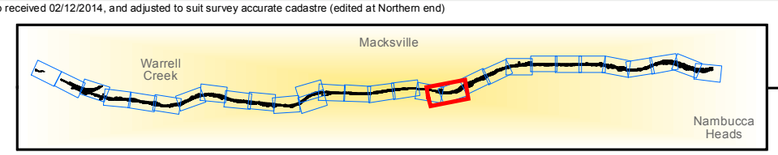

PACIFIC HIGHWAY UPGRADE **WC2NH**
North Facing Ramps at North Macksville – Preferred Option Report

Projection: GDA 1994 MGA Zone 56
Source: AFJV, RMS, AADJV, Geolink, Benwell

FIGURE: Option 2 and Option 2 (refined design) Sensitive Area Plans

Appendix B

Pacific Highway upgrade – Warrell Creek to Nambucca Heads, North Macksville ramps Submissions report

Roads & Maritime

Pacific Highway upgrade – Warrell Creek to Nambucca Heads North Macksville ramps

Submissions report

March 2016

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Roads and Maritime Services
Pacific Highway upgrade – Warrell Creek to Nambucca Heads
North Macksville ramps

Submissions report
March 2016

Prepared by

Arup Aurecon Design Joint Venture

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Fax: +61 2 9320 9321

Document Control

Document description

Project	Warrell Creek to Nambucca Heads upgrade	
Document Title:	Warrell Creek to Nambucca Heads North Macksville Ramps – Submissions report	**Document No/Ref: WC2NH-DD00-GE00-RPT-0011**
General Description	Submissions report	

Document development

		Prepared by	**Reviewed by**	**Approved by**
Revision	**Date**	Sarah Webb	Mike Luger	
01	11 December 2015			

		Prepared by	**Reviewed by**	**Approved by**
Revision	**Date**	Sarah Webb	Mike Luger	
02	27 January 2016			

		Prepared by	**Reviewed by**	**Approved by**
Revision	**Date**	Sarah Webb	Mike Luger	
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Issue summary

Revision	**Date**	**Issue description**	**Distribution**
01	11-12-2015	First Draft	RMS and AFJV review
02	27-01-2016	Final Draft	RMS and AFJV review
03	09-03-2016	Final Version	RMS and AFJV

Executive summary

This submissions report relates to submissions received from the Preferred Option Report (September 2015) prepared for the Warrell Creek to Nambucca Heads North Macksville Ramps, and should be read in conjunction with that document.

The Preferred Option Report was placed on public display between 16 September to 12 October 2015 and submissions relating to the proposal and the report were received by Roads and Maritime Services (Roads and Maritime). This submissions report summarises the issues raised and provides responses to each issue (**Chapter 2**), refinements made to the design since the display of the Preferred Option Report (**Chapter 3**), and lists the commitments made (**Chapter 4**).

A total of 144 submissions were received in response to the display of the Preferred Option Report comprising one government agency and 143 from the community.

Each submission has been examined individually to understand the issues being raised. The issues raised in each submission have been extracted and collated, and corresponding responses to the issues have been provided. Where similar issues have been raised in different submissions, only one response has been provided.

From the submission topics, five main categories were identified regarding the North Macksville Ramps. These include:

- Project development process
- Design change suggestions
- Landscape and visual amenity
- Community consultation
- Noise and vibration.

Comments were considered and where appropriate further refinements were made to the design. These refinements include:

- Realignment of Old Coast Road bridge approach and the road immediately west of the upgraded highway to maximise the distance from private properties, minimise vegetation clearing, and maximise revegetation areas
- The realignment of Letitia Close to improve the safety at the roundabout
- An additional section of visual screening along the southbound off-ramp to reduce the impacts of headlight intrusion
- Addition of a vegetated visual mound on Letitia Close near the south east corner of the roundabout to reduce the impacts of headlight intrusion
- Increased shoulder width on Old Coast Road to accommodate cyclists
- Selection of specialised road lighting to reduce light spillage into adjacent properties
- Relocation of the school bus stop into Letitia Close
- Refinements to Old Coast Road pavement surface to reduce noise.

A more detail description of the refinements are available in **Chapter 3**.

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1 Introduction and background

1.1 Purpose

This submissions report relates to submissions received from the Preferred Option Report (September 2015) prepared for the Warrell Creek to Nambucca Heads North Macksville Ramps, and should be read in conjunction with that document.

The Preferred Option Report was placed on public display between 16 September and 12 October 2015 and submissions relating to the proposal and the Preferred Option Report were received by Roads and Maritime Services (Road and Maritime). This submissions report summarises the issues raised and provides responses to each issue (**Chapter 2**), refinements made to the design since the display of the Preferred Option Report (**Chapter 3**), and lists the commitments made (**Chapter 4**).

1.2 The Preferred Option

Roads and Maritime completed an environmental assessment of the Warrell Creek to Urunga Pacific Highway upgrade (the Project EA) in January 2010. This project was designated critical infrastructure, under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act) and was formally approved by the Department of Planning and Environment on 19 July 2011.

Roads and Maritime has engaged Pacifico, an Acciona and Ferrovial Joint Venture, to design and build the 20 kilometre Warrell Creek to Nambucca Heads section of the Pacific Highway upgrade (the Approved Project).

In response to representations from Nambucca Shire Council and the Macksville Chamber of Commerce, ramps are proposed at North Macksville. The proposed ramps would include a northbound on-ramp onto the highway, a southbound off-ramp from the highway and a median cross-over facility to enable emergency vehicles (including ambulances stationed at North Macksville) to travel both north and south on the highway.

Since these ramps are not currently included in the Approved Project, planning approval will need to be obtained before being built.

Three options for the layout of the North Macksville Ramps and their connections to the road network were investigated and developed as documented in Preferred Option Report. An Options Assessment workshop was held by Roads and Maritime to compare and assess the three options using a Value Management methodology, from this Option 2 was selected as the Preferred Option.

During the Options Assessment workshop a number of improvement opportunities were identified and refinements were made to the design.

A more detailed description of the Preferred Option and the refinements made to the design is available in the Preferred Option Report.

1.3 Preferred Option Report display

Roads and Maritime prepared a Preferred Option Report to present and describe the three short-listed ramp options, report on potential impacts, compare the options, and outline how the Preferred Option was selected.

The display of the proposal was announced at two regular community information sessions that were held for the Approved Project. The proposal and display period was announced and the Preferred Option was briefly explained. The first information session was held at the Pacifico Site Office on 16 September 2015 from 6pm to 8.30pm. The second information session was held at the Nambucca Community and Arts Centre on 17 September from 6pm to 8pm.

The Preferred Option Report was displayed between 16 September and 12 October 2015 at five locations, as detailed in **Table 1.1**. The Preferred Option Report and a project Community Update

were placed on the Roads and Maritime internet website (rms.nsw.gov.au/pacific) and made available for download. The exhibition locations and website link were advertised in:

- Bellingen Courier Sun
- Coffs Coast Advocate
- Nambucca Guardian News.

A community drop-in session was held for the North Macksville Ramps on 6 October 2015 from 4pm to 7pm at the Macksville Senior Citizen Centre. The project team was available at the community drop-in session to answer questions and receive feedback.

Table 1.1 : Display locations

Display location	Address
Pacifico Site Office	124 Albert Drive, Macksville
Macksville Senior Citizen's Centre	39 Princess Street, Macksville
Macksville Library	41 Princess Street, Macksville
Nambucca Heads Library	23 Ridge Street, Nambucca Heads
Nambucca Community and Arts Centre	19 Ridge Street, Nambucca Heads

2 Response to issues

Roads and Maritime received 144 submissions, accepted up until 18 October 2015. A large number of submissions were received as a positive form letter that was written by someone in the community and shared around for others to use. A full list of the submissions is found in **Appendix A**. **Table 2.1** lists a summary of the respondents and each respondent's allocated submission number. The table also indicates where the issues from each submission have been addressed in **Chapter 2** of this report.

Table 2.1 : Summary of respondents

Respondent	Submission No.	Issues raised / positive feedback	Report section where issue is addressed
Individual /Business	1-2,4-9, 11-21, 23, 25-29, 32-36, 38-47, 49-50, 53, 55-65, 67-72, 74-75, 77, 80, 82, 84-93, 95, 98-102, 104, 107-111, 113-114, 116-120, 122-126, 128-129, 131, 133-134, 138-143	Positive feedback form letter	2.10
Individual	3, 10, 22, 24, 31, 37, 48, 52, 66, 76, 78, 81, 83, 94, 96, 97, 105-106, 115, 121, 132, 137, 144	Positive feedback supporting the project	2.10
Individual	30	Design change suggestions Landscape and visual amenity Community consultation Noise and vibration Land use and property Other issues	2.3 2.4 2.5 2.6 2.7 2.9
Individual	51	Design change suggestions Positive feedback	2.3 2.10
Nambucca Shire Council	54	Positive feedback supporting the project	2.10
Rotary Club of Macksville	73	Positive feedback supporting the project	2.10
Individual	79	Project development process Design change suggestions Landscape and visual amenity Noise and vibration Safety	2.2 2.3 2.4 2.6 2.8
Individual	103	Project development process Design change suggestions Landscape and visual amenity Noise and vibration Land use and property	2.2 2.3 2.4 2.6 2.7
Individual	112	Project development process Design change suggestions Positive feedback	2.2 2.3 2.10

Respondent	Submission No.	Issues raised / positive feedback	Report section where issue is addressed
Individual	127	Design change suggestions	2.3
Individual	130	Design change suggestions	2.3
Individual	135	Project development process Design change suggestions Landscape and visual amenity Community consultation Safety	2.2 2.3 2.4 2.5 2.8
Individual	136	Design change suggestions Positive feedback	2.3 2.10

2.1 Overview of issues raised

A total of 144 submissions were received in response to the display of the Preferred Option Report comprising one government agency and 143 from the community.

Each submission has been examined individually to understand the issues being raised. The issues raised in each submission have been extracted and collated, and corresponding responses to the issues have been provided. Where similar issues have been raised in different submissions, only one response has been provided. The issues raised and Roads and Maritime response to these issues forms the basis of this chapter.

Two per cent of the submissions received did not support the Preferred Option, one percent did not state an opinion either way and 97 percent supported the Preferred Option.

The main issues raised about the North Macksville Ramps included:

- Project development process (**Section 2.2**)
- Design change suggestions (**Section 2.3**)
- Landscape and visual amenity (**Section 2.4**)
- Community consultation (**Section 2.5**)
- Noise and vibration (**Section 2.6**).

Ninety six per cent of responses were received via email. Four per cent were responses received on the day of the community drop-in session or received via post or phone call.

Seventy six percent of responses received were positive feedback form letters.

The following nine sections describe the issues raised and provide responses.

2.2 Project development process

2.2.1 Design process

Submission number(s)

79, 103.

Issue description

In summary, the respondent(s) raised the following issues:

1. Questioned the project design process that led to the location of the ramps options.
2. The respondent disliked all the options and wants to know why options in other locations were not considered and was a cost a factor?
3. Why were the options developed by Pacifico?
4. The respondent would like to see the 100% design.

Response

1. and 2. The ramps are located as close to Macksville as possible to provide effective and efficient access for motorists wishing to travel to or from Macksville. The location of the ramps will reduce the travel distance and time for ambulance access to Macksville District Hospital.

   The area near Letitia Close provides the least overall impact for ramps between Nambucca Heads and Macksville. Ramp locations further to the north will increase impact to residents adjacent to Old Coast Road and Mattick Road, while ramp locations to the south of Letitia Close would require construction of embankments on the flood plain which would increase the flooding impacts in Macksville and have a substantial cost and construction time impact. Other locations for the ramps may have further impacts such as additional property acquisition, additional road construction requirements and additional environmental impacts. When all these issues are balanced, the area near Letitia Close is the best location for the addition of the ramps.

   The area near Letitia Close also provides good utilisation of the infrastructure required for the proposed local road network. If the ramps were moved further to the north all vehicles using the ramps would need to pass through the area near Letitia Close and the southern end of Old Coast Road.

   Potential interchange schemes were developed for review, from which three were selected for further investigation. The development of options and the selection of the Preferred Option took into account a broad range of factors including safety, community, noise, visual, other amenity and property impacts, construction staging, cultural heritage, ecological values, flooding and geotechnical conditions.

   Estimated costs for the three options were similar. Cost was not a factor in the selection of the Preferred Option.

3. Pacifico are the design and construct contractors appointed by Roads and Maritime to deliver the Warrell Creek to Nambucca Heads section of the Pacific Highway upgrade project. Roads and Maritime engaged Pacifico to assist in the development and assessment of the North Macksville Ramps options.
4. The project team will contact the respondent to provide a copy of the 100% design when it is available. In addition to this, the latest information and construction plans are available at the Warrell Creek to Nambucca Heads project site office at Warrell Creek. Residents may also contact the Project Team on 1800 074 588.

2.2.2 Options development

Submission number(s)

79, 135.

Issue description

In summary, the respondent(s) raised the following issues:

1. How were community factors considered in the options selection process?
2. What is the dollar value you have placed on the quality of life of the residents of Letitia Close and surrounds?
3. How does Option 2 improve travel time to Macksville?
4. How does Option 2 provide greater traffic efficiency and cater for future growth?
5. No scale drawings were displayed.

Response

1. and 2. The development of options and the selection of the Preferred Option took into account a broad range of factors including safety, community, noise, visual, other amenity and property impacts, construction staging, cultural heritage, ecological values, flooding and geotechnical conditions. The Preferred Option was selected as it was assessed to perform best across a wide range of criteria.

   As outlined in chapter five of the Preferred Option Report (September 2015) community factors were considered during the Options Assessment Workshop. A weighting of 25 per cent was allocated to community impacts for the comparison of the three options. The community factors considered included land acquisition, local enterprise, agribusiness, river/marine activities, emergency events, noise, light impacts, headlight intrusion, visual impacts and severance of land. Further details of this assessment are provided in the Preferred Option Report.

   The incremental impacts on social amenity associated with the addition of the ramps are addressed in Section 6 of the Modification Environmental Assessment.

   Estimated costs for the three options were similar. Cost was not a factor in the selection of the Preferred Option.

3. All three options developed for further assessment improve travel times, and therefore traffic efficiency, for vehicles travelling between Coffs Harbour and Macksville. The ramps allow traffic to exit directly at Macksville instead of exiting at Nambucca Heads and needing to travel along the existing Pacific Highway through Macksville, including some low speed environments. The upgraded Pacific Highway, with the ramps, is a more direct route than using the existing Pacific Highway.
4. The more direct route to Macksville supports future growth of businesses in the town resulting from additional visitors that might not otherwise visit Macksville. The ramps respond to requests from the Macksville Chamber of Commerce and Nambucca Shire Council.
5. Appendix A of the Preferred Option Report included the design drawings of all three options considered. The project team also had the detailed design plans for viewing at the drop in session that was held in Macksville on 6 October. In addition to this, the latest information and construction plans are available at the Warrell Creek to Nambucca Heads project site office at Warrell Creek. Residents may also contact the Project Team on 1800 074 588.

2.2.3 Approvals

Submission number(s)

79, 135.

Issue description

In summary, the respondent(s) raised the following issues:

1. Concerned about the decision process and can my letter be passed on to the decision making body?
2. What options do residents have if data used for assessments (eg traffic, noise, lights and air pollution) is incorrect and impacts are greater than planned for?
3. Concerned no cost/benefit study has been undertaken. Concerned these ramps are a waste of public money.

Response

1. The refined concept design and Modification environmental assessment will be submitted to the NSW Department of Planning and Environment for approval.

   The environmental assessment documents the potential environmental impacts of the ramps and the measures adopted to mitigate these impacts. The environmental assessment includes a summary of the submissions received in response to the display of the preferred option report and the responses to the issues that were raised.

   Roads and Maritime are the proponent for the Warrell Creek to Urunga upgrade. Roads and Maritime have identified the preferred option to meet the requirements for the North Macksville Ramps. As described in the Preferred Option Report, the three options were compared using a Value Management methodology. From this, Option 2 was selected by Roads and Maritime as the preferred option.

   Public comments received on the Preferred Option Report have been considered and where appropriate further refinements to the preferred option have been made (**Section 3**).

   At its discretion the NSW Department of Planning and Environment may display the environmental assessment for further public comment. If the environmental assessment is displayed, a report on the submissions received would be prepared and the design and environmental assessment may be further refined if required to address feedback.

   If approved the ramps are proposed to be built as part of the Warrell Creek to Nambucca Heads upgrade project.

2. Roads and Maritime have endeavoured to ensure that data used for the environmental assessments was relevant and up to date when it was prepared. Roads and Maritime would also consider further design refinements or ameliorative measures if operational impacts are greater than predicted.

   The project conditions of approval require Roads and Maritime to undertake operational noise monitoring within 12 months of the opening of the project to highway traffic. In accordance with the Roads and Maritime Environmental Noise Management Manual, should any residence have noise impacts of 2dB(A) more than the predictions, then Roads and Maritime will consult with affected property owners to determine any reasonable and feasible mitigation measures for any additional operational impacts.

   As part of the Approved Project air quality impacts were assessed in Chapter 19 of the environmental assessment. The proposal would not measurably increase these impacts which are well below the National Environment Protection Council goals.

3. North facing ramps are proposed at North Macksville, in response to representations from Nambucca Shire Council and the Macksville Chamber of Commerce.

The addition of the ramps at North Macksville together with the currently approved interchange at Bald Hill Road will allow motorists to take advantage of the facilities at Macksville, in either the northbound or southbound direction. Motorists will be able to rest and take advantage of the shops, service stations and other facilities before travelling on their journey.

2.2.4 Other issues

Submission number(s)

112, 135.

Issue description

In summary, the respondent(s) raised the following issues:

1. Suggestion that Australia should have a road policy that includes on and off ramps for every town that is within two kilometres of new highways.
2. States their neighbourhood has been impacted by construction. Concerned they have not been offered compensation.
3. Concerned that their amenity has been destroyed. Wants compensation for this.
4. Clarification required regarding the text “Bridge over the upgraded highway for Old Coast Road”.

Response

1. The suggestion is noted. The addition of the ramps at North Macksville together with the currently approved interchange at Bald Hill Road will allow motorists to take advantage of the facilities at Macksville, in either the northbound or southbound direction. Motorists will be able to rest and take advantage of the shops, service stations and other facilities before travelling on their journey.
2. and 3. Roads and Maritime are committed to reducing project impacts through mitigation measures that were identified in the Approved EA and the Submissions and Preferred Project Report for the Approved Project.

   The development of options and the selection of the Preferred Option took into account a broad range of factors including safety, community, noise, visual, other amenity and property impacts, construction staging, cultural heritage, ecological values, flooding and geotechnical conditions.
4. An overpass bridge for Old Coast Road is part of the Approved Project. The proposed bridge is required to retain continuity of the local road network. Option 3 did not have a bridge over the proposed highway at Letitia Close and has an additional intersection with the existing Pacific Highway on the western side of the proposed highway alignment to retain access to Old Coast Road.

2.3 Design change suggestions

2.3.1 Location of ramps

Submission number(s)

51, 79, 103, 112, 135, 136.

Issue description

In summary, the respondent(s) raised the following issues:

1. Why are there no on/off ramps on both southbound and northbound lanes similarly to the Bellingen/Bald Hill one?

2. The respondent does not object to the North Macksville Ramps project but objects to the placement and design.
3. The respondent suggests that a hybrid design, which combines the Option 3 on-ramp with the sound bound version of Option 2, would have better outcomes for noise, headlight intrusion, Vehicle Kilometres Travelled (VKT), pollution and fuel usage.
4. The respondent suggests moving the ramps to River Street/Gumma Road and including both on and off ramps at this location.
5. The respondent suggests moving the ramps 1-2 kilometres north towards Mattick Road.
6. Will ample signage be provided for the location of the ramps?

Response

1. Traffic data analysis that was undertaken for the options development indicates that on and off ramps in both directions (four ramps) are not required. As a result and to reduce impacts to the nearby residents only north facing ramps (two ramps) are proposed.

   The Bald Hill interchange has ramps in both directions due to its close access to the Macksville industrial area. This allows access without driving through the Macksville Central Business District.

   The North Macksville ramps allow traffic to join or leave the highway directly at Macksville instead of at Nambucca Heads and needing to travel along the existing Pacific Highway to Macksville, in a lower speed environment. The upgraded Pacific Highway, with the ramps, is a more direct route than using the existing Pacific Highway.

   The more direct route to Macksville supports future growth of businesses in the town resulting from additional visitors that might not otherwise visit Macksville. The ramps respond to requests from the Macksville Chamber of Commerce and Nambucca Shire Council.
2. It is noted that the respondent agrees to the North Macksville Ramps project in principle however objects to the location and design.
3. The hybrid design would increase the length of the bridge over the upgraded highway which would further alter the alignment of Old Coast Road and Letitia Close. This would potentially increase biodiversity, noise, visual amenity and water quality impacts. The hybrid design would also require additional property acquisition and an additional intersection with the existing Pacific Highway, which is not desirable from a road safety viewpoint.
4. A preliminary review of the relocation has determined that due to the proximity of River Street/Gumma Road to the Nambucca River, the flood plain and the upgraded highway bridge, on and off ramps to this area is not feasible.
5. The ramps are located as close to Macksville as possible to provide effective and efficient access for motorists wishing to travel to or from Macksville. The location of the ramps will reduce the travel distance and time for ambulance access to Macksville District Hospital. If the ramps were moved further to the north all vehicles using the ramps would need to pass through the area near Letitia Close and the southern end of Old Coast Road.
6. A signage strategy that complies with Roads and Maritime signage guidelines will be developed for the project. Roads and Maritime will consult with key stakeholders in order to maximise the benefits of constructing the ramps.

2.3.2 Bus stop location

Submission number(s)

79, 127, 135.

Issue description

In summary, the respondent(s) raised the following issues:

1. The respondent is concerned about the bus stop arrangements for Letitia Close children and sees safety issues for small children walking beside an on/off ramp in close proximity to traffic including trucks.
2. The respondent is concerned about safety in regards to the bus stop and access for drop off and pick up. Also concerned about pedestrian access and local traffic performing illegal u-turns after dropping off and picking up children.
3. Concerns about safety regarding the design of the bus stop, increased traffic and children crossing the upgraded Old Coast Road. Concerned that two lanes of traffic will be accelerating towards the bus stop.
4. Concerned about safety of the current bus stop during construction.

Response

1. to 3. After consultation with residents and the local bus company, the bus stop has been relocated into Letitia Close. This provides a safer location as the bus stop is separated from through traffic on Old Coast Road.
4. The current bus stop for school students living on Letitia Close was relocated to within the cul-de-sac on 17 August 2015. The change of location for the bus pickup area from its previous location on the edge of Old Coast Road was initiated following consultation with local parents and the bus company. Letitia Close was deemed the safest location for school students given that it is not a through road for traffic.

2.3.3 Existing highway intersection

Submission number(s)

130,135.

Issue description

In summary, the respondent(s) raised the following issues:

1. How will Old Coast Road tie into the existing highway? Concerned about the safety of the intersection. Are the traffic forecasts used in the assessments too low? The respondent suggests that a roundabout would be suitable for this intersection.
2. The respondent is concerned about the safety of the existing design of the Old Coast Road/existing highway intersection and is concerned this will continue to be unsafe.

Response

1. and 2. The Approved Project and proposed ramps comply with the Pacific Highway upgrade design safety standards. The traffic assessment that was undertaken as part of the options assessment indicated that the existing intersection layout is appropriate for the expected traffic volumes and would be retained.

   The design of this existing intersection was done in accordance with the appropriate standards and was subject to a Road Safety Audit.

   The design of this intersection will be further refined as part of the detailed design of the proposed works.

2.3.4 Other issues

Submission number(s)

30, 79, 103.

Issue description

In summary, the respondent(s) raised the following issues:

1. Can the powerlines (on the western side of the upgraded highway) be buried underground so that more vegetation can be kept and additional vegetation planted to create a buffer
2. What are the provision for pedestrians and cyclists?
3. Will a low noise pavement will be installed?

Response

1. The power line running perpendicular to the Upgraded Highway in an east west direction will be constructed underground. This will minimise clearing of existing vegetation and maximise potential for vegetation regrowth.
2. The design has been refined to provide enhanced pedestrian and cyclist facilities by increasing the width of the shoulder on Old Coast Road, including the overbridge, from one metre to two metres. A pedestrian / cyclist path has been provided on the south western corner of the proposed roundabout to provide connectivity from the two metre wide shoulder on Old Coast Road South to the two metre shoulder along the overbridge.
3. A low noise pavement is proposed for the North Macksville ramps. The spray seal pavement that was assessed as part of the Approved Project has been changed to a dense grade asphalt pavement. This pavement extends north from the intersection of Old Coast Road with the Existing Pacific Highway to the roundabout, on Old Coast Road. The roundabout is proposed to have a concrete surface. Additionally, the dense grade asphalt pavement extends west from the western side of the bridge to the north-bound on-ramp. The ramps pavement remains unchanged with low noise pavement.

2.4 Landscape and visual amenity

2.4.1 Light intrusion

Submission number(s)

30, 79, 103, 135.

Issue description

In summary, the respondent(s) raised the following issues:

1. Concerned about street light intrusion. Concerned that light spillage will impact on amenity and interfere with sleep.
2. Concerned about head light intrusion.
3. What mitigation measures will be implemented to minimise headlight intrusion for residents? Respondents request that blinds be provided to all nearby residences.

Response

1. It is acknowledged that these areas are currently unlit and there will be an increase in night time light levels compared to the Approved Project. Flag lighting is required at the intersection of the realigned Old Coast Road and on-ramp and the roundabout intersection of the realigned Old Coast Road, Letitia Close and off-ramp. The lighting has been designed to minimise light spill into adjacent residences.

2. The design has been refined to minimise headlight intrusion for residents by:
   - Relocating the power line underground to allow regrowth of vegetation
   - Shifting the alignment of Old Coast Road further away from the adjacent properties to the west to maximise the area of retained vegetation and minimise the impact in the area

   If necessary, additional options can be investigated after the opening of the highway for traffic.
3. Modelling has predicted that headlight intrusion may affect one residence closer to the roundabout. Roads and Maritime will consult with the property owner to determine suitable measures to mitigate the increased headlight intrusion.

2.4.2 Amenity

Submission number(s)

30, 79, 135.

Issue description

In summary, the respondent(s) raised the following issues:

1. The respondent is concerned about the proximity of the Preferred Option to their property. Can protection be provided to minimise impacts on the amenity of residents?
2. Concerned by amenity loss due to closeness of traffic to Letitia Close properties.
3. The respondent is concerned that vegetation clearing and traffic growth will reduce privacy.

Response

1. and 2. The increased volume of traffic and change in rural ambience is acknowledged. Roads and Maritime are committed to minimising the impacts on property owners where practicable.

   Detailed measures are outlined in Section 6.5 of the Modification Environmental Assessment. The mitigation measures include visual mounds and tree plantings at various locations.
3. The area of vegetation clearing will be minimised. The increased volume of traffic and change in rural ambience is acknowledged. The landscaping plans for this area will be modified to include a visual screen to the SE of the roundabout which will reduce the impact on amenity.

2.5 Community consultation

Submission number(s)

30, 79, 135.

Issue description

In summary, the respondent(s) raised the following issues:

1. The respondent is concerned that the Roads and Maritime “Community Charter” has not been followed. Will the Community Charter be adopted?
2. The respondent is concerned that community feedback has no impact and is ignored by Roads and Maritime. The respondent wants to know what their rights are throughout this procedure.
3. The respondent is concerned that Roads and Maritime have not collaborated with residents and concerned that contractors are visiting properties without prior notice.
4. The respondent is concerned by lack of correspondence from Roads and Maritime with the individual. The submission gives a specific example.

5. The respondent is concerned that Roads and Maritime has not listened to the community about the location of the school bus and has failed to take action.
6. Will Roads and Maritime make any changes to the design because of community consultation?
7. The way in which the Preferred Option was presented at a meeting on the 16 September at the Project Office was not clear or helpful.
8. The respondent wants to be kept informed as project progresses.

Response

1. The Roads and Maritime Customer Charter (as outlined by the submission) was developed in 2011 and articulates the commitments made by the Roads and Maritime to ensure that customers and stakeholders are considered at the centre of every service provided.

   Community consultation is taken very seriously during the project development process and the Customer Charter was further refined for undertaking community and stakeholder engagement activities. The Roads and Maritime community and stakeholder engagement goals are to:

   - Enhance its transparency and public accountability
   - Ensure that its decision-making is inclusive of diverse community ideas and opinions
   - Ensure that its strategic planning, project development, and service delivery meets the balance of community needs and expectations
   - Create a more efficient Roads and Maritime based on collaborative decision-making and enhanced public trust.

   The Approved Project Community Involvement Plan (CIP), available on the Approved Project website, describes how community and stakeholder involvement will be managed during the construction of the project.

   Building on Roads and Maritime policies, the CIP recognises and will endeavour to meet all reasonable needs and desires of the community and stakeholders. Its principles in relation to community involvement are:

   - Acciona and Ferrovial Joint Venture (AFJV) acknowledges the project team members are visitors to the community for the duration of the works. Personnel will be required and encouraged to respect the needs and workings of the local residents and business community
   - AFJV believes the community should receive early advice of activities and that early notification will ensure progress of works minimises uncertainty and disruption and fosters confidence among community members
   - Personal and targeted consultation with local residents, landowners, businesses and stakeholders will enable relationships to be built between all parties, thus providing the foundation for good working relationships and resolution of matters of concern
   - Proactive management of design (where applicable), construction, traffic management or other emerging issues will build on these foundations, maximising a reputation of reliability through prompt resolution of issues and minimising escalation of issues
   - Support for the safe and efficient delivery of the project with minimal disruption to the community.
2. The Approved Project has shown commitment to this by developing its community and stakeholder engagement goals and the Approved Project Community Involvement Plan. The proposal has also adopted these commitments.

Roads and Maritime have made refinements to the concept design as a result of community consultation. During detailed design further refinements would be investigated and made if appropriate. Refinements include:

- Realignment of Old Coast Road bridge approach and the road immediately west of the upgraded highway to maximise the distance from private properties, minimise vegetation clearance, and maximise revegetation areas
- The realignment of Letitia Close to improve the safety at the roundabout
- An additional section of visual screening along the southbound off-ramp to reduce the impacts of headlight intrusion
- Addition of a vegetated visual mound on Letitia Close near the south east corner of the roundabout to reduce the impacts of headlight intrusion
- Increased shoulder width on Old Coast Road to accommodate cyclists
- Selection of specialised road lighting to reduce light spillage into adjacent properties
- Relocation of the school bus stop into Letitia Close
- Refinements to Old Coast Road pavement surface to reduce noise.

3. Roads and Maritime and its contractor has had ongoing consultation with local residents regarding the proposal and the Approved Project. The specific examples given by the respondent have been previously investigated and discussed with the resident.
4. Roads and Maritime consults with the community using a variety of means. Project updates are provided at every community information session, project communications including letters to residents, weekly traffic alerts, community updates and responses to phone calls and meetings with residents. The needs of the community in relation to the amount of consultation vary, however there are many opportunities to discuss issues with the project team including by phoning the community line on 1800 074 588 , by email at community@afjv.com.au or by visiting the Community Display Centre at Albert Drive, Warrell Creek. The letter referred to in the submission was forwarded to the respondent on 30 September 2015.
5. Following consultation with residents and the local bus company during the construction phase of the project, arrangements were made as of 17 August 2015 to pick up and set down children in Letitia Close.

   After further consultation with residents and the local bus company, arrangements have been made as part of the design refinement process to permanently relocate the bus stop into Letitia Close. This provides a safer location as the bus stop is separated from through-traffic on Old Coast Road.
6. Roads and Maritime are committed to undertaking community and stakeholder engagement and the project has followed the community and stakeholder engagement goals of:

   - Enhance its transparency and public accountability
   - Ensure that its decision-making is inclusive of diverse community ideas and opinions
   - Ensure that its strategic planning, project development, and service delivery meets the balance of community needs and expectations
   - Create a more efficient Roads and Maritime based on collaborative decision-making and enhanced public trust.

   As identified in this report Roads and Maritime have made refinements to the concept design as a result of community consultation, Refinements include:

- Realignment of Old Coast Road bridge approach and the road immediately west of the upgraded highway to maximise the distance from private properties, minimise vegetation clearance, and maximise revegetation areas
- The realignment of Letitia Close to improve the safety at the roundabout
- An additional section of visual screening along the southbound off-ramp to reduce the impacts of headlight intrusion
- Addition of a vegetated visual mound on Letitia Close near the south east corner of the roundabout to reduce the impacts of headlight intrusion
- Increased shoulder width on Old Coast Road to accommodate cyclists
- Selection of specialised road lighting to reduce light spillage into adjacent properties
- Relocation of the school bus stop into Letitia Close
- Refinements to Old Coast Road pavement surface to reduce noise.

7. This community consultation feedback has been noted and lessons learnt will be discussed and actioned by project staff.

   The display of the Preferred Option Report was briefly announced at the regular community information session held for the Approved Project at the Pacifico Site Office on 16 September. During the community information session the arrangements for a community drop-in session, to discuss the ramp options in detail, were advised to the community. Alternate arrangements for providing information and receiving feedback were made with individuals who were not able to attend the community drop-in session. Roads and Maritime met with the respondent prior to the community drop-in session on 6 October.

8. The project team will contact the respondent to provide regular updates. The respondent has been included on the project contact database. In addition to this, the latest information and construction plans are available at the Warrell Creek to Nambucca Heads project site office at Warrell Creek. Residents may also contact the Project Team on 1800 074 588.

2.6 Noise and vibration

Submission number(s)

30, 79.

Issue description

In summary, the respondent(s) raised the following issues:

1. Concerned about an increase in traffic noise will have an effect on local properties. Is the data accurate and valid? Has an increased volume of traffic been looked at? Has the emotional impacts been considered
2. Concerned about noise by heavy vehicles
3. The respondent has indicated that properties near the Macksville Bridge have suffered for years with traffic noise and accidents. The respondent feels that this will move to the North Macksville Ramps and with increased traffic volumes causing noise, fumes, and potential loss of life and destruction of property.
4. Concerned that gradient of ramps will increase noise.
5. What impacts will the ramps and roundabout have on the noise for the resident? How does this impact the model that was undertaken for the upgraded highway?
6. What noise mitigation will we receive to restore amenity to levels prior to the upgraded highway?

Response

1. Noise modelling predicts that the addition of the north facing ramps will not change the predicted noise levels of the Approved Project by more than one decibel compared to the Approved Project at all residences. These predictions use the 2026 forecast traffic data from the updated traffic modelling that was developed as part of the ramp options assessment. It is acknowledged that the Approved Project as well as the increased traffic on Old Coast Road will change the amenity value of residents in the immediate vicinity. Residences that are eligible for noise treatment will be offered at residence treatments to reduce the impact of road traffic noise. The usual treatments offered are either air conditioning or improved glazing, doors and seals.
2. The effect of heavy vehicles has been considered in the noise predictions. In close proximity to residents the down-grade of the northbound on ramp will assist acceleration while the climbing grade of the southbound off ramp will assist with deceleration and therefore reduce noise. The proposed highway speed limit in this area will be 110km/hr for light vehicles, however the heavy vehicles will be limited to 100km/hr as per the current speed limit legislation.
3. The highway upgrade, including the proposed North Macksville Ramps have been designed to increase the safety of road users. Independent road safety audits are carried out during the design development of the ramp designs. The designers must consider and address all safety issues and requirements relating to safety during construction, operation and maintenance in the development and production of the Design Documentation. The highway upgrade and North Macksville Ramps will be designed to current standards which are much safer than the standards that applied when the Macksville Bridge was designed.

   The adjacent resident's safety is considered during the detailed design development. Where errant vehicles are a concern, appropriate means of controlling these vehicles within the road corridor are incorporated in the design.

   A noise assessment has been undertaken for the potential noise impacts from the three ramp options. This assessment was undertaken to assist in the selection of the preferred option for the ramps. The maximum increase in noise compared to the approved layout for the surrounding properties is 1dB(A). This is not considered a significant variation in noise level, since changes in noise level of 2dB(A) or less are not able to be detected by most people.

   The ramps are generally located within the previously acquired highway corridor. Additional acquisition was limited to one property.

   The inclusion of the North Macksville Ramps is supported by sections of the community including Nambucca Shire Council and the Macksville Chamber of Commerce.
4. In close proximity to residents the down-grade of the northbound on ramp will assist acceleration while the climbing grade of the southbound off ramp will assist with deceleration and therefore reduce noise.
5. Noise modelling predicts that the addition of the North Macksville Ramps will not change the predicted noise levels of the Approved Project by more than one decibel compared to the Approved Project at all residences. These predictions use the 2026 forecast traffic data from the updated traffic modelling that was developed as part of the ramp options assessment.
6. The project team is currently working with eligible residents, including the respondent, to develop at-house noise treatments for their residences. The usual treatments offered are either air conditioning or improved glazing, doors and seals.

2.7 Land use and property

Submission number(s)

30, 103.

Issue description

In summary, the respondent(s) raised the following issues:

1. Has the proposal considered the future population growth of the area?
2. Concerned that access will impact on trees and the environment. The respondent requests minimal vegetation clearing.
3. Respondents have asked for that sufficient level area be provided next to the property access for letter boxes and bins.
4. Can the respondents new property access be moved towards the east so that more mature trees can be retained.

Response

1. The future expansion of the population is not expected to be affected negatively by the addition of the North Macksville Ramps. The addition of the ramps will better cater for traffic growth for any increased development in the area. A traffic capacity analysis has been carried out and based on the expected traffic volumes all intersections associated with the ramps have the highest level of service (Level of Service A). This means that the ramps and the associated intersections have a significant capacity for additional traffic that may be generated from residential development in the surrounding area.
2. It is expected that some trees will need to be cleared as part of the works to construct the access.
3. The project team will consult with the affected property owners to agree on a suitable area for letter boxes and bins that meets the requirements of relevant service providers.
4. It is expected that some trees will need to be cleared as part of the works to construct the access. The proposed access design has been refined to minimise the clearing of trees as much as possible while still providing a safe access.

2.8 Safety

Submission number(s)

79, 135.

Issue description

In summary, the respondent(s) raised the following issues:

1. Concerned that the same safety issues that occurred at Macksville Bridge will occur at the North Macksville Ramps.
2. Concerned about safety in regards to speeding vehicles on local roads.
3. Concerned that there will be an increase in risk for accidents due to increase in vehicles and the proposed roundabout.
4. Concerns about the current construction activities and safety with accessing their property

Response

1. The Approved Project, including the proposed North Macksville Ramps have been designed to meet the road safety requirements that apply to Pacific Highway Upgrade projects. The road is designed to comply with the standards and guidelines adopted by the project. The design

process includes review by independent consultants who are specialised in the area of road design including safety in design. Independent road safety audits were carried out during the design development.

The adjacent residents' safety is considered during the detailed design development. Intersection designs and driveway accesses that intersect with the local roads are checked during the design to ensure that they comply with the design guidelines. The safety of motorists and surrounding residents is considered with the alignments selected. Where necessary, road safety barriers are installed to provide improved safety outcomes for both motorists and adjacent residents.

2. The Approved Project and proposed ramps comply with stringent design safety standards. Letitia Close and Old Coast Road South are to be signposted at 50 km/h and 60 km/h, respectively. These speed limits are enforceable in the same manner as speed limits at any other location on the project.
3. The Approved Project, including the proposed North Macksville Ramps has been designed to increase the safety of road users. Independent road safety audits are carried out during the design development of the ramp designs. The designer must consider and address all safety issues and requirements relating to safety during construction, operation and maintenance in the development and production of the Design Documentation.
4. The issues raised in this submission are not related to the proposal.

   The current construction activities are part of the Approved Project and the issues raised have been investigated and actioned by the project team.

2.9 Other issues

Submission number(s)

30, 79.

Issue description

In summary, the respondent(s) raised the following issues:

1. The respondent is concerned about an increase in exhaust fumes.
2. The respondent is concerned about bush restoration.
3. The respondent is concerned about safety with increased snake sightings on their property. How is this addressed and by who? Has the Red-bellied black snake been considered like endangered grasses?

Response

1. As part of the Approved Project air quality impacts were assessed in Chapter 19 of the Approved EA. The proposal would not measurably increase these impacts which are well below the National Environment Protection Council goals.
2. The design of the ramps has been refined to minimise the area of vegetation clearing. The landscaping plans for this area will be modified to include suitable revegetation and landscaping for the area affected by the addition of the ramps.
3. Increased snake sightings generally occur during the spring and summer months as the temperature increases. Snakes seen on properties should not be approached. WIRES or your local vet can be contacted for further advice.

   Roads and Maritime endeavours to minimise the impacts of the project on native plants and animals. Many native animals are protected by legislation however as the Red-bellied black snake (*Pseudechis porphyriacus*) is not currently listed as threatened or endangered in State

or Federal legislation No specific management provisions have been made for it in the proposal or Approved Project.

2.10 Positive feedback

Submission number(s)

Positive submissions numbers: 3, 10, 22, 24, 31, 37, 48, 52, 66, 76, 78, 81, 83, 94, 96, 97, 105-106, 115, 121, 132, 137, 144.

Positive form letter submissions numbers: 1-2,4-9, 11-21, 23, 25-29, 32-36, 38-47, 49-50, 53, 55-65, 67-72, 74-75, 77, 80, 82, 84-93, 95, 98-102, 104, 107-111, 113-114, 116-120, 122-126, 128-129, 131, 133-134, 138-143.

Issue description

1. Different respondent(s) raised different reasons for their support. The following issues were raised:
   - Quicker access and connections to Macksville
   - Reduced commute time for local workers, reducing fuel and maintenance costs
   - Opportunities to increase tourism and commerce
   - Allows for tourists to access and leave the town quickly, therefore providing incentive as a town to stop and revive in on long trips
   - Improved response times for emergency vehicles
   - More opportunities for town growth.

Response

1. We thank you for your comments and your support for the proposal is acknowledged.

3 Refinements to the Preferred Option

As identified in this report, Roads and Maritime have made refinements to the concept design as a result of community consultation. These refinements include:

- Realignment of Old Coast Road bridge approach and the road immediately west of the upgraded highway to maximise the distance from private properties, minimise vegetation clearing, and maximise revegetation areas
- The realignment of Letitia Close to improve the safety at the roundabout
- An additional section of visual screening along the southbound off-ramp to reduce the impacts of headlight intrusion
- Addition of a vegetated visual mound on Letitia Close near the south east corner of the roundabout to reduce the impacts of headlight intrusion
- Increased shoulder width on Old Coast Road to accommodate cyclists
- Selection of specialised road lighting to reduce light spillage into adjacent properties
- Relocation of the school bus stop into Letitia Close
- Refinements to Old Coast Road pavement surface to reduce noise.

3.1 Realignment of Old Coast Road and overbridge

The Old Coast Road overbridge was realigned and straightened across the upgraded highway to:

- Reduce the need for curve widening of the overbridge and improve the site line on approach to the overbridge from the south
- Improve the viability of the overbridge by reducing the span of the girders and reducing the total overbridge deck area.

The changes to the overbridge allowed for the realignment of Old Coast Road on the western side of the Upgraded Highway. The realignment was refined to maximise the distance of the road from private properties, reduce the vegetation clearing required for the Moist Open Forest vegetation community and to maximise areas for revegetation.

3.2 Realignment of Letitia Close

The currently approved T-intersection of the Old Coast Road and Letitia Close would be modified to a roundabout. The minor realignment of Letitia Close where it joins the roundabout would improve the sight distance and approach angle for traffic entering the roundabout.

Four additional lights (one light is currently approved) and signage relating to the roundabout and ramps, would also be installed at the intersection. Current pedestrian and cyclist facilities would be upgraded to provide access for crossing Old Coast Road on the southern side of the roundabout and Letitia Close.

3.3 Visual screening

Two additional visual barriers would be included to reduce headlight intrusion.

This proposal modifies about 200 meters of the vegetated visual mound on the east side of the Upgraded Highway that is north of Letitia Close between chainage 53,435 and 53,650 that was described in the Approved Project. This modification lifts the mound at the southern end to provide two metre screening. An additional visual barrier would connect to the southern end of the modified vegetated visual mound to provide continuous two metre screening along the entirety of the eastern side of the off-ramp. This additional visual barrier may allow for vegetation to be planted on top in some areas to increase the height of the visual barrier.

A second vegetated visual mound would be included on the southern side of the roundabout on the corner of Letitia Close and Old Coast Road to reduce the impacts of headlight intrusion.

3.4 Increased shoulder width

The design has been refined to provide enhanced cyclist facilities by increasing the width of the shoulder on Old Coast Road, including the overbridge, from one metre to two metres. A pedestrian / cyclist path has been provided on the south western corner of the proposed roundabout to provide connectivity from the two metre wide shoulder on Old Coast Road South to the two metre shoulder along the overbridge.

3.5 Lighting

Flag lighting is required at the intersection of the realigned Old Coast Road and on-ramp and the roundabout intersection of the realigned Old Coast Road, Letitia Close and off-ramp. The lighting has been designed to minimise light spill into adjacent residences.

One mast light is required at the intersection of the realigned Old Coast Road and on-ramp. Four mast lights (in addition to the one currently approved) are required at the roundabout. Aeroscreen luminaires will be installed to minimise light spillage into the adjacent properties.

The design has been refined to minimise headlight intrusion for residents by:

- Relocating the power underground to allow regrowth of vegetation
- Shifting the alignment of Old Coast Road further away from the adjacent properties to the west to maximise the area of retained vegetation and minimise the impact in the area.

Headlight intrusion for residents to the east of the Upgraded Highway would be minimised by:

- An additional vegetated visual mound on the southern side of the roundabout at the corner of Letitia Close and Old Coast Road
- Extension of an approved vegetated visual mound by addition of a visual barrier along the southbound off-ramp.

If necessary, additional options can be investigated after the opening of the highway for traffic.

Modelling has predicted that headlight intrusion may affect one residence closer to the roundabout. Roads and Maritime will consult with the property owner to determine suitable measures to mitigate the increased headlight intrusion.

3.6 Bus stop relocation

The current bus stop for school students living on Letitia Close was relocated to within the cul-de-sac on 17 August 2015. The change of location for the bus pickup area from its previous location on the edge of Old Coast Road was initiated following consultation with local parents and the bus company. Letitia Close was deemed the safest location for school students given that it is not a through road.

After consultation with residents and the local bus company, it has been agreed to permanently locate the bus stop in Letitia Close. This provides a safer location as the bus stop is separated from through traffic on Old Coast Road.

3.7 Old Coast Road Pavement

A low noise pavement is proposed for the North Macksville ramps. The spray seal pavement that was assessed as part of the Approved Project has been changed to a dense grade asphalt pavement. This pavement extends north from the intersection of Old Coast Road with the Existing Pacific Highway to the roundabout, on Old Coast Road. The roundabout is proposed to have a concrete surface. Additionally, the dense grade asphalt pavement extends west from the western side of the bridge to the north-bound on-ramp. The ramps pavement remains unchanged with low noise pavement.

4 Commitments

After consideration of the issues raised in the submissions and changes to the proposal, refinements have been made to the design and a number of management and mitigation measures have been revised.

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

The Construction Environmental Management Plan (CEMP) would be updated to describe commitments identified. These plans will provide a framework for establishing how environmental measures will be implemented and the party with which the responsibility lies for their implementation.

4.1 Summary of commitments

These commitments would minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The commitments are summarised in **Table 4.1**.

Table 4.1 : Summary of commitments

No.	Impact	Commitment	Timing
1	Community Consultation	The project team will contact the resident to provide regular updates. The respondent has been included on the project contact database.	Pre-construction
2	Land use and Property	The project team will consult with the affected property owners to agree on a suitable area for letter boxes and bins that meets the requirements of relevant service providers.	Pre-construction
3	Project development process	A signage strategy that complies with Roads and Maritime signage guidelines will be developed for the project. Roads and Maritime will consult with key stakeholders in order to maximise the benefits of constructing the ramps.	Detailed Design
4	Project development process	The project team will contact the resident to provide a copy of the 100% design when it is available.	After completion of detailed design. Pre-construction
5	Project Design	The local bus stop would be moved and permanently located in Letitia Close.	Pre-construction
6	Project Design	Visual screening provided includes: • An additional vegetated visual mound on the southern side of the roundabout at the corner of Letitia Close and Old Coast Road • Extension of an approved vegetated visual mound by addition of a visual barrier along the southbound off-ramp (chainage 53,425 to 53,650).	Detailed Design
7	Project Design	Increase shoulder width on Old Coast Road and overbridge from 1m to 2m.	Detailed Design
8	Project Design	The lighting designs will be directional to minimise light pollution. Lighting will be located and designed to not shine directly into any residences. Aeroscreen luminaires will be installed to minimise light spillage into the adjacent properties.	Detailed Design
9	Project Design	Sections of pavement on Old Coast Road will be changed from a spray seal pavement to a dense grade asphalt pavement.	Detailed Design
10	Project Design	The power line running perpendicular to the Upgraded Highway in an east west direction will be replace with an underground powerline.	Detailed Design
11	Project Design	Areas of vegetation clearing will be minimised if possible. The landscaping plans will be modified, if required, to include suitable revegetation and landscaping	Detailed Design
12	Project Design	Property access designs would be refined to minimise vegetation clearing and tree removal.	Detailed Design
13	Noise and Vibration	The project team will continue to work with eligible residents to develop at-house noise treatments for their residences.	Pre-construction

5 References

Roads and Maritime Services 2010, *Warrell Creek to Urunga Pacific Highway upgrade Environmental Assessment*, January, Sydney.

Roads and Maritime Services 2012 *Pacific Highway Upgrade, Warrell Creek to Urunga, Traffic Modelling Final Report*, May, Sydney.

Roads and Maritime Services 2015 *Warrell Creek to Nambucca Heads Operational noise modelling and assessment*, March Sydney.

Roads and Maritime Services 2015 *Warrell Creek to Nambucca Heads North Facing Ramps at North Macksville – Preferred option report*, September, Sydney.

Appendix A

List of submissions

Table 5.1 : Full list of submissions

Respondent	Submission No.	Issues raised
Individual	1	Positive feedback form letter
Individual	2	Positive feedback form letter
Individual	3	Positive feedback supporting the project
Business	4	Positive feedback form letter
Individual	5	Positive feedback form letter
Business	6	Positive feedback form letter
Individual	7	Positive feedback form letter
Individual	8	Positive feedback form letter
Individual	9	Positive feedback form letter
Individual	10	Positive feedback supporting the project
Individual	11	Positive feedback form letter
Individual	12	Positive feedback form letter
Individual	13	Positive feedback form letter
Business	14	Positive feedback form letter
Individual	15	Positive feedback form letter
Business	16	Positive feedback form letter
Business	17	Positive feedback form letter
Individual	18	Positive feedback form letter
Business	19	Positive feedback form letter
Business	20	Positive feedback form letter
Business	21	Positive feedback form letter
Individual	22	Positive feedback supporting the project
Individual	23	Positive feedback form letter
Individual	24	Positive feedback supporting the project
Business	25	Positive feedback form letter
Business	26	Positive feedback form letter
Business	27	Positive feedback form letter
Business	28	Positive feedback form letter
Business	29	Positive feedback form letter
Individual	30	Landscape and visual amenity, Noise and vibration, Air quality, Design change, Land use and property, Community consultation
Individual	31	Positive feedback supporting the project
Business	32	Positive feedback form letter
Individual	33	Positive feedback form letter
Individual	34	Positive feedback form letter
Business	35	Positive feedback form letter

Respondent	Submission No.	Issues raised
Individual	36	Positive feedback form letter
Individual	37	Positive feedback supporting the project
Individual	38	Positive feedback form letter
Individual	39	Positive feedback form letter
Individual	40	Positive feedback form letter
Individual	41	Positive feedback form letter
Business	42	Positive feedback form letter
Individual	43	Positive feedback form letter
Business	44	Positive feedback form letter
Individual	45	Positive feedback form letter
Business	46	Positive feedback form letter
Individual	47	Positive feedback form letter
Individual	48	Positive feedback supporting the project
Individual	49	Positive feedback form letter
Business	50	Positive feedback form letter
Individual	51	Positive feedback Design change
Individual	52	Positive feedback supporting the project
Business	53	Positive feedback form letter
Nambucca Shire Council	54	Positive feedback supporting the project
Individual	55	Positive feedback form letter
Individual	56	Positive feedback form letter
Individual	57	Positive feedback form letter
Business	58	Positive feedback form letter
Individual	59	Positive feedback form letter
Individual	60	Positive feedback form letter
Individual	61	Positive feedback form letter
Individual	62	Positive feedback form letter
Business	63	Positive feedback form letter
Individual	64	Positive feedback form letter
Individual	65	Positive feedback form letter
Individual	66	Positive feedback supporting the project
Individual	67	Positive feedback form letter
Individual	68	Positive feedback form letter
Individual	69	Positive feedback form letter
Business	70	Positive feedback form letter
Individual	71	Positive feedback form letter
Individual	72	Positive feedback form letter
Rotary Club of Macksville	73	Positive feedback supporting the project
Business	74	Positive feedback form letter
Business	75	Positive feedback form letter

Respondent	Submission No.	Issues raised
Individual	76	Positive feedback supporting the project
Individual	77	Positive feedback form letter
Individual	78	Positive feedback supporting the project
Individual	79	Biodiversity, Landscape and visual amenity, Noise and vibration, Design change, Community consultation, Safety, Project development
Business	80	Positive feedback form letter
Individual	81	Positive feedback supporting the project
Individual	82	Positive feedback form letter
Business	83	Positive feedback supporting the project
Business	84	Positive feedback form letter
Individual	85	Positive feedback form letter
Individual	86	Positive feedback form letter
Business	87	Positive feedback form letter
Business	88	Positive feedback form letter
Individual	89	Positive feedback form letter
Individual	90	Positive feedback form letter
Individual	91	Positive feedback form letter
Individual	92	Positive feedback form letter
Individual	93	Positive feedback form letter
Business	94	Positive feedback supporting the project
Individual	95	Positive feedback form letter
Individual	96	Positive feedback supporting the project
Individual	97	Positive feedback supporting the project
Individual	98	Positive feedback form letter
Business	99	Positive feedback form letter
Business	100	Positive feedback form letter
Business	101	Positive feedback form letter
Business	102	Positive feedback form letter
Individual	103	Landscape and visual amenity, Design change, Land use and property
Individual	104	Positive feedback form letter
Individual	105	Positive feedback supporting the project
Individual	106	Positive feedback supporting the project
Business	107	Positive feedback form letter
Business	108	Positive feedback form letter
Individual	109	Positive feedback form letter
Individual	110	Positive feedback form letter
Individual	111	Positive feedback form letter
Individual	112	Design change, Project development
Individual	113	Positive feedback form letter
Business	114	Positive feedback form letter

Respondent	Submission No.	Issues raised
Business	115	Positive feedback supporting the project
Individual	116	Positive feedback form letter
Individual	117	Positive feedback form letter
Business	118	Positive feedback form letter
Business	119	Positive feedback form letter
Individual	120	Positive feedback form letter
Business	121	Positive feedback supporting the project
Business	122	Positive feedback form letter
Business	123	Positive feedback form letter
Individual	124	Positive feedback form letter
Individual	125	Positive feedback form letter
Business	126	Positive feedback form letter
Individual	127	Design change
Individual	128	Positive feedback form letter
Individual	129	Positive feedback form letter
Individual	130	Design change
Individual	131	Positive feedback form letter
Business	132	Positive feedback supporting the project
Business	133	Positive feedback form letter
Business	134	Positive feedback form letter
Individual	135	Landscape and visual amenity, Noise and vibration, Design change, Community consultation, Safety, Project development
Individual	136	Positive feedback, Traffic and transport
Individual	137	Positive feedback supporting the project
Business	138	Positive feedback form letter
Individual	139	Positive feedback form letter
Individual	140	Positive feedback form letter
Individual	141	Positive feedback form letter
Business	142	Positive feedback form letter
Individual	143	Positive feedback form letter
Individual	144	Positive feedback supporting the project

Appendix C

Biodiversity Assessment, North Facing Ramps – Warrell Creek to Nambucca Heads Pacific Highway Upgrade

Biodiversity Assessment

North Facing Ramps – Warrell Creek to Nambucca Heads Pacific Highway Upgrade

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Prepared for: Acciona and Ferrovial Joint Venture (AFJV)

UPR	*Description*	*Date Issued*	*Issued By*
2378-1168	First Issue	27/11/2015	DGH
2378-1211	Second Issue	08/03/2016	DGH

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Appendices

1. Introduction

1.1 Project Overview

The Pacific Highway Upgrade Program is a joint commitment by the Australian and New South Wales (NSW) Governments to improve the standard and safety of the Pacific Highway between Hexham and the Queensland border.

The Warrell Creek to Urunga (WC2U) project forms part of the Pacific Highway Upgrade Program and comprises approximately 42 kilometres of dual carriageway road that would bypass the towns of Warrell Creek, Macksville, Nambucca Heads and Urunga on the Mid North Coast of NSW. The Project has been divided into two stages with Stage 1 consisting of the approximate 22.5 kilometre stretch from Nambucca Heads to Urunga (NH2U) and Stage 2 consisting of the remaining approximate 19.5 kilometres of dual carriageway between Warrell Creek and Nambucca Heads (WC2NH). This biodiversity assessment relates to Stage 2 (WC2NH) which is referred to throughout this report as 'the Project'.

Pacifico, the Acciona and Ferrovial Joint Venture (AFJV) has been awarded the contract to design and construct the WC2NH upgrade.

1.2 Background

GeoLINK was engaged by the AFJV to undertake a biodiversity assessment of an area around the southern end of Old Coast Road and to the north of the existing Pacific Highway which has been nominated for the construction of North Facing Ramps (NFR) proposed as part of the WC2NH project (the Proposal) (refer to **Plate 1.1**). The general locality of the proposal is shown in **Illustration 1.1**.

The purpose of this biodiversity assessment is to provide an assessment to address the likely impacts of the Proposal on threatened species, ecological communities and migratory species under the *Threatened Species Conservation Act 1995* (TSC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This assessment has been prepared to assess and compare the impacts of the Proposal with the overall biodiversity impacts assessed as part of the broader Warrell Creek to Urunga (WC2U) Pacific Highway upgrade project (SKM 2010) and provide additional assessment of the impacts on threatened species and endangered ecological communities where required.

This assessment covers additional areas outside the previously approved WC2NH project boundary which have not previously been assessed and are proposed to be included within a revised project boundary to encompass the North Facing Ramps proposal. The subject sites are shown in **Illustration 1.2** and include the following areas:

- Additional clearing required under the Consistency Assessment for North Facing Ramps.
- Additional clearing required under Modification for North Facing Ramps.

Additional areas subject to assessment include a 10 m buffer zone.

The contents of this report are set out as follows:

- **Section 2** describes the methodology for the survey.
- **Section 3** reports on the results of the survey.
- **Section 4** discusses the potential impacts associated with the Proposal.
- **Section 5** discusses mitigation of impacts on threatened and migratory species and EECs affected.

Extensive ecological surveys and assessments have been undertaken as part of the Project Approval and planning stages of the WC2U Project. These include:

- Biodiversity surveys undertaken as part of WC2U Project EA (SKM 2010).
- Targeted threatened flora surveys undertaken by Ecos Environmental of the Project footprint (2013) and utilities relocations for NH2U (2012).
- Targeted threatened orchid surveys undertaken by GeoLINK (2012).
- Mapping of habitat trees as part of the *Warrell Creek to Urunga: Nest Box Plan of Management* (Lewis 2012).
- Microbat surveys as part of the *Warrell Creek to Urunga: Microchiropteran Bat Management Strategy* (Lewis 2013a).
- Frog surveys associated with the *Warrell Creek to Urunga: Giant Barred Frog (Mixophyes iteratus) Management Strategy* (Lewis 2013b).
- Koala surveys and habitat assessment as part of the draft *Warrell Creek to Nambucca Heads Pacific Highway Upgrade - EPBC Act Koala Impact Assessment* (GeoLINK 2013a).
- Biodiversity surveys undertaken as part of the draft *Biodiversity Assessment – WC2NH Utilities Installation and Decommissioning as Part of the WC2U Project* (GeoLINK 2013b).
- Ecological Groundtruthing as part of the preliminary assessment for the WC2NH North Facing Ramps (GeoLINK 2015)

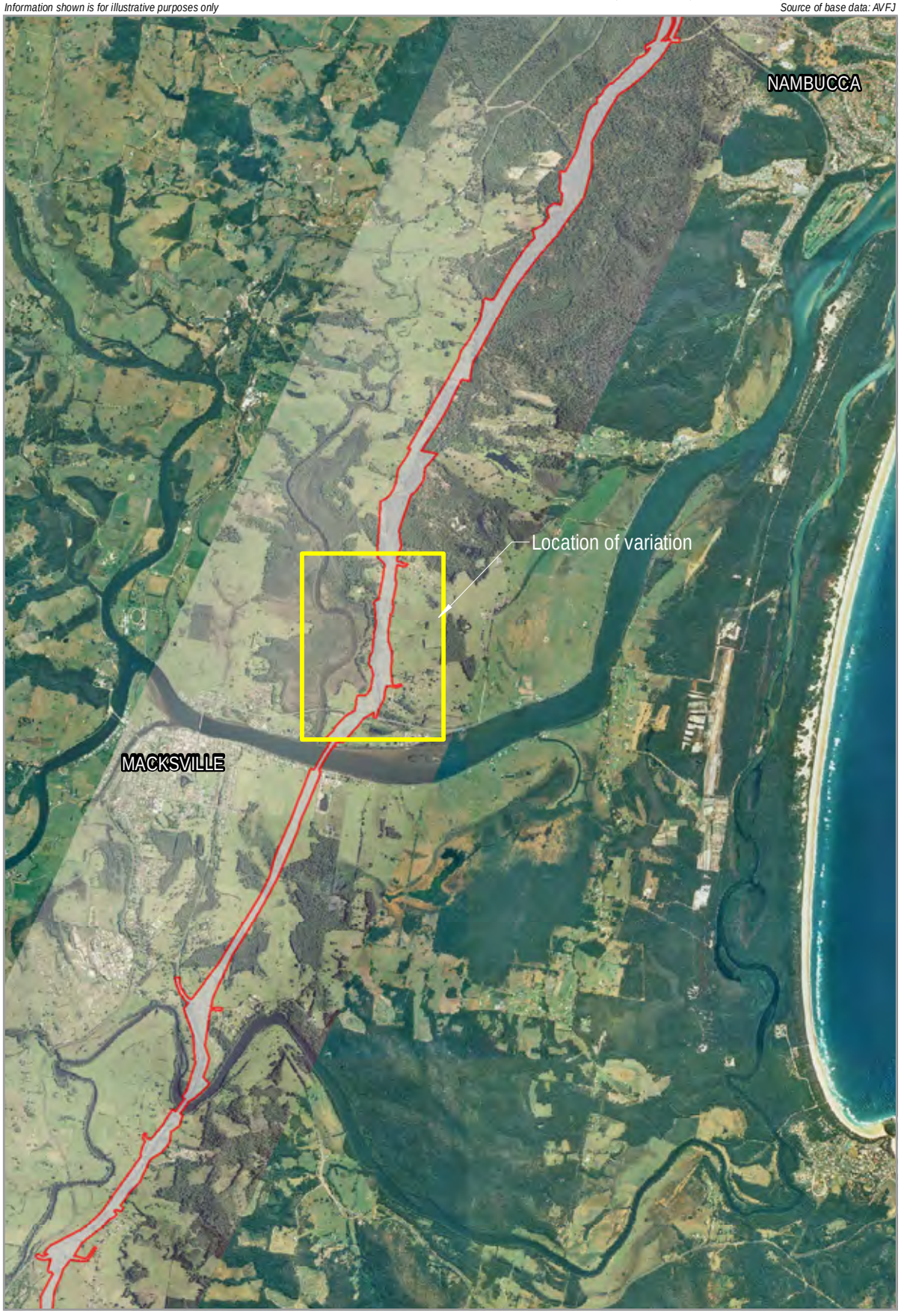
The following additional data corresponding to the above studies was provided by NSW Roads and Maritime Services and has been reviewed as part of this assessment:

- Spider_Orchids_Ecopro.
- Slender_Marsdenia_Ecopro.
- Giant_Barred_Frog_Habitat_18_04_13.
- LikelyGreenThighedFrogHabitat_18_04_13.
- Moderate_likelihood_Giant_barred_frog_18_04_13.
- Lewis_Ecological_Survey_HBT_121102.
- Lewis_Ecological_Survey_HBT_120414.

Drawn by: RE Checked by: GJM Reviewed by: DGH Date: 24/11/2015

Information shown is for illustrative purposes only

Source of base data: AVFJ



LEGEND

Approved Project Boundary 02/12/14_V2

0 1.2 km

North

Context Map

Information shown is for illustrative purposes only

Drawn by: RE Checked by: GJM Reviewed by: JOL Date: 11/11/15
Source of base data: AFJV

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AREA 4
AREA 5
AREA 3
AREA 1
AREA 2
OLD COAST ROAD
PACIFIC HIGHWAY

LEGEND
- Approved Project Boundary 02/12/14_V2
- North Facing Ramps proposed project boundary 03/09/2015 including Design refinements
- Additional clearing required under Consistency Assessment for North Facing Ramps
- Additional clearing required under Modification for North Facing Ramps

0 60

North

GeoLINK environmental management and design

Biodiversity Assessment - North Facing Ramps - Warrell Creek to Nambucca Heads Pacific Highway Upgrade
2378-1174

Subject Site

Illustration 1.2

Plate 1.1 View of the proposal site, looking south

2. Methodology

2.1 Overview

The methodology for this biodiversity assessment has been formulated based on a review of the NSW Department of Environment and Conservation (DEC, now Office of Environment and Heritage) *Threatened Species Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft, November 2004* (DEC 2004a). The methodology is broadly as follows:

- Desktop review.
- Undertake flora and fauna field surveys.
- Assess the habitat value.
- Assess the ecological impacts.
- Outline mitigation measures to be implemented to reduce potential impacts.

The assessment covers the subject sites as shown in **Illustration 1.2**. Detailed methodology for the assessment is provided in the following sections.

2.2 Desktop Review

A desktop review was undertaken to determine the flora and fauna species and plant communities of conservation significance recorded previously, or potentially occurring at the site. The results of the desktop review were used to assist with consideration of species to be targeted during field surveys. Reviewed material included:

- Searching the OEH BioNET Atlas of NSW Wildlife and EPBC Act Protected Matters Online Search Tool databases for records of threatened species and endangered populations within approximately 10 kms of the site.
- Searching for records of Rare or Threatened Australian Plants (RoTAP) listed species from the Nambucca Shire Council (NSC) local government area (LGA) using the PlantNet website database.
- Relevant reports including the Project EA (SKM 2010), Threatened Flora Management Plan (Ecos Environmental 2013) and EPBC Act Koala Impact Assessment (GeoLINK 2013a).
- Review of the relevant WC2U fauna management plans and strategies (Lewis 2012, 2013a, 2013b).
- Review of the Office of Environment and Heritage (OEH) Critical Habitat register.
- Review of the Department of Planning (DoP) *State Environmental Planning Policy (SEPP) 14 – Coastal Wetland and SEPP 26 – Littoral Rainforest* mapping.

2.3 Field Surveys

Field surveys were undertaken on the 14 April 2015 and involved preliminary groundtruthing of the vegetation communities present at the sites. Additional surveys were undertaken on 6 November 2015 and involved undertaking a meander survey throughout the entire study area. These surveys involved:

- Identifying vegetation communities and EECs within the study area.
- Target threatened flora searches.
- Identification of significant fauna habitat features.

The meander survey methods adopted were conducted according to the *Threatened Species Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft, November 2004* (DEC 2004).

3. Results

3.1 Desktop Review

3.1.1 Threatened Species Database Searches

OEH BioNet Atlas of NSW Wildlife
A search of the Atlas of NSW Wildlife for threatened flora for a search area encompassing approximately 10 km surrounding the site identified records of 33 threatened species (seven flora and 26 fauna species) listed under the TSC Act (refer to **Appendix A**). A potential occurrence assessment of these species (excluding marine species) within the study area is provided in **Appendix B**.

EPBC Protected Matters Report
Results from the Protected Matters Search Tool for a search area encompassing approximately 10 kilometres surrounding the site identified 65 threatened species (11 flora and 40 fauna species) listed under the EPBC Act that are 'likely to occur' or 'may occur' within the search area or have habitat that is 'likely to occur' or 'may occur' within the search area. Of the 40 fauna species listed, only 18 require further consideration as the remaining 22 fauna species are dedicated marine species, for which no suitable habitat occurs on or adjacent to the study area. The database search results are provided in **Appendix A**, while a potential occurrence assessment of the non-marine species within the study area is provided in **Appendix B**.

Migratory Species
A total of 60 migratory species listed by the EPBC Act were identified for the search area by the Protected Matters Search Tool (refer to **Appendix A**). Seven are listed as migratory terrestrial species, 15 are listed as migratory wetland species and the remainder are listed as migratory marine species.

Threatened Ecological Communities
Three threatened ecological communities Littoral Rainforest and Coastal Vine Thickets of Eastern Australia, Lowland Rainforest of Subtropical Australia and Subtropical and Temperate Coastal Saltmarsh are listed under the EPBC Act were identified as likely to occur within the search area by the Protected Matters Search Tool (refer to **Appendix A**).

3.1.2 Critical Habitat

A search of the Register of Critical Habitat (6/11/2015) indicated that the site does not contain or adjoin any areas of listed Critical Habitat.

3.1.3 SEPP14 Coastal Wetland

No occurrences of SEPP 14 Coastal Wetlands or SEPP 26 Littoral Rainforest are within the study area. The closest area of SEPP 14 Coastal Wetland is associated with the Nambucca River floodplain and Newee Creek to the west of the study area.

3.1.4 Review of Project Environmental Reports

Threatened fauna species identified as potential occurrences and needing consideration for impact assessment were identified through review of the Project EA with additional species identified through the updated EPBC Act Protected Matters Search Tool and OEH BioNet database searches (refer to **Appendix B**).

The Project EA confirmed 14 threatened species and considered a further 13 threatened species as potential occurrences within the WC2U study area (refer to Table 10-7 in Section 7 of the Project EA). The EPBC Act Protected Matters Search Tool and OEH BioNet database searches identified a further 24 threatened fauna species or species habitat that are known or likely to occur within 10 km of the WC2NH project footprint, excluding marine species. Refer to the potential occurrence assessment for these species in **Appendix B**.

Threatened flora species identified as being potential occurrences and needing consideration for impact assessment were based on the list of species identified in the *WC2U Threatened Flora Management Plan* (Ecos Environmental 2013). Twenty known or potentially occurring threatened flora species were identified as target species for threatened flora surveys of the Project construction footprint (plus 10 m) undertaken by Ecos Environmental (2013). No additional species were identified in the EPBC Act Protected Matters Search Tool and OEH BioNet database search.

3.2 Field Surveys

3.2.1 General Survey Results

In general the areas surveyed comprised largely cleared and modified lands which have been historically used for agricultural pursuits. Native vegetation on the sites is represented by isolated paddock trees and some small areas comprising the following native vegetation communities:

- *Moist Open Forest – White Mahogany – Grey Gum.*
- *Swamp Oak regrowth*.
- *Dry Open Forest – Blackbutt*.
- Swamp *Mahogany/ Paperbark Forest (Swamp Sclerophyll Forest EEC)*

A summary of the field survey results are shown in **Table 3.1**. Ecological constraints associated with the sites are shown in **Illustration 3.1** and **Illustration 3.2** and discussed in the sections below.

Table 3.1 Summary of Field Survey Results

Area	*Vegetation Description*	*Fauna Habitats Present*	*Photos*
Area 1	A small area of *Swamp Mahogany/ Paperbark Forest (Swamp Sclerophyll Forest EEC)* occurs in the south eastern corner of the site directly adjacent to the existing Pacific Highway. Weeds species such as Lantana, Camphor Laurel and Morning Glory also occur in this portion of the site.	▪ Wetland areas surrounding the site provide potential habitat for locally occurring/ migratory wetland birds. ▪ Small areas of Swamp Forest provide potential roosting/ nesting habitat for locally occurring/ migratory bird species. ▪ Areas of Swamp Forest representing potential Koala habitat occur given the presence of Swamp Mahogany (*Eucalyptus robusta*) a preferred Koala food tree.	
Area 2	A small area of *Swamp Mahogany/ Paperbark Forest (Swamp Sclerophyll Forest EEC)* occurs in the south eastern corner of the site directly adjacent to the existing Pacific Highway. The inundated portion of the site supports a number of common Freshwater Wetland species dominated by *Blechnum* Fern with nearby forested Swamp Forest EEC. Weed species such as Lantana, Camphor Laurel and Morning Glory also occur in this portion of the site.	▪ The inundated area would provide habitat for aquatic fauna and locally occurring/ migratory wetland birds.	

Area	Vegetation Description	Fauna Habitats Present	Photos
Area 3	The area is representative of regrowth Swamp Oak forest and flanks Old Coast Road and Letitia Close on steep cut batters. Also present is Camphor Laurel and Privet with scattered occurrences of Lantana, Blackberry and Bracken Fern occurring in the southern parts of this site around the intersection of Old Coast Road and the existing Pacific Highway.	▪ Given the steep nature of the batters and the young regrowth vegetation present only low value fauna habitat would be available in this area.	
Area 4	Area 4 is predominantly cleared pasture land dominated by Broad-leaved Paspalum with a remnant stand of mature *Moist Open Forest – White Mahogany Grey Gum* occurring in the western portion of the site, which runs parallel to Old Coast Road on both the eastern and western sides of the road. This vegetation contains a high density of hollow-bearing trees with a number of trees supporting multiple hollows. This area was nominated as *Nest Box Replacement Zone 'S'*, within the WC2NH Nest Box Management Plan. A total of 25 nest boxes have been installed (with a further 24 nest boxes prescribed for installation in this area) to compensate for hollow bearing trees cleared for highway construction. Scattered paddock trees also occur on cleared areas of the site including Swamp Turpentine, Tallowwood and conifer species.	▪ Hollows within mature trees/ stags would provide nesting/ denning or roosting habitat for hollow dependant fauna species. ▪ This area also supports known records of Slender Marsdenia nominated for insitu roadside monitoring as the plants are outside of the current approved clearing limits. ▪ Areas of Moist Open Forest representing potential Koala habitat occur within the Moist Open Forest within the site and would be impacted by the proposal. ▪ Potential habitat for locally occurring arboreal mammals including Koala, Glider and Possums as part of the surrounding forested areas of the Nambucca State Forest.	 ▪ Moist open forest on the eastern side of Old Coast Road.

Area	Vegetation Description	Fauna Habitats Present	Photos
			 ▪ Moist Open Forest on the western side of Old Coast Road.
Area 5	Predominantly cleared pasture land surrounds a residential property which supports Swamp Forest EEC and adjacent low lying areas in the eastern part of the site. This stand includes some ephemeral wetland elements and has a small dam and drainage line which runs through the property.	▪ A small farm dams occurs on the site and would provide habitat opportunities for aquatic fauna and locally occurring migratory/ wetland birds. ▪ Wetland areas surrounding the site provide potential habitat for locally occurring migratory/ wetland birds. ▪ A small area of Swamp Forest EEC provides potential roosting/ nesting habitat for locally occurring/ migratory bird species. ▪ 1 Nest box installed by the landowner and two active bird nests are present within the stand.	

3.2.2 Noxious Weeds

The following noxious weeds listed under the *Noxious Weeds Act 1993* (NW Act) are present within the study area:

- Fireweed.
- Lantana.
- Blackberry (mostly under control).

Additionally, environmental weeds including Whiskey Grass, Camphor Laurel and Coolatai Grass were detected over large parts of the subject sites. Measures to manage these weed species are outlined in the Weed and Pathogen Management Plan (WPMP) for the project.

3.2.3 Threatened Flora Species

One threatened flora species was de within the subject sites, namely Slender Marsdenia (*Marsdenia longiloba*) which is listed as endangered under the TSC Act and vulnerable under the EPBC Act. A number of Slender Marsdenia plants occur immediately adjacent to Old Coast Road (recorded previously as part of earlier studies on the project) associated with areas of Moist Open Forest (refer to **Illustration 3.1** and **Illustration 3.2**).

Slender Marsdenia plants identified within the subject site are included as part of the *WC2NH Threatened Flora Management Plan* as threatened plants which are to be retained and monitored in situ. It is envisaged that should impacts to Slender Marsdenia or other threatened species be unavoidable, translocation of impacted plants should be undertaken in accordance with the requirements of the *Threatened Flora Management Plan*.

Milky Silkpod (*Parsonsia dorrigoensis*) has been recorded at the southern extent of the WC2NH Project site associated with areas of Moist Open Forest. This species has some potential to occur within areas associated with the subject site, based on appropriate habitat type being present. However it is considered to have a very low potential to occur based on the extensive surveys undertaken associated with the subject site which have not detected this species to date.

3.2.4 Endangered Ecological Communities

The following TSC Act listed EECs occur within the broader area surrounding the subject sites (including a 50 m buffer zone):

- *Swamp Sclerophyll Forest EEC.*
- *Swamp Forest – Swamp Mahogany/ Paperbark EEC.*
- *Freshwater Wetland EEC.*
- *Swamp Oak Forest EEC.*

The NFR proposal would impact an additional 2,170 m^2 (0.217 ha) of *Swamp Forest – Swamp Mahogany/ Paperbark EEC* (refer to **Illustration 3.1** and **Illustration 3.2**). EEC to be affected is moderately to highly disturbed (following historic clearing, livestock grazing, drainage modification and dam construction, and edge effects). This vegetation comprises relatively small and fragmented patches of regrowth vegetation. Similar areas of EEC occur adjacent to the study area and within the broader locality, where equivalent and better quality examples occur on the Nambucca River and Warrell Creek floodplains.

3.2.5 Fauna Habitat Assessment

3.2.5.1 Fauna Habitat Types

The subject sites include the following general fauna habitat types as described in the Project EA:

- Aquatic/ riparian habitats: occurrences on site are of low to moderate habitat value.
- Modified habitats: dominant habitat type across the site and of low habitat value.
- Dry open forests: small areas of this habitat type (e.g. Blackbutt forest) associated with the site.
- Moist open forest: small areas of this habitat type associated with sites of moderate habitat value.
- Swamp forest: small occurrences on site are of low to moderate habitat value.

Descriptions of the values of these habitats are provided in the Project EA. The key habitat features within the study area include:

- **Aquatic/ riparian habitats**: occur within parts of the subject site consisting of disturbed swamp forest wetlands, farm dams and modified drainage lines providing potential habitat for common frogs (low likelihood of supporting threatened frog species) and birds, including the TSC Act listed species Black-necked Stork and Brolga.
- **Hollow-bearing trees**: a number of hollow-bearing trees are associated with mature trees occurring on the sites. It is envisaged that a number of mature trees containing hollows will be impacted by the proposal.
- **Nest Box Replacement Zone**: a total of 49 Nest boxes have been prescribed for installation within Nest Box Replacement Zone S with 25 already installed at this location. It is envisaged that a number of trees supporting nest boxes will be impacted by the proposal.
- **Koala food trees**: low densities of primary Koala food trees Tallowwood (*Eucalyptus* microcorys) and Swamp Mahogany are associated with areas of moist open forest and to a lesser extent swamp forest. However, scat and scratch searches below trees failed to record any evidence of Koala activity. Based on Koala Population Monitoring undertaken, it is currently considered that areas associated with the WC2NH project experience low level usage by Koalas.

In general, although the subject site was found to contain a variety of fauna habitat resources, relative to the extent of habitat within the Approved Project footprint and retained habitats within the broader locality the Proposal affects a minor portion of the habitat available locally.

3.2.5.2 Threatened Fauna

No threatened fauna species were detected during the field surveys within the NFR subject sites. The sites provides moderate to high value habitat locally throughout moist open forest due to the density of hollow bearing trees which is expected to be partially impacted by the proposal. A potential occurrence assessment of threatened fauna species is provided in **Appendix B** (excluding marine species).

The following threatened fauna species were considered known/ potential occurrences in areas associated with the subject sites:

- Varied Sittella (*Daphoenositta chrysoptera*).
- Black-necked Stork (*Ephippiorhynchus asiaticus*).
- Little Lorikeet (*Glossopsitta pusilla*).
- Brolga (*Grus rubicunda*).
- Little Eagle (*Hieraaetus morphnoides*).

- Swift Parrot (*Lathamus discolor*).
- Square-tailed Kite (*Lophoictinia isura*).
- Masked Owl (*Tyto novaehollandiae*).
- Black Bittern (*Ixobrychus flavicollis*).
- Regent Honeyeater (*Xanthomyza phrygia*)
- Little Bentwing-bat (*Miniopterus australis*).
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*).
- Eastern Freetail-bat (*Mormopterus norfolkensis*).
- Grey-headed Flying-fox (*Pteropus poliocephalus*).
- Large-footed Myotis (*Myotis macropus*).
- Greater Broad-nosed Bat (*Scoteanax rueppellii*).
- Eastern Blossom bat (*Syconycteris australis*)
- Koala (*Phascolarctos cinereus*).
- Yellow-bellied Glider (*Petaurus australis*)
- Spotted-tailed Quoll (*Dasyurus maculatus*)

For all of these species, the habitat within the subject sites forms a minor portion of the habitat available to the known/ potentially occurring local populations of these species in the locality. Key habitat features (e.g. significant foraging habitat, potential breeding habitat, etc.) for most of these species either do not occur within the study area or are minor occurrences within the study area relative to their local occurrence.

3.2.6 EPBC Act Listed Migratory Species

The values of the site for EPBC Act listed migratory species is generally as described in the Project EA. Results of the field survey and the nature of the Proposal (small vegetation impacts) concur with the Project EA statement that: '*There is no evidence to suggest that an area of important habitat exists or that the study area is occupied by an ecologically significant proportion of a population of a migratory species*.' Consequently, it is unlikely that any EPBC Act listed migratory species would be significantly affected by the Proposal, triggering the need for referral to the Australian Government Department of Environment (DoE).

Information shown is for illustrative purposes only

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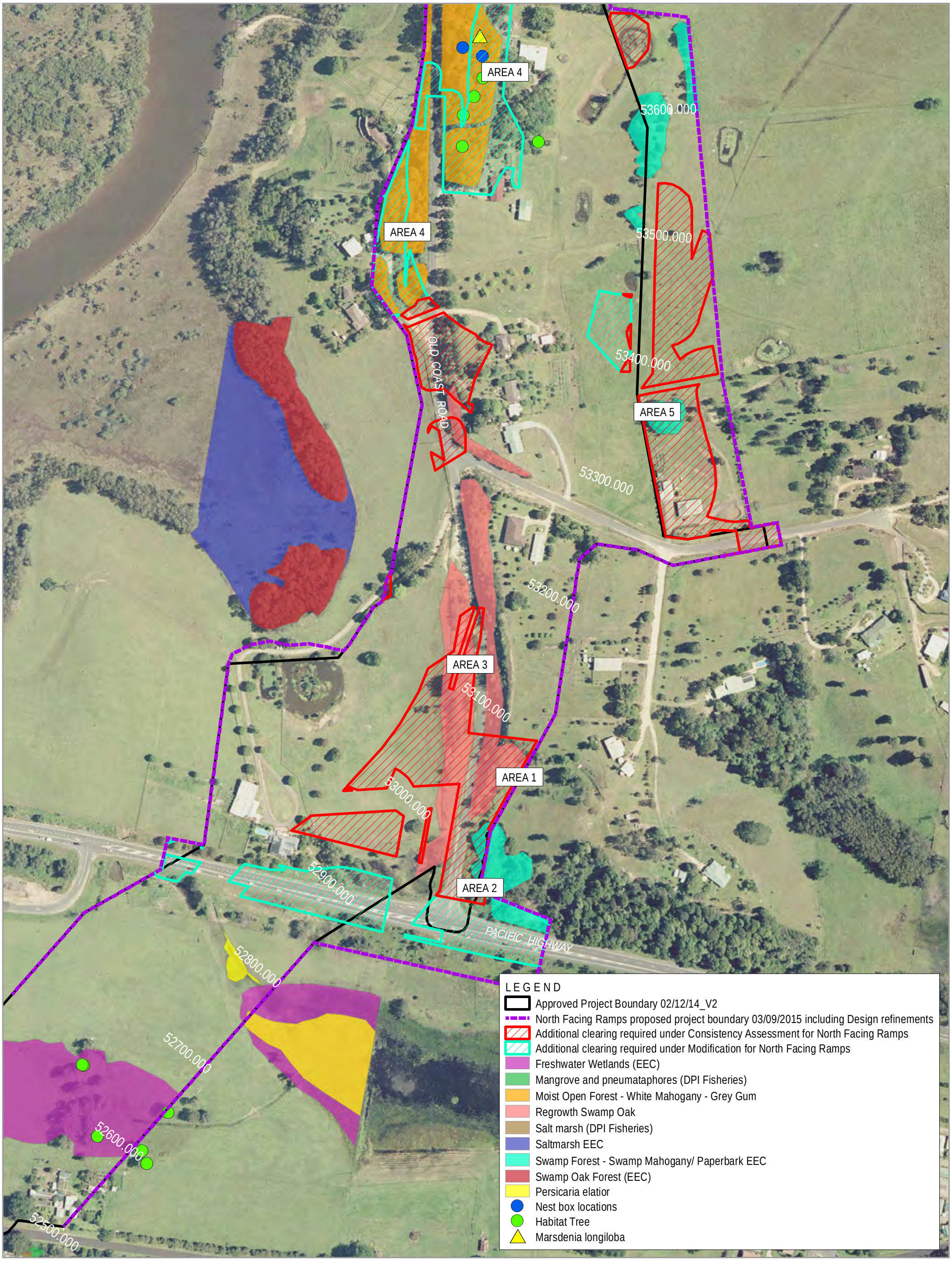

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North

GeoLINK environmental management and design

Biodiversity Assessment - North Facing Ramps - Warrell Creek to Nambucca Heads Pacific Highway Upgrade
2378-1170

Ecological Constraints

Illustration 3.1

Information shown is for illustrative purposes only

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OLD COAST ROAD

AREA 4

LEGEND
- Approved Project Boundary 02/12/14_V2
- North Facing Ramps proposed project boundary 03/09/2015 including Design refinements
- Additional clearing required under Consistency Assessment for North Facing Ramps
- Additional clearing required under Modification for North Facing Ramps
- Moist Open Forest - White Mahogany - Grey Gum
- Open Forest - Blackbutt
- Swamp Forest - Swamp Mahogany/ Paperbark EEC
- Nest box locations
- Habitat Tree
- Marsdenia longiloba

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North

GeoLINK environmental management and design

Biodiversity Assessment - North Facing Ramps - Warrell Creek to Nambucca Heads Pacific Highway Upgrade
2378-1170

Ecological Constraints

Illustration 3.2

4. Potential Biodiversity Impacts

4.1 Potential Impacts

Clearing impacts to vegetation communities and threatened fauna habitats from the NFRs proposal are summarised in **Table 4.1**. Vegetation clearing impacts are separated into those affected as part of:

- additional clearing required under the Consistency Assessment for North Facing Ramps; and
- additional clearing required under Modification for North Facing Ramps.

Clearing areas are shown including a 10 m buffer and 15 m buffer.

In addition the proposal would have the following impacts on biodiversity:

- Potential clearing impacts to a number of Slender Marsdenia adjacent to Old Coast Road. Impacts to this species are to be avoided if possible (refer to further mitigation measures for this species in **Section 5)**.
- Habitat removal for potentially occurring EPBC, TSC Act and ROTAP listed flora species (refer to **Table 4.1**).
- Likely loss of hollow-bearing trees but as mentioned it is envisaged that clearing of mature vegetation would be minimised where possible.
- Likely loss of trees currently supporting nest boxes installed for hollow bearing tree loss, however these boxes can relocated. Partial loss of *Nest Box Replacement Zone S*.
- Habitat removal for locally occurring fauna, including EPBC listed species, (refer to **Table 4.1**) below, although habitats present are generally of low quality with the exception of native vegetation represented by the moist open forest stand which would be partially impacted. The Proposal may contribute to habitat fragmentation although this would be minor given that clearing of native vegetation would be avoided.
- The use of the subject sites for NFRs would have the potential to contribute to the risk of introducing/ and or spreading weeds and pathogens to/ from the site.
- The Proposal would incrementally contribute to the overall risk associated the wildlife injury and mortality associated with the Approved Project during vegetation/ habitat removal/ modification, though only to a relatively minor extent.

Table 4.1 Summary of Clearing Impacts

Vegetation/ Habitat Type Impacted	*Clearing Areas (m^2) including 10 m Buffer*			*Clearing Areas (m^2) including 15 m Buffer*		
	Clearing Required under Consistency Assessment for NFR	*Clearing Required under Modification for NFR*	*Total Area*	*Clearing Required under Consistency Assessment for NFR*	*Clearing Required under Modification for NFR*	*Total Area*
Vegetation Communities						
Open Forest – Blackbutt	222	-	**222**	620	10	**630**
Moist Open Forest – White Mahogany, Grey Gum	-	13,240	**13,240**	-	15,250	**15,250**
Swamp Mahogany/ Paperbark (Swamp Sclerophyll Forest EEC)	1,400	770	**2,170**	1,454	837	**2,291**
Regrowth Swamp Oak	5,557	-	**5,557**	5,704	-	**5,704**
Threatened Fauna Potential Habitat						
Regent Honeyeater	1,400	770-	**2,170**	1,454	837	**1,454**
Koala	1,622-	14,010-	**15,632-**	2,074	16,097	**18,171**
Grey-headed Flying-fox habitat (foraging habitat)	1,622-	14,010-	**15,632-**	2,074	16,097	**18,171**
Spotted-tailed Quoll habitat	1,622-	14,010-	**15,632-**	2,074	16,097	**18,171**
Threatened Flora Potential Habitat						
Slender Marsdenia	-	13,240	**13,240**	-	15,250	**15,250**
Milky Silkpod	-	13,240	**13,240**	-	15,250	**15,250**

4.2 Statutory Considerations

4.2.1 Threatened Flora

The proposal has the potential to impact one threatened flora species, Slender Marsdenia. A number of plants occurring in proximity to Old Coast Road may be impacted. The design should aim to avoid impacts to this plant. If this is not possible, translocation affected individuals should be undertaken in accordance with the *WC2NH Threatened Flora Management Plan*.

In the event that translocation of a number of Slender Marsdenia plants is required, additional impacts to this species would not be substantially different to that assessed as part of the WC2NH project. The conclusions of the Project EA would not be altered in relation to this species.

4.2.2 EEC

The proposal would impact an additional 2,170 square metres (0.217 ha) of *Swamp Forest – Swamp Mahogany/Paperbark EEC* (allowing for a 10 m buffer). Additional impacts to this EEC are relatively minor however cumulative in relation to impacts associated with the broader WC2U project. These additional impacts would not alter the conclusions of the Project EA in relation to this EEC.

4.2.3 Threatened/ Migratory Fauna

In relation to listed threatened/ migratory fauna species, while the project would affect some additional areas of low quality habitat for such species, the impacts of this would be unlikely to alter the conclusions of the Project EA.

As discussed in **Section 3.2.6**, it is unlikely that any EPBC Act listed migratory species would be significantly affected by the Proposal and trigger the need for referral to the DoE.

5. Mitigation Measures

5.1 Mitigation Measures

In order to minimise impacts to biodiversity it is recommended that the detailed design process would aim to position NFRs to:

- avoid direct impacts (clearing) to areas of EEC and provided a 10 m buffer to these areas where possible;
- avoid impacts to the identified locations of Slender Marsdenia with the final design of the NFR;
- avoid clearing of native vegetation where possible; and
- avoid clearing of hollow bearing trees where possible.

Additionally the following measures should be undertaken in order to ameliorate impacts to biodiversity.

- An additional Nest Box Replacement Zone of similar quality habitat should be selected for relocation of nest boxes.
- Should impacts to Slender Marsdenia be unavoidable, translocation of the affected individual must be undertaken in accordance with the *WC2NH Threatened Flora Management Plan*. In this instance, consideration of additional biodiversity offsetting requirements should be undertaken by RMS.

6. Conclusions

6.1 Conclusion

The Proposal would have a minor incremental negative effect on local biodiversity relative to the impacts of the Approved WC2NH Proposal.

Previous assessments of significance for threatened species, migratory species and EECs impacted by the broader WC2NH project have been prepared for the Project EA. These assessments have been reviewed and updated in relation to additional impacts to threatened species, migratory species and EECs from the potential clearing of the Project footprint. Whilst these works would contribute to additional incremental impacts to threatened species and EECs as part of the broader WC2NH project, the Proposal would not increase the risk of 'significant impacts' to threatened species and EECs.

References

DEC (2004). *Threatened Biodiversity Survey and Assessment: guidelines for developments and activities (working draft)*. NSW Department of Environment and Conservation, Hurstville, NSW.

Ecos Environmental (2013). Warrell Creek to Urunga upgrade: Threatened Plant Species Management Plan. Report to Roads and Maritime Services.

GeoLINK (2013). *Draft Biodiversity Assessment – WC2NH Utilities Installation and Decommissioning as Part of the WC2U Project.* Unpublished report to Roads and Maritime Services. GeoLINK Consulting, Coffs Harbour.

Lewis, B.D. (2012). Warrell Creek to Urunga: Nest Box Plan. Report prepared by Lewis Ecological Surveys for NSW Roads and Maritime Services.

Lewis, B.D. (2013a). Warrell Creek to Urunga: Microchiropteran Bat Management Strategy. Report prepared by Lewis Ecological Surveys for NSW Roads and Maritime Services.

Lewis, B.D. (2013b). Warrell Creek to Urunga: Giant Barred Frog (Mixophyes iteratus) Management Strategy. Report prepared by Lewis Ecological Surveys for NSW Roads and Maritime Services.

SKM (2010). *Environmental Assessment – Upgrading the Pacific Highway Warrell Creek to Urunga*. Report to Roads and Maritime Services.

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Appendix A

BioNET and EPBC Act Database Searches

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. The data are only indicative and cannot be considered comprehensive inventory, and may contain errors and omissions.
Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°; ^^ rounded to 0.01°).

Search criteria : Public Report of all Valid Records of Threatened (listed on TSC Act 1995) or Commonwealth listed Animals in selected area [North: -30.62 Wes
152.82 East: 153.03 South: -30.82] returned a total of 930 records of 52 species.
Report generated on 7/11/2013 3:52 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records
Animalia	Amphibia	Myobatrachidae	3073	*^Mixophyes balbus*		Stuttering Frog	E1,P,2	V	1
Animalia	Amphibia	Hylidae	3166	*Litoria aurea*		Green and Golden Bell Frog	E1,P	V	2
Animalia	Amphibia	Hylidae	3169	*Litoria brevipalmata*		Green-thighed Frog	V,P		5
Animalia	Reptilia	Cheloniidae	2004	*Caretta caretta*		Loggerhead Turtle	E1,P	E	1
Animalia	Reptilia	Cheloniidae	2007	*Chelonia mydas*		Green Turtle	V,P	V	2
Animalia	Aves	Columbidae	0025	*Ptilinopus magnificus*		Wompoo Fruit-Dove	V,P		18
Animalia	Aves	Procellariidae	0929	*Macronectes giganteus*		Southern Giant Petrel	E1,P	E	2
Animalia	Aves	Procellariidae	0971	*Pterodroma solandri*		Providence Petrel	V,P	J	1
Animalia	Aves	Ciconiidae	0183	*Ephippiorhynchus asiaticus*		Black-necked Stork	E1,P		47
Animalia	Aves	Ardeidae	0196	*Ixobrychus flavicollis*		Black Bittern	V,P		5
Animalia	Aves	Accipitridae	0225	*Hieraaetus morphnoides*		Little Eagle	V,P		2
Animalia	Aves	Accipitridae	0230	*^^Lophoictinia isura*		Square-tailed Kite	V,P,3		14
Animalia	Aves	Accipitridae	8739	*^^Pandion cristatus*		Eastern Osprey	V,P,3		52
Animalia	Aves	Gruidae	0177	*Grus rubicunda*		Brolga	V,P		4
Animalia	Aves	Burhinidae	0175	*Esacus magnirostris*		Beach Stone-curlew	E4A,P		15

Animalia	Aves	Haematopodidae	0131	*Haematopus fuliginosus*	Sooty Oystercatcher	V,P		6
Animalia	Aves	Haematopodidae	0130	*Haematopus longirostris*	Pied Oystercatcher	E1,P		14
Animalia	Aves	Scolopacidae	0166	*Calidris alba*	Sanderling	V,P	C,J,K	2
Animalia	Aves	Scolopacidae	0160	*Xenus cinereus*	Terek Sandpiper	V,P	C,J,K	2
Animalia	Aves	Laridae	0117	*Sternula albifrons*	Little Tern	E1,P	C,J,K	49
Animalia	Aves	Cacatuidae	0265	*^Calyptorhynchus lathami*	Glossy Black-Cockatoo	V,P,2		180
Animalia	Aves	Psittacidae	0260	*Glossopsitta pusilla*	Little Lorikeet	V,P		5
Animalia	Aves	Psittacidae	0309	*^^Lathamus discolor*	Swift Parrot	E1,P,3	E	2
Animalia	Aves	Strigidae	0246	*^^Ninox connivens*	Barking Owl	V,P,3		1
Animalia	Aves	Strigidae	0248	*^^Ninox strenua*	Powerful Owl	V,P,3		9
Animalia	Aves	Tytonidae	0250	*^^Tyto novaehollandiae*	Masked Owl	V,P,3		10
Animalia	Aves	Tytonidae	9924	*^^Tyto tenebricosa*	Sooty Owl	V,P,3		20
Animalia	Aves	Maluridae	0527	*Stipiturus mallee*	Mallee Emu-wren	P	E	1
Animalia	Aves	Meliphagidae	0603	*Anthochaera phrygia*	Regent Honeyeater	E4A,P	E	1
Animalia	Aves	Neosittidae	0549	*Daphoenositta chrysoptera*	Varied Sittella	V,P		3
Animalia	Aves	Campephagidae	0428	*Coracina lineata*	Barred Cuckoo-shrike	V,P		7
Animalia	Mammalia	Dasyuridae	1008	*Dasyurus maculatus*	Spotted-tailed Quoll	V,P	E	8
Animalia	Mammalia	Dasyuridae	1017	*Phascogale tapoatafa*	Brush-tailed Phascogale	V,P		6
Animalia	Mammalia	Phascolarctidae	1162	*Phascolarctos cinereus*	Koala	V,P	V	32
Animalia	Mammalia	Petauridae	1136	*Petaurus australis*	Yellow-bellied Glider	V,P		119
Animalia	Mammalia	Petauridae	1137	*Petaurus norfolcensis*	Squirrel Glider	V,P		23
Animalia	Mammalia	Pteropodidae	1280	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	109
Animalia	Mammalia	Pteropodidae	1294	*Syconycteris australis*	Common Blossom-bat	V,P		4

Animalia	Mammalia	Emballonuridae	1321	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V,P		1
Animalia	Mammalia	Molossidae	1329	*Mormopterus norfolkensis*	Eastern Freetail-bat	V,P		12
Animalia	Mammalia	Vespertilionidae	1372	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V,P		2
Animalia	Mammalia	Vespertilionidae	1369	*Kerivoula papuensis*	Golden-tipped Bat	V,P		2
Animalia	Mammalia	Vespertilionidae	1346	*Miniopterus australis*	Little Bentwing-bat	V,P		47
Animalia	Mammalia	Vespertilionidae	1834	*Miniopterus schreibersii oceanensis*	Eastern Bentwing-bat	V,P		14
Animalia	Mammalia	Vespertilionidae	1357	*Myotis macropus*	Southern Myotis	V,P		5
Animalia	Mammalia	Vespertilionidae	1336	*Nyctophilus bifax*	Eastern Long-eared Bat	V,P		1
Animalia	Mammalia	Vespertilionidae	1361	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V,P		7
Animalia	Mammalia	Vespertilionidae	1025	*Vespadelus troughtoni*	Eastern Cave Bat	V,P		1
Animalia	Mammalia	Otariidae	1882	*Arctocephalus pusillus doriferus*	Australian Fur-seal	V,P		1
Animalia	Mammalia	Balaenopteridae	1575	*Megaptera novaeangliae*	Humpback Whale	V,P	V	2
Animalia	Mammalia	Physeteridae	1578	*Physeter macrocephalus*	Sperm Whale	V,P		1
Animalia	Insecta	Hesperiidae	I023	*Ocybadistes knightorum*	Black Grass-dart Butterfly	E1		50

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. The data are only indicative and cannot be considered comprehensive inventory, and may contain errors and omissions.
Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°; ^^ rounded to 0.01°).

Search criteria : Public Report of all Valid Records of Threatened (listed on TSC Act 1995) or Commonwealth listed Plants in selected area [North: -30.62 West: 152.82 East: 153.03 South: -30.82] returned a total of 149 records of 11 species.
Report generated on 7/11/2013 3:56 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records
Plantae	Flora	Apocynaceae	1233	*Marsdenia longiloba*		Slender Marsdenia	E1,P	V	34
Plantae	Flora	Apocynaceae	9505	*Parsonsia dorrigoensis*		Milky Silkpod	V,P	E	66
Plantae	Flora	Fabaceae (Faboideae)	11606	*Glycine clandestina (broad leaf form)*		Glycine clandestina (broad leaf form) in the Nambucca Local Government Area	E2		1
Plantae	Flora	Juncaginaceae	3363	*Maundia triglochinoides*			V,P		1
Plantae	Flora	Menispermaceae	7167	*Tinospora smilacina*		Tinospora Vine	E1,P		1
Plantae	Flora	Myrtaceae	4252	*Melaleuca groveana*		Grove's Paperbark	V,P		6
Plantae	Flora	Orchidaceae	6630	*^Dendrobium melaleucaphilum*		Spider orchid	E1,P,2		15
Plantae	Flora	Poaceae	8979	*Alexfloydia repens*		Floyd's Grass	E1,P		4
Plantae	Flora	Rutaceae	6457	*Acronychia littoralis*		Scented Acronychia	E1,P	E	7
Plantae	Flora	Santalaceae	5871	*Thesium australe*		Austral Toadflax	V,P	V	1
Plantae	Flora	Sapotaceae	11957	*Niemeyera whitei*		Rusty Plum, Plum Boxwood	V,P		13

Australian Government
Department of the Environment

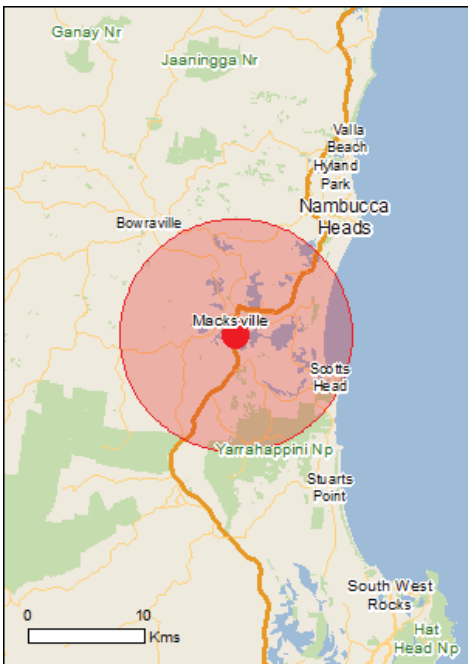
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

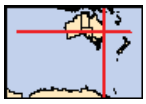
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 07/11/13 15:43:19



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	65
Listed Migratory Species:	58

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	3
Commonwealth Heritage Places:	1
Listed Marine Species:	73
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	2
State and Territory Reserves:	5
Regional Forest Agreements:	1
Invasive Species:	32
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora epomophora Southern Royal Albatross [25996]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora sanfordi Northern Royal Albatross [82331]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans antipodensis Antipodean Albatross [82269]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans exulans Tristan Albatross [82337]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Diomedea exulans gibsoni Gibson's Albatross [82271]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta salvini Salvin's Albatross [82343]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris impavida Campbell Albatross [82449]	Vulnerable	Species or species habitat may occur within area
Fish		
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Frogs		
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat may occur within area
Litoria booroolongensis Booroolong Frog [1844]	Endangered	Species or species habitat may occur within area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Mixophyes iteratus Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat likely to occur within area
Insects		
Phyllodes imperialis smithersi Pink Underwing Moth [86084]	Endangered	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Acronychia littoralis Scented Acronychia [8582]	Endangered	Species or species habitat likely to occur within area
Allocasuarina defungens Dwarf Heath Casuarina [21924]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
Euphrasia arguta [4325]	Critically Endangered	Species or species habitat may occur within area
Hicksbeachia pinnatifolia Monkey Nut, Bopple Nut, Red Bopple, Red Bopple Nut, Red Nut, Beef Nut, Red Apple Nut, Red Boppel Nut, Ivory Silky Oak [21189]	Vulnerable	Species or species habitat likely to occur within area
Marsdenia longiloba Clear Milkvine [2794]	Vulnerable	Species or species habitat likely to occur within area
Parsonsia dorrigoensis Milky Silkpod [64684]	Endangered	Species or species habitat likely to occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
Streblus pendulinus Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat likely to occur within area
Taeniophyllum muelleri Minute Orchid, Ribbon-root Orchid [10771]	Vulnerable	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Triplarina imbricata [64543]	Endangered	Species or species habitat likely to occur within area
Tylophora woollsii [20503]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Emydura macquarii signata (Bellinger River, NSW) Bellinger River Emydura [1785]	Vulnerable	Species or species habitat likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area
Sharks		
Carcharias taurus (east coast population)		
Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat may occur within area
Carcharodon carcharias		
Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat may occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat may occur within area
Diomedea antipodensis		
Antipodean Albatross [64458]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena		
Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto)		
Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato)		
Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni		
Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi		
Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli		
Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera		
Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Puffinus carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Puffinus leucomelas Streaked Shearwater [66541]		Species or species habitat may occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Xanthomyza phrygia Regent Honeyeater [430]	Endangered*	Species or species habitat known to occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Breeding likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or

Name	Threatened	Type of Presence
		related behaviour known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Foraging, feeding or related behaviour known to occur within area
Numenius madagascariensis Eastern Curlew [847]		Foraging, feeding or related behaviour known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Telstra Corporation Limited

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Macksville Post Office	NSW	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Breeding likely to occur within area

Name	Threatened	Type of Presence
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Foraging, feeding or related behaviour known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Himantopus himantopus Black-winged Stilt [870]		Foraging, feeding or related behaviour known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Foraging, feeding or related behaviour known to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew [847]		Foraging, feeding or related behaviour known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Solegnathus dunckeri Duncker's Pipehorse [66271]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse		Species or species

Name	Threatened	Type of Presence
[66275]		habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paegnius Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within

Name	Status	Type of Presence
		area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Warrell Creek Coastal Forest	NSW	Registered
Indigenous		
Nambucca Aboriginal Area	NSW	Registered

State and Territory Reserves [Resource Information]

Name	State
Gaagal Wanggaan (South Beach)	NSW
Nambucca	NSW
Unnamed FMZ1	NSW

Name	State
Unnamed FMZ2	NSW
Yarriabini	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Bufo marinus Cane Toad [1772]		Species or species habitat likely to occur within area
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Senecio madagascariensis		
Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
100 Acre Swamp	NSW

Coordinates

-30.72 152.92

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix B

Threatened Species Potential Occurrence Assessment

Appendix B Threatened Fauna Potential Occurrence and Impact Risk Assessment

Scientific Name	*Common Name*	*TSC Act*	*EPBC Act*	*Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)*	*Suitability of Site Habitat*	*Potential Occurrence*	*Impact Risk and Update to Project EA Impact Assessment*	*Consistency Project EA Assessment Outcomes*
Amphibia								
Crinia tinnula	Wallum Froglet	V	-	Acid paperbark and sedge swamps known as 'wallum', this is a banksia-dominated lowland heath ecosystem characterised by acidic waterbodies.	Low. No potential habitat on or adjacent to the site.	Unlikely	No change	Not considered a potential occurrence in the Project EA.
Litoria aurea	Green and Golden Bell Frog	E	V	Amongst vegetation in and around permanent swamps, lagoons, farm dams and on flood-prone river flats, particularly where there are bullrushes or spikerushes.	Low-moderate. A relatively small area of potential low quality habitat occurs in the modified drainage line and at a farm dam at the site. Moderate quality habitat occurs in the freshwater wetlands at the site.	Unlikely. A single old record (1975) within 1 10 km of the site. However, due to contraction of the distribution of this species since this time and the nearest known key population being at Crescent Head approximately 50 km to the south, the site is highly unlikely to support this species.	No change	Not considered a potential occurrence in the Project EA.
Litoria brevipalmata	Green-thighed Frog	V	-	Rainforest, moist to dry eucalpyt forest and heath, typically where surface water gathers after rain.	Low. Available forested and adjacent farmland habitat is of low quality and highly fragmented.	Unlikely.	No change	Low. Proposal would not impact on known/ potential habitat.
Litoria olongburensis	Olongburra Frog	V	V	Paperbark swamps and sedge swamps of the coastal 'wallum' country amongst sedges and rushes.	Low. Outside of the known range of this species (restricted to the slopes and tablelands in NSW).	Unlikely	No change	Not considered a potential occurrence in the Project EA.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)	Suitability of Site Habitat	Potential Occurrence	Impact Risk and Update to Project EA Impact Assessment	Consistency Project EA Assessment Outcomes
Mixophyes iteratus	Giant Barred Frog	E	E	Deep, damp leaf litter in rainforests, moist eucalypt forest and near dry eucalypt forest.	Low within the study area and adjacent habitats.	Unlikely. However, known from Warrell Creek.	No change	Low. Proposal would not impact on known/ potential habitat.
Mixophyes balbus	Stuttering Frog	V	V	Cool rainforest, moist eucalypt forest and occasionally along creeks in dry eucalypt forest.	Low	Unlikely	No change	Not considered a potential occurrence in the Project EA.
Aves								
Anthochaera phrygia (formerly Xanthomyza phrygia)	Regent Honeyeater	CE	E	Dry open forest and woodland with an abundance of nectar-producing eucalypts, particularly box-ironbark woodland, swamp mahogany forests, and riverine sheoak woodlands.	Moderate. Habitat on site is of low suitability. Foraging habitat exists in the broader locality as part of extensive range.	Possible as opportunistic seasonal foraging during non-breeding period (winter).	Additional minor incremental impacts to habitat clearing	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.
Botaurus poiciloptilus	Australasian Bittern	E	E	Permanent freshwater wetlands with tall dense vegetation, particularly bullrushes and spikerushes.	Low in broad habitat terms in areas of dense vegetation within the Freshwater Wetlands.	Low. No records within the locality.	No change	Not considered a potential occurrence in the Project EA.
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Sheoaks in coastal forests and woodlands, timbered watercourses, and moist and dry eucalypt forests of the coast and the Great Divide up to 1,000 m.	Low on or adjacent to the site. The subject species only very rarely feeds on the seeds of Swamp Oak. Therefore any habitat present within Swamp Sclerophyll Forest at the site is likely to be of low suitability. However, this species was recorded in surveys for the Project EA.	Low	No change	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)	Suitability of Site Habitat	Potential Occurrence	Impact Risk and Update to Project EA Impact Assessment	Consistency Project EA Assessment Outcomes
Daphoenositta chrysoptera	Varied Sittella	V	-	Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Low-moderate in broad habitat terms.	Possible	Additional minor incremental impacts to habitat clearing	No species specific impact assessment undertaken as part of the Project EA.
Dasyornis brachypterus	Eastern Bristlebird	E	E	High elevation open forest, woodland with dense tussock or sedge understorey adjacent to rainforest or wet eucalypt forest.	Low. No potential habitat on or adjacent to the site.	Unlikely	No change	Not considered a potential occurrence in the Project EA.
Ephippiorhynchus asiaticus	Black-necked Stork	E	-	Swamps, mangroves, mudflats, dry floodplains.	Low to moderate. Potential foraging habitat is present adjacent to the site but not within the site. However, no breeding habitat was identified.	Possible. Sixteen records within 10 km of the site.	Additional minor incremental impacts to habitat clearing	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.
Erythrotriorchis radiatus	Red Goshawk	CE	V	Along or near watercourses, swamp forest and woodlands on the coastal plain.	Moderate in broad habitat terms.	Unlikely. No known records within the locality.	No change	Not considered a potential occurrence in the Project EA.
Glossopsitta pusilla	Little Lorikeet	V	V	Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri.	Low-moderate. Potential foraging and nesting habitat amongst Moist Open Forest vegetation.	Possible. One record within 10 km of the site.	Additional minor incremental impacts to habitat clearing	No species specific impact assessment undertaken as part of the Project EA.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)	Suitability of Site Habitat	Potential Occurrence	Impact Risk and Update to Project EA Impact Assessment	Consistency Project EA Assessment Outcomes
Grus rubicunda	Brolga	V	-	Shallow swamps, floodplains, grasslands and pastoral lands, usually in pairs or parties.	Low as only opportunistic foraging habitat within the site. Better quality habitat occurs in the broader locality in less disturbed floodplain and wetland areas closer to the Nambucca River and Warrell Creek.	Possible four records within 10 km of the site as opportunistic foraging habitat.	Additional minor incremental impacts to habitat clearing	No species specific impact assessment undertaken as part of the Project EA.
Ixobrychus flavicollis	Black Bittern	V	-	Dense vegetation fringing and in streams, swamps, tidal creeks and mudflats, particularly amongst swamp sheoaks and mangroves.	Low within the study area. Potential habitat occurs within the broader locality in and around the Nambucca River and Warrell Creek.	Low on the site. No significant impact on key foraging or nesting habitat.	No change	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.
Lathamus discolor	Swift Parrot	E	E	Forests, woodlands, plantations, and banksias.	Moderate as foraging habitat within an extensive range.	Possible as opportunistic seasonal forager during non-breeding period (winter).	Additional minor incremental impacts to habitat clearing	Yes. Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.
Lophoictinia isura	Square-tailed Kite	V	-	Dry woodland and open forest, particularly along major rivers and belts of trees in urban or semi-urban areas. Home range can extend over at least 100 km^2.	Moderate in broad habitat terms.	Possible.	Additional minor incremental impacts to habitat clearing	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)	Suitability of Site Habitat	Potential Occurrence	Impact Risk and Update to Project EA Impact Assessment	Consistency Project EA Assessment Outcomes
Pandion cristatus (formerly Pandion haliaetus)	Eastern Osprey	V	-	Forage for fish in fresh, brackish or saline waters of rivers, lakes, estuaries with suitable nesting sites nearby.	Low within the study area. Potential habitat occurs within the broader locality in and around the Nambucca River and Warrell Creek. This species may on occasion transit the site between feeding and nesting areas, however the site has no particular value for foraging or nesting.	Low on the site. No significant impact from the proposal on key foraging or nesting habitat.	No change	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.
Rostratula benghalensis australis	Australian Painted Snipe	E	V	Well-vegetated shallows and margins of wetlands, dams, sewage ponds, wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub, and open timber.	Low within the study area. Potential habitat occurs within the broader locality in and around the Nambucca River and Warrell Creek.	Unlikely. No known records within the locality.	No change	Not considered a potential occurrence in the Project EA.
Sternula albifrons	Little Tern	E	-	Coastal waters, bays, shallow inlets, salt or brackish lakes.	Low within the study area. Potential habitat occurs within the broader locality in and around the Nambucca River and Warrell Creek.	Low on the site. No significant impact from the proposal on key foraging or nesting habitat.	No change	Not considered a potential occurrence in the Project EA.
Tyto novaehollandiae	Masked Owl	V	-	Dry eucalypt forest and woodlands.	Low within the study area and any usage of the site would be opportunistic foraging on occasion. However, potential habitat is present within the broader locality.	Low	No change	The outcomes of the Project EA assessment remain valid.
Mammals								
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Near cave entrances and crevices in cliffs.	Low. No potential habitat on or adjacent to the site	Unlikely	No change	Not considered a potential occurrence in the Project EA.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)	Suitability of Site Habitat	Potential Occurrence	Impact Risk and Update to Project EA Impact Assessment	Consistency Project EA Assessment Outcomes
Dasyurus maculatus maculatus	Spotted-tailed Quoll	V	E	Dry and moist eucalypt forests and rainforests, fallen hollow logs, large rocky outcrops.	Low potential for suitable habitat on or adjacent to the site. In the broader locality habitat would exist within large territories.	Low	No change	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.
Miniopterus australis	Little Bentwing-bat	V	-	Moist eucalypt forest, rainforest and dense coastal scrub.	Moderate. Forested areas at the site provide potential foraging habitat for this species as a small part of a larger area of potential foraging habitat. Medium density of tree hollows may also provide potential roosting (non-breeding) opportunities.	Possible. 34 OEH BioNet records within 10 km of site and recorded in project EA surveys.	Additional minor incremental impacts to habitat clearing	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	Forest or woodland, roost in caves, old mines and stormwater channels.	Moderate. Forested areas at the site provide potential foraging habitat for this species as a small part of a larger area of potential foraging habitat.	Possible. Five OEH BioNet records within 10 km of site.	Additional minor incremental impacts to habitat clearing	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	Occurs in dry sclerophyll forest and woodland east of the Great Dividing Range. Roosts in tree hollows.	Moderate. Forested areas at the site provide potential foraging habitat for this species as a small part of a larger area of potential foraging habitat. Low density of tree hollows may also provide limited potential roosting (including breeding) opportunities.	Possible. Eight OEH BioNet records within 10 km of site.	Additional minor incremental impacts to habitat clearing	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)	Suitability of Site Habitat	Potential Occurrence	Impact Risk and Update to Project EA Impact Assessment	Consistency Project EA Assessment Outcomes
Myotis macropus	Large-footed Myotis	V	-	Bodies of water, rainforest streams, large lakes, reservoirs.	Moderate. Open water habitats are of low-quality and minor extent at the site. However, habitat is present in the broader locality.	Possible	Additional minor incremental impacts to habitat clearing	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.
Petaurus australis	Yellow-bellied Glider	V	-	Tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Dens in tree hollows of large trees, often in family groups. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.	Moderate. Forested areas at the site provide potential foraging habitat for this species as a small part of a larger area of potential foraging habitat. Medium density of tree hollows may provide habitat for refuge and breeding opportunities. Recorded in surveys for the project EA.	Moderate	Additional minor incremental impacts to habitat clearing	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.
Petaurus norfolcensis	Squirrel Glider	V	-	Blackbutt, bloodwood and ironbark eucalypt forest with heath understorey in coastal areas, and box-ironbark woodlands and River Red Gum forest inland.	Low on site. However, habitat is present within the broader locality.	Low on site	No change	Not considered a potential occurrence in the Project EA
Petrogale penicillata	Brush-tailed Rock Wallaby	V	V	North-facing cliffs and dry eucalypt forest and woodland, inhabiting rock crevices, caves, overhangs during the day, and foraging in grassy areas nearby at night.	Low. No potential habitat on or adjacent to the site.	Unlikely	No change	Not considered a potential occurrence in the Project EA.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)	Suitability of Site Habitat	Potential Occurrence	Impact Risk and Update to Project EA Impact Assessment	Consistency Project EA Assessment Outcomes
Phascolarctos cinereus	Koala	V	V	Appropriate food trees in forests and woodlands, and treed urban areas.	Low - moderate within the study area. A low density of Koala food trees in roadside mixed eucalypt vegetation. Recorded in surveys for the project EA but not in proximity of the site.	Possible. 16 records within 10 km of site.	Additional minor incremental impacts to habitat clearing.	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.
Pseudomys novaehollandiae	New Holland Mouse	-	V	Occurs in open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	Low. No potential habitat on or adjacent to the site.	Unlikely	No change	Not considered a potential occurrence in the Project EA.
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	High. Areas of Swamp Sclerophyll Forest are suitable as foraging habitat. No known camps at the site.	Likely. Known to camp approximately 3 km to south of site.	Additional minor incremental impacts to habitat clearing.	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest.	Moderate. Forested areas at the site provide potential foraging habitat for this species as a small part of a larger area of potential foraging habitat. Medium density of tree hollows may also provide potential roosting opportunities.	Possible. Two OEH BioNet records within 10 km of site and recorded in surveys for the project EA.	Additional minor incremental impacts to habitat clearing.	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of Project EA assessment.
Syconycteris australis	Eastern Blossom-bat	V	-	Littoral rainforest and feed on flowers in adjacent heathland and paperbark swamps.	Moderate as foraging habitat.	Possible	Additional minor incremental impacts to habitat clearing.	Not considered a potential occurrence in the Project EA.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)	Suitability of Site Habitat	Potential Occurrence	Impact Risk and Update to Project EA Impact Assessment	Consistency Project EA Assessment Outcomes
Reptiles								
Cacophis harriettae	White-crowned Snake	V	-	Low to mid-elevation dry eucalypt forest and woodland with well-developed litter layer.	Low potential habitat on the site.	Low	No change	Not considered a potential occurrence in the Project EA.
Coeranoscincus reticulatus	Three-toed Snake-tooth Skink	V	V	Rainforest and occasionally moist eucalypt forest, on loamy or sandy soils.	Low as little suitable habitat is present on the site.	Possible	No change	Not considered a potential occurrence in the Project EA.
Hoplocephalus bitorquatus	Pale-headed Snake	V	-	Dry eucalypt forests and woodlands, cypress woodland and occasionally in rainforest or moist eucalypt forest. Favours streamside areas, particularly in drier habitats.	Low as little suitable habitat is present on the site.	Possible	No change	Not considered a potential occurrence in the Project EA.
Hoplocephalus stephensii	Stephens' Banded Snake	V	-	Rainforest and eucalypt forests and rocky areas up to 950 m.	Low as little suitable habitat is present on the site.	Possible	Additional minor incremental impacts to habitat clearing.	Not considered a potential occurrence in the Project EA.

V = Vulnerable; E = Endangered; CE = Critically Endangered; EP = Endangered Population

Appendix B Threatened Flora Potential Occurrence and Impact Risk Assessment

Scientific Name	*Common Name*	*TSC Act*	*EPBC Act*	*Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)*	*Suitability of Site Habitat*	*Potential Occurrence*	*Consistency Project EA Assessment Outcomes*
Acacia chrysotricha	Newry Golden Wattle	E	-	Grows as an understorey species on rainforest edges and in wet or dry eucalypt forest in steep narrow gullies on quartzite soils.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Acronychia littoralis	Scented Acronychia*	E	E	Littoral rainforest on sand.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Alexfloydia repens	Floyd's Grass*	E	-	Understorey of Swamp Oak (*Casuarina glauca)* forest and along the uppermost fringe of mangroves.	Moderate. Potential habitat beneath Swamp Oak in Swamp Sclerophyll Forest occurs at the site. However, due to extensive past disturbance (grazing and clearing) the overall suitability is low.	Unlikely. This species was not located during the survey despite a targeted search of suitable habitat areas. However, recorded in project surveys near Warrell Creek.	No additional impacts as part of the proposal.
Allocasuarina defungens	Dwarf Heath Casuarina	E	E	Tall heath on sand, also on clay and sandstone.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Arthraxon hispidus	Hairy-joint Grass*	V	V	Moist shady places in or on the edges of rainforest and wet eucalypt forest, often near creeks or swamps.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)	Suitability of Site Habitat	Potential Occurrence	Consistency Project EA Assessment Outcomes
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	Does not have well defined habitat and is known from a range of communities, including swamp-heath and woodland.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Cynanchum elegans	White-flowered Wax Plant	E	E	Dry, littoral or subtropical rainforest, and occasionally in scrub or woodland.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Dendrobium melaleucaphilum	Spider Orchid	E	-	Grows frequently on *Melaleuca styphelioides*, less commonly on rainforest trees or on rocks in coastal districts. Occurs in coastal districts and nearby ranges, extending from Queensland to lower Blue Mountains.	Moderate. Potential habitat occurs on the site where *Melaleuca stypheloides* grows in Swamp Sclerophyll Forest.	Unlikely. This species was not located during the survey despite a targeted search of suitable habitat areas. However, recorded in project surveys.	Minor incremental impacts of the Proposal associated with habitat removal are unlikely to affect the outcomes of the impact assessment undertaken in the Threatened flora Species Management Plan.
Diuris disposita	Willawarrin Doubletail	E	-	Known only from eucalypt forest with grassy understorey in the Kempsey area,	Low. No potential habitat on or adjacent to the site and outside of known range.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)	Suitability of Site Habitat	Potential Occurrence	Consistency Project EA Assessment Outcomes
Diuris flavescens	_	CE	-	The confirmed populations grow on well-drained loam or heavy clay soils in and around remnants of grassy woodland, or sclerophyll forest, in which the groundcover is dominated by *Themeda australis* and *Imperata cylindrica*.	Low. Outside the range of this species.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Diuris sp. aff chrysantha	Byron Bay Diuris	E	-	Known from a single location only, at Byron Bay in north-east NSW. Only about 20 plants have been recorded	Low. Outside the range of this species.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Euphrasia arguta	-	PCE	CE	Known from three sites in/near Nundle State Forest in eucalypt forest with a mixed grass and shrub understorey. Habitat includes open forest country around Bathurst in subhumid places, grassy country near Bathurst and in meadows near rivers.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.

Scientific Name	***Common Name***	***TSC Act***	***EPBC Act***	***Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)***	***Suitability of Site Habitat***	***Potential Occurrence***	***Consistency Project EA Assessment Outcomes***
Glycine clandestina (broad leaf form)	*Glycine clandestina* (broad leaf form) in the Nambucca Local Government Area	E	-	This form only occurs in coastal grassland at Scotts Head on the Mid North Coast of NSW.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Hicksbeachia pinnatifolia	Red Bopple Nut	V	V	Subtropical rainforest, moist eucalypt forest and Brush Box forest.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Maundia triglochinoides	Maundia	V	-	Grows in swamps, lagoons, dams, channels, creeks or shallow freshwater 30 - 60 cm deep on heavy clay, low nutrients.	Moderate-High	Unlikely. This species was not located during the survey despite a targeted search of suitable habitat areas. However, recorded in project surveys.	Minor incremental impacts of the Proposal associated with removal of potential habitat are unlikely to affect the outcomes of the impact assessment undertaken in the Threatened flora Species Management Plan. Safeguards are provided to minimise the risk of indirect impacts of the Proposal on this species.
Marsdenia longiloba	**Slender Marsdenia**	E	V	Subtropical and warm temperate rainforest, lowland moist eucalypt forest adjoining rainforest and, sometimes, in areas with rock outcrops.	High	Known to occur within subject site.	Minor incremental impacts of the Proposal are unlikely to affect the outcomes of the impact assessment undertaken in the Threatened flora Species Management Plan.

Scientific Name	***Common Name***	***TSC Act***	***EPBC Act***	***Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)***	***Suitability of Site Habitat***	***Potential Occurrence***	***Consistency Project EA Assessment Outcomes***
Melaleuca biconvexa	Biconvex Paperbark	V	V	Grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Moderate in broad habitat terms.	Unlikely. This species was not located during the survey despite a targeted search of suitable habitat areas.	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Melaleuca groveana*	Grove's Paperbark	V	-	Heath and shrubland, often in exposed sites, rocky outcrops and cliffs at high elevations, also in dry woodlands.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Niemeyera whitei (formerly *Amorphospermum whitei)*	Rusty Plum	V	-	Rainforest and adjoining moist eucalypt forest.	Low. No potential habitat on or adjacent to the site.	Unlikely. However, recorded in project surveys.	No additional impacts as part of the proposal.
Parsonsia dorrigoensis	**Milky Silkpod**	V	E	Subtropical and warm temperate rainforest, on rainforest margins, and in moist eucalypt forest up to 800 m, on brown clay soils.	Moderate. Potential habitat on or adjacent to the site.	Unlikely based on extensive survey effort in area not having identified this species.	Minor incremental impacts of the Proposal associated with removal of potential habitat are unlikely to affect the outcomes of the impact assessment undertaken in the Threatened flora Species Management Plan.
Phaius australis	Southern Swamp Orchid	E	E	Swampy grassland or swampy forest including rainforest, eucalypt or paperbark forest mostly in coastal areas.	Moderate. Potential habitat occurs within Swamp Sclerophyll Forest at the site. However, due to extensive past disturbance this habitat is of low quality.	Unlikely. This species was not located during the survey despite a targeted search of suitable habitat areas.	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)	Suitability of Site Habitat	Potential Occurrence	Consistency Project EA Assessment Outcomes
Streblus pendulinus	Siah's Backbone	-	E	Found in warmer rainforests, chiefly along watercourses at altitudinal range is from near sea level to 800 m above sea level. Grows in well-developed rainforest, gallery forest and drier, more seasonal rainforest. On Norfolk Island, the species is found in a variety of forest types, though it is rare.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Syzygium paniculatum	Magenta Lilly Pilly			Magenta Lilly Pilly is found only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest, restricted mainly to remnant stands of littoral (coastal) rainforest and gallery rainforest.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Taeniophyllum muelleri	Minute Orchid	-	V	Grows on outer branches and branchlets of rainforest trees; coast and coastal ranges, from sea level to 250 m alt., north from the Bellinger River.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Requirement (Source: OEH and/ or EPBC website profile 2013)	Suitability of Site Habitat	Potential Occurrence	Consistency Project EA Assessment Outcomes
Thesium australe	Austral Toadflax	V	V	Grassland or grassy eucalypt woodland where *Themeda australis* is predominant, on grassy headlands.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Tinospora smilacina	Tinospora Vine	E	-	Dry rainforest and along the boundaries of dry rainforest and dry eucalypt forest.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Tinospora tinosporoides	Arrow-head Vine	V	V	Wetter subtropical rainforest, including littoral rainforest, on fertile, basalt-derived soils.	Low. No potential habitat on or adjacent to the site.	Unlikely	No impact assessment undertaken in project EA/ Threatened Flora Species Management Plan. No additional assessment required.
Tylophora woolsii	Cryptic Forest Twiner	E	E	Grows in moist eucalypt forest, moist sites in dry eucalypt forest and rainforest margins.	Moderate.	Unlikely as not detected during extensive surveys undertaken of the subject site.	Minor incremental impacts of the Proposal associated with removal of potential habitat are unlikely to affect the outcomes of the impact assessment undertaken in the Threatened flora Species Management Plan.

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