M1 PACIFIC MOTORWAY REPLACEMENT AND WIDENING TUGGERAH TO DOYALSON

Submissions Report

OCTOBER 2014

Roads and Maritime Services: RMS 14.517
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Prepared by SMEC Australia

Executive summary

Roads and Maritime Services is proposing to replace and widen 12 kilometres of the M1 Pacific Motorway between Wyong Road, Tuggerah and the Doyalson Link Road (the proposal).

Key features of the proposal are:

- Widening a 12 kilometre section of the motorway to provide three lanes in each direction between Wyong Road at Tuggerah and the Doyalson Link Road
- Removing and replacing a nine kilometre section of concrete road surface between Wyong River and the Doyalson interchange to provide a smoother road surface
- Improving road drainage for greater wet weather safety
- Providing safety and capacity improvements at key motorway interchanges at Warnervale and Doyalson.

A review of environmental factors (REF) was carried out to assess the environmental impacts of the proposal. The REF was publicly displayed between 6 August 2014 and 3 September 2014. The REF report was available in hard copy at four locations across Tuggerah, Lake Haven, The Entrance, and Bateau Bay and was also available to view on the Roads and Maritime website. Two community information sessions were held on 21 and 23 August 2014 with Roads and Maritime staff and a noise specialist in attendance.

A total of 25 submissions were received in response to the public display of the REF. One submission was received from a government agency and twenty four submissions were received from the community and businesses. Submissions were generally supportive of or neutral towards the upgrade proposal.

The main issues raised in the submissions related to:

- Construction and operational noise impacts, including a request for further noise monitoring to be carried out and for reconsideration of noise barriers
- Potential drainage and flooding impacts
- Landscaping and concern about visual impacts during construction and operation
- Design considerations including suggestions relating to breakdown bays, the number of travel lanes and the road surface type proposed
- Traffic and transport considerations
- Requests for further consultation and
- General enquiries about the proposal.

After consideration of the submissions received, and as a result of additional assessments undertaken by Roads and Maritime following the REF display, some changes to the proposal including changes to proposed safeguards and management measures have been made. Should the proposal be approved to proceed, these (updated) management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

In summary, the proposal as described in the REF, including refinements as documented in this submissions report, meets the proposal objectives, while minimising environmental impacts and appropriately considering community issues.

Contents

1 Introduction and background

1.1 Purpose

This submissions report relates to the review of environmental factors (REF) prepared for the *M1 Pacific Motorway replacement and widening: Tuggerah to Doyalson* (August 2014), and should be read in conjunction with that report.

The REF was placed on public display between 6 August and 3 September 2014. Submissions relating to the proposal and the REF were received by Roads and Maritime. The submissions report summarises the issues raised and provides responses to each issue (Chapter 2), additional assessment (Chapter 3) and summarises the proposed environmental management measures (Chapter 4). Consultation activities in relation to the proposal carried out prior to the REF display are summarised in the Issues Summary Report (August 2014).

1.2 The proposal

Roads and Maritime proposes to replace and widen 12 kilometres of the M1 Pacific Motorway to three lanes in each direction and rebuild a nine kilometre section of the motorway between Wyong Road, Tuggerah, and Doyalson Link Road.

The proposal would involve the following:

- Provision of two additional lanes (one lane northbound and one lane southbound) on a 12 kilometre section of the M1 Pacific Motorway using techniques including road widening and providing new line marking to define new lane configurations
- Provision of an additional lane by providing new line marking to define new lane configurations on five northbound and six southbound motorway bridges
- Provision of an additional lane by widening the bridge and providing new line marking to define new lane configurations on the northbound motorway bridge over St Johns Road
- Provision of an additional lane in each direction south of the Wyong River between Wyong Road and Wyong River (around three kilometres in length) by constructing a widened flexible road pavement in the existing central median, placing an asphalt overlay over the existing traffic lanes, and providing new line marking to achieve three lanes on each carriageway
- Replacement of the existing road pavement and stabilisation of the road sub-base through full removal and reconstruction of around nine kilometres of rigid concrete road pavement (north of the Wyong River)
- Upgrades to the existing Warnervale interchange (at Sparks Road) including a new separated G-loop entry ramp that connects with the motorway north of the Doyalson interchange northbound exit ramp, reconfiguration of intersections and approaches, and provision of a new pedestrian overbridge across the motorway at Sparks Road
- Provision of new signalised intersections at the Warnervale interchange where Sparks Road joins the southbound motorway exit ramp and where Sparks Road joins the northbound motorway entry ramp

- Upgrades to the Doyalson interchange including reconstruction of the Doyalson Link Road northbound exit ramp to extend over the proposed Sparks Road northbound extended entry ramp
- Provision for a future southbound exit ramp on to the Doyalson Link Road and a new northbound entry ramp from Doyalson Link Road including a new bridge over the motorway (subject to further investigation including traffic modelling)
- Lengthening of the northbound and southbound motorway on ramps from both service centres on the motorway
- Minor reconfiguration of the northbound and southbound motorway exit ramps to both service centres to accommodate the widening
- Provision of a commuter car park at the south-west corner of the Warnervale interchange at Sparks Road
- Ancillary facilities to support construction activities including stockpiling, storage, concrete batching and crushing.

1.3 REF display

Roads and Maritime prepared a REF to assess the environmental impacts of the proposed works. The REF report was displayed between 6 August 2014 and 3 September 2014 at four locations, as detailed in Table 1-1. The REF was placed on the Roads and Maritime website and made available for download. The public display was advertised in The Central Coast Express Advocate on Wednesday 6 August 2014.

In addition, an invitation to comment and a copy of the community update was sent to around 5,700 properties in the project area (Appendix E) and several identified stakeholders (Appendix A). A letter inviting comment and attendance at the information sessions was also sent to stakeholders identified as potentially affected by noise. A copy of the stakeholder letter is included in Appendix B and a copy of the community update is included at Appendix D.

Table 1-1: Display locations

Location	Address
Tuggerah Library and Council Services	Westfield Tuggerah, 50 Wyong Road, Tuggerah NSW 2259 Monday - Friday 9:00am - 5:30pm Saturday 9:00am - 3:00pm Telephone (02) 4350 1560
Lake Haven Library and Council Services	Lake Haven Shopping Centre, Goobarabah Ave, Lake Haven NSW 2263 Monday - Friday 9:00am - 5:30pm Saturday 9:00am - 3:00pm Sunday 10:00am - 2:00pm Telephone (02) 4350 1570
The Entrance Library and Council Services	211a The Entrance Road, The Entrance NSW 2261 Monday - Friday 9:30am - 4:30pm Saturday 9:00am - 12 noon

Location	Address
	Telephone (02) 4350 1550
Bateau Bay Library	Bateau Bay Square, 10 Bay Village Road, Bateau Bay NSW 2261 Monday - Friday 9:00am - 5:30pm Saturday 9:00am - 3:00pm Telephone (02) 4350 1580

A media release was issued by the Member for Swansea on 6 August 2014, advising of the concept design and REF display and inviting community comment.

1.4 Noise consultation

As documented in Section 5.6 of the REF, and following consultation with officers from the NSW Environment Protection Authority (EPA), Roads and Maritime identified that there was a need to carry out additional consultation with residents likely to be affected by the proposed extended construction working hours.

A community update was distributed to around 5,700 properties located in the vicinity of the proposal. A map showing the distribution area is included in Appendix E. In addition a community update and accompanying letter were distributed to potentially noise affected property owners at the start of the REF display period. The community update outlined:

- Proposed construction working hours
- Types of construction activities that would be carried out
- Predicted noise impacts.

The community update contained contact details for enquiries and to provide feedback in addition to details about the public display of the REF.

Noise modelling was carried out for the proposal under a number of different construction scenarios. All properties that were identified as potentially affected under one or more scenarios were included in the mailing list. A letter was sent to around 600 potentially noise affected property owners providing noise related information specific to the proposal.

A copy of the letter sent to potentially noise affected residents is provided in Appendix B. A copy of the community update is provided in Appendix D.

1.5 Community information sessions

Two community information sessions were held to provide the opportunity for interested parties to view and discuss the concept design and REF. No formal presentations were made, however Roads and Maritime staff and a noise specialist were available to discuss the proposal and potential impacts.

Community information sessions were held on:

- 21 August between 4pm and 7pm
- 23 August between 9am and 12pm.

The community information sessions were held at the Roads and Maritime Motor Registry Office, Training Room, Anzac Avenue, Wyong.

There were 21 interested parties recorded as attending these information sessions. Ten submissions via feedback forms were completed by attendees at the information sessions.

2 Response to issues

Roads and Maritime received 25 submissions, accepted up until 3 September 2014. No late submissions were received. Table 2-1 lists the respondents and each respondent's allocated submission number. The table also indicates where the issues from each submission have been addressed in Chapter 3 of this report.

Table 2-1: Respondents

Respondent	Submission No.	Section number where issues are addressed
Individual	1	2.9.1
Individual	2	2.2.4, 2.9.2
Individual	3	2.2.1, 2.2.4, 2.3.1, 2.4.1 , 2.4.2, 2.5.7
Individual	4	2.2.4
Individual	5	2.2.4, 2.5.3, 2.5.5
Individual	6	2.5.4
Individual	7	2.2.4
Individual	8	2.5.5
Individual	9	2.2.2, 2.2.4, 2.3.2, 2.5.6, 2.5.7, 2.5.8
Business	10	2.4.3
Business	11	2.2.1, 2.5.1, 2.5.3, 2.8.1, 2.7.2, 2.9.3
Individual	12	2.2.4, 2.5.6, 2.6.1
Individual	13	2.2.3, 2.2.4
Individual	14	2.9.2
Individual	15	2.5.5
Individual	16	2.2.4
Wyong Shire Council	17	2.5.6
Business	18	2.5.2
Individual	19	2.2.1, 2.4.3, 2.7.1
Individual	20	2.2.1
Individual	21	2.2.4
Individual	22	2.2.4
Individual	23	2.2.4
Individual	24	2.2.4
Individual	25	2.9.2

2.1 Overview of issues raised

A total of 25 submissions were received in response to the exhibition of the REF, comprising one government agency submission, three from private organisations and 21 from the community.

An acknowledgement letter or a direct response was sent to all of the individuals and groups that provided a submission. A copy of the acknowledgement letter sent is provided in Appendix F.

Each submission has been considered 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 to respondents. Where similar issues were raised in different submissions, the issues were grouped together and only one response has been provided. The issues raised and Roads and Maritime responses to these issues form the basis of this chapter.

Overall, eight per cent of respondents supported the proposal, and 92 per cent of respondents did not offer a position for or against the proposal.

The main issues raised by stakeholders and the community relate to construction and operational noise and vibration, hydrology and potential drainage impacts, landscaping and visual impacts during construction and operation, design considerations, road conditions, traffic and transport considerations, requests for further consultation and general enquiries.

A submission was received from Wyong Shire Council which raised several issues related to their intention to develop a new airport. Council's perspective is that the airport proposal will generate substantial additional traffic movements in the Central Coast area. Council has requested consideration of a southbound entry ramp with a G-loop configuration on the motorway for vehicles travelling east on Sparks Road to accommodate these traffic movements.

2.2 Noise and vibration

2.2.1 **Construction noise**

Submission number(s): 3, 11, 19, 20

Issue description

In summary, respondents raised concerns about construction noise within 40 metres of residences. Respondents generally accepted that noise and traffic impacts are an inevitable consequence of a major construction upgrade and that Roads and Maritime and its contractors would work within effective consent conditions and EPA licence conditions to mitigate all noise and traffic impacts.

Response

Noise modelling for potential construction impacts assessed a range of different construction activities and assessed impacts at the identified sensitive receivers (potentially noise affected properties). The REF notes that "the minimum distance identified from any house to the existing carriageway is 40 metres, and most houses are more than 100m away". The potential impact of the various activities has been modelled based on the actual distance of the individual sensitive receivers from the work area. That is, the noise impact on the identified property was assessed as a sensitive receiver at a distance of around 40 metres from the noise source.

The REF has also assessed potential operational noise impacts and identifies a number of properties that need to be considered for noise mitigation. The properties

identified as most affected by operations noise impacts are also those most affected by construction noise impacts.

Roads and Maritime will seek to implement treatments for properties identified as being affected by operational noise in consultation with property owners as soon as reasonably practical. Such property treatments could include mounding, noise barriers or architectural treatments in addition to any road surface treatments implemented. These various treatments while providing reduced operational noise levels at the properties would also provide some construction noise relief if implemented early. These mitigation measures would be considered in addition to various management measures that Roads and Maritime would carry out including training for workers, using quieter equipment, considering alternative construction techniques and scheduling noise related activities during standard construction hours.

The Construction Environmental Management Plan (CEMP) for the proposal would be prepared and implemented in conjunction with the Environmental Protection Licence (EPL) for the proposal. All feasible and reasonable mitigation measures would be implemented so that the potential for adverse impact on the local community is minimised.

It is noted that no respondents indicated concerns regarding the extended construction working hours, despite the targeted consultation to potentially affected residents.

2.2.2 Heavy vehicles

Submission number(s): 9

Issue description

In summary, the respondent questioned why the REF did not mention the Alison Road overpass and the associated increase in noise from heavy vehicles using air brakes to reduce speed. The respondent wanted to know whether this had been investigated and if not, whether any investigations were proposed for the future.

Response

While there is no specific mention of the descending roadway from the Alison Road overpass heading northbound, or of trucks using compression brakes, the noise assessment does consider a range of factors, including the topography of the proposal and adjacent lands and vehicle numbers and type. As such, the descending roadway heading north from Alison Road was included in the noise modelling and the calculation of potential noise impacts associated with the proposal.

In relation to the compression brakes, Roads and Maritime signage is in place on the motorway in the vicinity of the service centres to remind truck drivers of their obligations to limit compression braking in built up areas. Compression braking is not identified in the REF as an impact of the proposal as the proposal was not considered likely to create impacts relating to compression braking.

2.2.3 Background noise monitoring

Submission number(s): 13

Issue description

In summary, the respondent requested that further noise monitoring be carried out under still and clear conditions'.

Response

Noise monitoring was carried out simultaneously with traffic counts at three locations between 4 April and 16 April 2013, enabling data to be collected during a broad range of wind and weather conditions, including times when conditions could be categorised as still and clear. The logging results collected were then edited to exclude periods of rain or excessive wind, as determined using data from the Bureau of Meteorology for Mangrove Mountain monitoring site.

Roads and Maritime will also be carrying out additional noise monitoring throughout the detailed design to further assess various noise mitigation measures and the noise reductions they could provide. Roads and Maritime is committed to working with stakeholders and potentially noise affected property owners in order to make informed decisions related to this proposal.

2.2.4 Operational noise – noise barriers

Submission number(s): 2, 3, 4, 5, 7, 9, 12, 13, 16, 21, 22, 23, 24

Issue description

In summary, the respondents raised the following issues:

- Requests for further operational noise assessment and reconsideration of noise barriers in areas that are subject to acute noise within Noise Catchment 4 as described in Appendix F of the REF.
- Concerns about operational noise with perceptions that there had been inadequate noise impact assessments carried out and requests that noise barriers be included in the proposal.
- Concerns that the design does not include noise walls. Request for noise walls to be provided to mitigate operational noise impacts and to help mitigate property impacts by the public and rubbish.

Response

The noise assessment has considered existing noise levels and predicted future noise levels with and without the proposal. The noise assessment has concluded that noise barriers will not provide the minimum required reduction in noise level at the properties required by the relevant guidelines and as such are not considered feasible and reasonable. Where noise mitigation measures are required, Roads and Maritime will explore options for quieter road surfaces and property treatments in consultation with relevant property owners as part of the upcoming detailed design.

Potential noise impacts are recognised by Roads and Maritime as a key consideration in the proposed upgrade of the motorway between the Tuggerah and Doyalson interchanges. The REF includes details of the modelling and monitoring of current noise and predicted future noise levels. The noise modelling shows that noise levels as a result of the proposed upgrade and forecast traffic growth change by less than three decibels, with most properties experiencing a change of less than 1 decibel.

The Roads and Maritime Environmental Noise Management Manual (ENMM) (RTA 2001) includes a comparative cost-effectiveness assessment methodology for analysing an acceptable balance between noise barrier height and effectiveness. This process was followed and is included in Appendix F of the REF. Section 9.6 of Appendix F of the REF assessed a barrier option in the location of the Noise Catchment 4 and concluded "…these receivers are elevated and distant from the road, leading to mitigation of less than 1dBA using barriers up to seven metres. Therefore, a barrier is not recommended at this location."

Roads and Maritime will carry out additional noise monitoring to assess various noise mitigation measures and the noise reduction they could provide. Roads and Maritime are committed to working with stakeholders and the community to inform decisions made regarding appropriate noise mitigation measures and outcomes are achieved related to this proposal. This is especially the case for those residents identified as being noise affected.

The REF and accompanying concept design outlines the current proposal. The proposal will be further refined during detailed design. This refinement will include ongoing consideration of cost effective measures to mitigate the impacts of road traffic noise.

2.2.5 **Operational noise – general**

Submission number(s): 2, 3, 4, 5, 7, 9, 12, 13, 16, 21, 22, 23, 24

Issue description

In summary, the respondents raised the following issues:

- Concern expressed about additional noise impacts due to additional road capacity and a higher number of average daily traffic volumes.
- Concern expressed about additional noise impacts due to raising the road height.
- Concern expressed about additional noise impacts due to absence of a flexible road pavement layer under the concrete.
- Enquired as to whether noise impacts at their property would be acute. Requested further information, including details for the proposal information documents and consultation to be carried out about noise treatment options.
- Concerned about the potential requirement to remove trees between properties and the motorway given that the trees may be providing some operational noise reduction.
- Requested that the design excludes rumble strips due to the operational noise that they generate. Requested discussions about operational noise management options including those options where acute noise has been predicted at specific properties.

Response

The proposal would provide for an additional travel lane in each direction. That is, there would be one additional northbound lane and one additional southbound lane. Page 8 of the REF refers to a previous (2007) study that suggested traffic on this section of the motorway could increase to around 90,000 vehicles per day by 2029. The REF goes on to state that "more recent forecasts suggest volumes in 2029 would be between 75,000 and 80,000 vehicles per day". The proposed lane configuration, changes in levels and increases in forecast traffic volumes have all

been considered as part of the environmental assessment, including the use of the future traffic volumes forecast in the noise assessment.

The current proposal includes increasing the road level north of Wyong River generally between 100 and 300 millimetres. This proposed change in surface level and the projected increase in traffic volumes 10 years after the forecast opening of the proposed upgrade have both been factored into the noise assessment and consideration of treatment options.

The proposal generally deals with pavement on a like-for-like basis. South of the Wyong River, there is currently a flexible (asphalt) road pavement in place, while north of the river there is a rigid (concrete) road pavement in place. South of the river, the widening will occur into the median only, with the existing road pavement to be retained and the additional lane northbound and southbound built by widening into the median.

North of Wyong River, the existing rigid (concrete) road pavement is failing and has been recommended for complete removal and replacement. While this is the option that has been assessed in the REF, Roads and Maritime has recently awarded a contract for detailed design which included a requirement for the consultant to investigate alternate road pavement solutions (rather than the complete removal or replacement of the existing concrete road pavement). This would include assessing the suitability of a range of flexible and rigid road pavement options.

Asphalt road pavements are generally considered to be quieter than concrete road pavements. One of the measures committed to in the REF for the section north of Wyong River is to “introduce longitudinal tining or diamond grinding to further reduce the noise of the concrete road pavements as part of detailed design investigations”. This process involves placing small grooves into the surface of the concrete road pavement to help control noise. This would provide for reduced noise levels compared with the concrete road pavement assessed as part of the REF.

Predicted future noise levels with and without the proposed upgrade in place are detailed in Appendix F of the REF. The tabulation of forecast future noise levels contained in Appendix B1 of the noise assessment refers to forecasted changes in noise levels. Additionally, the noise assessment identifies whether the forecast noise levels would contribute to properties experiencing an acute level of noise. This table also identifies properties that would experience acute noise levels. This categorisation (acute) means that the property has been predicted to be exposed to noise levels of 65dB(A) or more during the day (LA_{eq} 15hr) and/or 60dB(A) or more during the night (LA_{eq} 9hr) at a period ten years after the upgrade has been completed and should be assessed for noise mitigation. Roads and Maritime will continue to explore options for cost effective noise mitigation measures in consultation with relevant property owners as part of the upcoming detailed design.

There are currently no plans to remove the vegetation in the location between the relevant respondent’s property and the motorway. Should Roads and Maritime need to remove vegetation on the outer verges of the motorway, replacement vegetation will be introduced. In addition, the REF details locations where screen planting could be introduced as part of the integrated design. These opportunities will be explored further during detailed design. However it is noted that while dense vegetation screen planting will have visual and privacy benefits, it provides minor acoustic attenuation, about 1 dB(A) for a 10 metre vegetation depth.

Rumble strips are not installed on every existing road or road upgrade. There are protocols for installing rumble strips which are dependent on factors such as driver safety and the proximity of the road to residences. These factors are carefully

considered before installing rumble strips in a noise sensitive area and would be further investigated at the detailed design stage of the project.

Traffic noise at residences will be addressed with consideration of reasonable and feasible noise management measures. Measures may include architectural treatments to houses that are assessed to be acutely affected, once the detailed design is complete.

2.3 Hydrology

2.3.1 **Flooding**

Submission number(s): 3

Issue description

In summary, the respondent raised concerns about possible flooding due to culvert design.

Response

The REF refers to the drainage and culvert system, including the need to adjust existing drainage pits along the motorway and the need to construct new drainage pits with connections to the existing network at a number of locations where road widening will be carried out.

The REF notes “modelling indicated that there would be no material change to the flood levels as a result of the proposal. This was confirmed by verifying that the existing motorway culverts have the capacity to pass the 100 year average recurrence interval (ARI) flood event without overtopping”. This means that the current culverts have sufficient capacity to carry the expected volume of water for a flood event that might be expected once in 100 years.

Roads and Maritime is aware that there had previously been a blockage at the culvert adjacent to the respondent’s property and that its maintenance staff rectified the issue. As part of the detailed design the adequacy of the existing drainage system will be investigated in this area to consider if any modifications are required.

2.3.2 **Drainage**

Submission number(s): 9

Issue description

In summary, the respondent questioned whether the design and/or impact assessment addressed culverts and drainage.

Response

The REF refers to the drainage and culvert system, including the need to adjust existing drainage pits along the motorway and construct new drainage pits with connections to the existing network at a number of locations where road widening will be carried out.

The REF notes “modelling indicated that there would be no material change to the flood levels as a result of the proposal. This was confirmed by verifying that the existing motorway culverts have the capacity to pass the 100 year ARI flood event without overtopping”. Roads and Maritime would continue to assess the adequacy of drainage systems to accommodate the proposed upgrade throughout the detailed design. In the short term, Roads and Maritime will carry out video inspections of the

current road surface drainage system to confirm its condition. Subject to the results of the video inspections and ongoing design development, Roads and Maritime will utilise, repair, upgrade or replace elements of the drainage system to complement the proposed upgrade.

2.4 Landscaping and visual impacts

2.4.1 **Construction visual impact**

Submission number(s): 3

Issue description

In summary, the respondent raised concerns about visual impacts during construction, such as lighting towers and flashing amber vehicles/machinery rotators shining light into bedroom windows.

Response

Where artificial lighting is required, lighting equipment will be placed and directed to minimise impacts on adjacent properties. In relation to flashing lights on vehicles, these warning systems are a necessary safety device for construction vehicles on worksites. The likelihood of a vehicle being adjacent to the respondent's property at night time with flashing lights in operation for an extended period of time is low. Vehicles passing with flashing lights in operation will be intermittent and are expected to have similar impact such as headlight glare that may be commonly experienced, given the respondent's proximity to both the motorway and Hue Hue Road.

Approval will be sought to extend work hours to make maximum use of daylight hours during the various seasons without the need for artificial lighting as much as reasonably practicable.

2.4.2 **Operational visual impact**

Submission number(s): 3

Issue description

In summary, the respondent raised concerns about visual impacts resulting from the road level height being raised as part of the design.

Response

The current concept design proposes to increase the level of the road north of Wyong River by between 100 and 300 millimetres. In addition to this minimal proposed height increase, the proposed design relocates the travel lanes around two metres closer to the median (and away from adjacent properties). Any impacts of increased visibility into adjacent properties would be diminished. Roads and Maritime will also develop a landscaping plan during the detailed design phase which will include investigations into opportunities for vegetation to be planted to provide additional screening along the motorway.

2.4.3 **Landscaping and visual impact**

Submission number(s): 10, 19

Issue description

In summary, the respondents raised the following issues:

- Requested advice on the landscaping that would be provided to shield properties from the motorway in the southbound direction, between the service centre on-ramp and Alison Road overpass.
- Concerned about operational visual screening between property and motorway.

Response

As part of the REF, Roads and Maritime carried out a range of specialist studies. This included the assessment of urban design and visual impacts as well as the development of a landscaping strategy. Page 65 of Appendix I of the REF (*Urban design, landscape character and visual impact assessment*) provides an indicative representation of areas where existing vegetation should be retained and areas where screen planting should be considered as part of an integrated design. Roads and Maritime has recently awarded a contract for detailed design of the proposed upgrade which includes further development and detailed treatment for a range of matters including the proposed landscape design. One of the objectives of the proposed planting arrangements is to provide screening between the motorway and adjacent properties.

2.5 Design

2.5.1 **Consultation**

Submission number(s): 11

Issue description

In summary, the respondent indicated support for the proposal and requested additional consultation be carried out in relation to the design and possible future improvements at the Doyalson Link Road interchange, including potential impacts on nearby land.

Response

The proposal will continue to be developed and refined throughout the detailed design phase. Roads and Maritime has awarded a contract to complete the detailed design and prepare tender documents for construction of the proposed upgrade.

The proposal is not expected to have any direct property impacts on the land to the north east of the Doyalson interchange beyond the existing road reserve. At this stage the proposal does not include provision of the ramps to and from Doyalson Link Road which are in close proximity to the commercial land north-east of the Doyalson Link Road interchange.

The environmental assessment identified a range of possible site compounds, including land located north of the Caltex Service Stations adjacent to the motorway and St Johns Road. Confirmation of current in-principle support of the use of this site by Roads and Maritime (subject to commercial and other ongoing discussions) will be discussed further with representatives of the landowner.

Roads and Maritime will be seeking additional construction compound sites, adjacent to or north of Sparks Road given the recently announced Chinese Theme Park

development in this area and Wyong Shire Council's master planning for the area north west of the interchange.

Roads and Maritime will continue to work with substantive land owners such as Wyong Shire Council to source appropriate additional compound sites.

2.5.2 Design services

Submission number(s): 18

Issue description

In summary, the respondent enquired about the Roads and Maritime procurement of future detailed design services, and in particular noise assessments.

Response

A contract has been awarded to an engineering consultancy to undertake the detailed design. As part of the preparation of the detailed design, a range of additional specialist investigations will continue, including urban and landscape design, road and bridge design and noise impact assessment and development of mitigation measures.

2.5.3 North facing ramps at Doyalson Link Road interchange

Submission number(s): 5, 11

Issue description

In summary, the respondents raised the following issues:

- Supported the inclusion of future north facing ramps at the Doyalson Link Road interchange in the proposal.
- Identified a future proposal in close proximity to the Doyalson Link Road interchange and requested further details on timing for construction of the north facing ramps at Doyalson and ongoing consultation to be carried out in relation to the design and construction implications for the nearby property development.

Response

Support for the possible north facing connections between the motorway and the Doyalson Link Road has been noted by Roads and Maritime. As identified in the REF, while the ramps have been assessed as part of the proposal they are not part of the project scope. Based on traffic volume assessments and cost analysis the ramps are not currently warranted. The detailed design will allow for the ramps to be included at a future stage subject to traffic demand and funding availability. The concept design ensured there were no direct property impacts on adjacent properties in relation to the ramps.

2.5.4 Truck pullover areas

Submission number(s): 6

Issue description

In summary, the respondent requested the upgrade include truck pull-over area(s).

Response

Roads and Maritime encourages all truck operators to take regular rest breaks and to ensure their vehicle loads are safely secured prior to entering the motorway. There are areas off the motorway at Berowra, Hawkesbury River, Ourimbah and the twin service stations at Warnervale (or at any other exit) where safe stopping areas are already provided. Additional truck pull over areas on this section of the M1 Pacific Motorway could present additional noise issues for local residents, as it passes through residential and semi-residential areas, and additional engine braking would be generated. Noise concerns held by residents is a major issue for this proposal.

The proposal is designed in such a way that all upgrade work will be within the current road boundaries and there is no intention to widen out past the shoulder in the current proposal, which would be required if additional truck pullover areas were to be implemented.

2.5.5 Motorway between Warnervale and Doyalson interchanges

Submission number(s): 5, 8, 15

Issue description

In summary, the respondents raised the following issues:

- Concerned that the proposed upgrade between the Warnervale and Doyalson interchanges is not warranted.
- Requested the design allow for four lanes northbound between the Warnervale and Doyalson interchanges.
- Requested consideration of design modifications between the southbound entry ramp at the Doyalson interchange and the southbound exit ramp at the Warnervale interchange.

Response

The proposed upgrades to the Warnervale and Doyalson interchange ramps have been designed to cater for current and forecast traffic growth, providing an acceptable level of service for around 20 years after the proposed completion of this proposal. Section 6.1.2 of the REF details the expected performance improvements as a result of the proposal.

In relation to the suggestion for a fourth lane northbound between the Warnervale and Doyalson interchanges, the current proposal effectively provides for this. There will be three lanes passing beneath the Warnervale interchange (northbound) and the entry lanes from the interchange run parallel to these lanes and are separated by a median barrier. On the northbound approach to the Doyalson interchange northbound, the motorway exit ramp height will increase in order to pass over the top of a new entry ramp to the motorway. This arrangement provides for greater traffic capacity as well as enhancing road safety outcomes between traffic entering the motorway from the Warnervale interchange and traffic exiting the motorway at the Doyalson interchange.

Spacing between the southbound entry ramps from the Doyalson interchange and the southbound exit ramp at the Warnervale interchange is quite close. The spacing between the entry and exit ramps is not dissimilar to the spacing between the respective northbound ramps at the Warnervale and Doyalson interchanges.

The key difference between the northbound (where a unique road treatment is being adopted) and southbound directions is the prevailing speeds for vehicles on the motorway and the ramps, especially for heavy vehicles. Vehicles travelling south on Doyalson Link Road travel at a speed that more closely matches the prevailing speed of traffic on the motorway. However, for heavy vehicles entering at Sparks Road, the entry lane is too short to accelerate to the minimum desirable entry speed for a heavy vehicle (85 km/h). This situation can contribute to vehicle breakdowns in the smooth flow of traffic and complicates the weaving arrangements.

A range of options could be considered to address the spacing between the southbound entry ramp from the Doyalson interchange and the exit ramp to the Warnervale interchange, including:

- Rebuilding the existing Doyalson interchange entry ramp, moving it further north
- Implementing a similar treatment to that proposed for the northbound direction
- A combination of the above two options.

Given the closer prevailing travel speeds and the motorway volumes during peak periods as well as the likely cost, these options were not considered warranted. The additional southbound lane is predicted to improve the operation of the motorway in this vicinity.

2.5.6 Traffic and transport

Submission number(s): 9, 12, 17

Issue description

In summary, the respondents raised the following issues:

- Questioned the extent that the design will accommodate the predicted traffic increases.
- Concern that the design of the Sparks Road right turn into the motorway southbound entry ramp is inadequate for motorist safety.
- Considerations for potential increases in traffic movements as a result a future airport proposed by Wyong Shire Council. Requests for the consideration of a southbound motorway entry ramp G-loop for vehicles travelling east on Sparks Road.

Response

The proposal would provide for an additional travel lane in each direction. There would be one additional northbound lane and one additional southbound lane. Page 8 of the REF refers to a previous (2007) study that suggested traffic on this section of the motorway could increase to around 90,000 vehicles per day by 2029. The REF goes on to state that “more recent forecasts suggest volumes in 2029 would be between 75,000 and 80,000 vehicles per day”. The proposed lane configuration, changes in road surface level and forecast traffic volume increases have all been considered as part of the environmental assessment.

The proposed upgrade of the M1 Pacific Motorway primarily involves widening into the existing median area. This includes lengthening the southbound entry ramp from the service centre. There will be minimal work to the outside verge and as such minimal clearance in this area is expected.

The proposed upgrade of the motorway and interchanges at Warnervale and Doyalson has considered current and forecast future traffic levels. The proposal would provide a good level of service for the motorway and interchanges for around 20 years from completion of construction scheduled for 2019.

The need for additional upgrades to Sparks Road or its connections to the motorway or other State roads beyond the current proposal, as a result of adjacent new developments such as the proposed regional airport or upgrade to the existing waste facility is a matter for proponents of these developments. The proponents would be required to provide mitigation measures (such as increased roadway capacity) at their own cost as a result of any traffic volume increases to ensure the continued safe and efficient operation of the road network.

2.5.7 **Safety**

Submission number(s): 3, 9

Issue description

In summary, the respondents raised the following issues:

- Concerns about the safety of the design and unsafe driver behaviour.
- Concerns about the possible need to remove trees between a property and the motorway given that the trees may be providing some vehicle protection.

Response

In relation to unsafe driver behaviour, the upgraded road surface would include the provision of upgraded safety barriers, including a wire rope safety barrier system. This barrier system has proved effective in retaining and redirecting unsafe driver behaviour of all types at motorway speeds.

There are currently no plans to remove vegetation in the area between the respondent's property and the motorway. In areas where vegetation needs to be removed to enable construction to proceed and where it is safe to do so in relation to the way the upgraded motorway will function, Roads and Maritime will reinstate or replace the cleared vegetation.

2.5.8 **Pavement**

Submission number(s): 9

Issue description

In summary, the respondent requested consideration of an extension to the proposed flexible road pavement in the design to achieve operational noise reduction and to reduce potential structural property impacts.

Response

The proposal generally deals with road pavement on a like-for-like basis. South of Wyong River, there is currently a flexible (asphalt) road pavement in place, while north of the river there is a rigid (concrete) road pavement in place. South of the river, the widening will occur into the median only, with the existing road pavement to be

retained and the additional lane northbound and southbound built by widening into the median.

North of Wyong River, the existing rigid (concrete) road pavement is failing and has been recommended for complete removal and replacement. While this is the option that has been assessed in the REF, Roads and Maritime has recently awarded a contract for detailed design which included a requirement to investigate alternate road pavement solutions (rather than the complete removal or replacement of the existing concrete road pavement). This would include a range of flexible and rigid road pavement options as well as exploring opportunities to retain the existing road pavement and overlay and strengthen it with flexible or rigid road pavement solutions.

Asphalt road pavements are generally considered to be quieter than concrete road pavements. One of the measures committed to in the REF for the section north of Wyong River is to "introduce longitudinal tining or diamond grinding to further reduce the noise of the concrete pavements would be investigated as part of detailed design". This measure would provide for reduced noise levels compared to plain road concrete pavement assessed as part of the REF.

In relation to vibration impacts, the REF notes that vibration levels will be below the criteria for building cosmetic damage. This does not mean that vibrations will not be felt during construction of the upgrade. The proposed road pavement material (asphalt, concrete or composite) would have less impact on vibration effects than the underlying geology and the proximity of the receiver to the source (the motorway construction).

2.6 Road condition

2.6.1 **Safety**

Submission number(s): 12

Issue description

In summary, the respondent raised the issue of existing cracks in the motorway road surface near the Hue Hue Road crossover.

Response

The REF noted the following on page 13: "the concrete pavement is in poor condition and is close to the end of its design life. Pavement maintenance and repair costs are an ongoing substantial expense. The poor pavement condition also increases vehicle operating costs by way of increasing wear and tear on vehicles."

The concept design assessed in the REF proposes the complete removal and replacement of the concrete road surface. While this is the option that has been assessed in the REF, Roads and Maritime has recently awarded a detailed design contract and included a requirement for the consultant to investigate alternate road pavement solutions (rather than the complete removal or replacement of the existing concrete road pavement). This would include a range of flexible and rigid road pavement options as well as exploring opportunities to retain the existing road pavement and overlay and strengthen it with flexible or rigid road pavement solutions.

2.7 Traffic and transport

2.7.1 **Construction**

Submission number(s): 19

Issue description

In summary, the respondents raised concerns about construction traffic using Hue Hue Road.

Response

A construction traffic and transport technical study formed part of the REF. This considered a number of options for the movement of construction vehicles. Hue Hue Road was considered an appropriate heavy vehicle transport route due to the connections it provides to the local road network. There are a limited number of suitable roads in the area that could be used for this purpose. Structural condition surveys would be carried out on Hue Hue Road both prior to and following construction to determine any rectification works that may be required.

The level of construction traffic using Hue Hue Road will be kept to a practical minimum and Roads and Maritime will monitor operation of the road throughout construction and where necessary seek to modify practices or implement further management measures to alleviate impacts on adjacent residents as reasonably practicable.

2.7.2 **Complementary traffic improvement works**

Submission number(s): 11

Issue description

In summary, the respondent raised the following issues:

- Indicated general support for the proposal regarding traffic and transport improvements.
- Highlighted the apparent complementary nature of the proposed works with the Wallarah 2 Coal Project. Particular reference was made to traffic flow and safety for motorway traffic, particularly for traffic entering and leaving the motorway at key interchanges and for traffic entering the motorway from the service centre ramps.

Response

Roads and Maritime acknowledges the Wallarah 2 Coal project proposal and the importance of maintaining a close working relationship as both projects continue to develop.

The proposed upgrade would deliver substantial traffic benefits for the operation of the motorway and interchanges and this will benefit all road users, including adjacent business interests such as Wallarah 2 Coal.

Further information of the Wallarah 2 Coal project can be found at the project website (listed below).

http://www.wallarah.com.au/project-description

2.8 Consultation

2.8.1 **Construction ancillary facilities**

Submission number(s): 11

Issue description

In summary, the respondent raised concerns about the requirement for ongoing consultation regarding proposed construction ancillary sites, in particular in relation to land owned by Wallarah 2 Coal north of the Caltex Service Station adjacent to the motorway and St John's Road.

Response

The potential ancillary site at the service station was identified in the correspondence sent to key stakeholders to request input into the preparation of the REF in accordance with the requirements of the State Environmental Planning Policy (Infrastructure) 2007. A submission was received from Wallarah Coal in response to this consultation, and the outcomes of this submission were incorporated into the environmental assessment contained in the REF report (refer Table 5.3 in Section 5 of the REF).

The REF identified a range of possible site compounds, including Wallarah 2 Coal lands north of the Caltex Service Stations adjacent the motorway and St Johns Road. Current in-principal support by Wallarah 2 Coal of the use of this site by Roads and Maritime (subject to commercial and other ongoing discussions) is appreciated. Roads and Maritime anticipates further consultation to be undertaken with Wallarah 2 Coal and the project delivery team.

Roads and Maritime notes that the Warren Road site has recently been identified for an alternative purpose (Chinese Theme Park) by private developers. Given the potential timing of the proposed motorway upgrade and possible theme park development, it is likely that Roads and Maritime will need to find an alternate ancillary site.

The REF (page 22) identified the range of criteria that were adopted to assess potential ancillary sites for suitability. These same criteria would be used to assess any alternate sites required. Replacement ancillary sites will be explored throughout the detailed design, with a supplementary environmental assessment completed for any proposed replacement sites.

2.9 General enquiries

2.9.1 **Community consultation**

Submission number(s): 1

Issue description

In summary, the respondents requested details of the community information session.

Response

Roads and Maritime called the respondent and discussed the details of the community information sessions, which were included in all communication materials and available on the Roads and Maritime website.

2.9.2 Project documents

Submission number(s): 2, 14, 25

Issue description

In summary, the respondents requested access details for the proposal information documents and the proposal documents on public display.

Response

Proposal documents are available on the Roads and Maritime website at:

Proposal website:

http://www.rms.nsw.gov.au/projects/central-coast/m1-pacific-motorway/tuggerah-to-doyalson-motorway-widening/index.html

REF Documents:

http://www.rms.nsw.gov.au/projects/central-coast/m1-pacific-motorway/tuggerah-to-doyalson-motorway-widening/project-documents.html

Appendix F of the REF - Noise Assessment

http://www.rms.nsw.gov.au/documents/projects/central-coast/m1-pacific-motorway/tuggerah-to-doyalson-motorway-widening/m1-tuggerah-to-doyalson-ref-appendix-f.pdf

2.9.3 Timing of construction

Submission number(s): 11

Issue description

In summary, the respondent(s) requested more information about the proposal timeframes for construction.

Response

Roads and Maritime has awarded a contract for detailed design and tender document preparation.

Current planning for the proposal is targeting construction commencement in late 2016 with the project scheduled for completion in 2019.

The north facing ramps between the motorway and Doyalson interchange have been assessed as part of the REF but are not proposed for delivery as part of the current proposal.

3 Additional assessment

Following the public display of the REF, Roads and Maritime commissioned additional assessment and sought further specialist advice in relation to some aspects of the proposal. The additional assessment and/or advice has assisted the response to the submissions provided in Chapter 2 or specifically relates to proposed changes to the proposal from that described in the REF. Proposed changes to the proposal are described and assessed in this chapter of the submissions report.

Updated safeguards have been developed for the proposal as a result of this additional consideration and assessment. Chapter 4 details the updated safeguards that would be applied to manage the impacts of the proposal.

3.1 Correction to the vibration safe working distances

During the public exhibition period, it was identified that there was a data input error in Table 6-18 of Section 6.2 of the REF. The table in error formed part of the noise and vibration section of the REF. The table detailed recommended safe working distances between vibration intensive plant and vibration sensitive receivers. Table 3-1 provides a reproduction of the table provided in the REF and includes the correct values.

Table 3-1: Corrected safe working distance for vibration criteria

		Correct values, from TfNSW - Construction Noise Strategy		Incorrect values as reported in the REF Table 6-18	
Plant Item	Rating/Description	Safe Working Distance		Safe Working Distance	
		Cosmetic Damage (BS 7385)	Human Response (OH&E Vibration Guideline)	Cosmetic Damage (BS 7385)	Human Response (OH&E Vibration Guideline)
Vibratory Roller	< 50 kN (Typically 1-2 tonnes)	5 m	15 m to 20 m	5 m	5 m
	< 100 kN (Typically 2-4 tonnes)	6 m	20 m	15 - 20 m	15 - 20 m
	< 200 kN (Typically 4-6 tonnes)	12 m	40 m	6 m	6 m
	< 300 kN (Typically 7-13 tonnes)	15 m	100 m	20 m	20 m
	> 300 kN (Typically 13-18 tonnes)	20 m	100 m	12 m	12 m
	> 300 kN (> 18 tonnes)	25 m	100 m	40 m	40 m
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator)	2 m	7 m	15 m	15 m
Medium Hydraulic Hammer	(900 kg – 12 to 18t excavator)	7 m	23 m	100 m	100 m
Large Hydraulic Hammer	(1600 kg – 18 to 34t excavator)	22 m	73 m	20 m	20 m
Vibratory Pile Driver	Sheet piles	2 m to 20 m	20 m	100 m	100 m
Pile Boring	≤ 800 mm	2 m (nominal)	N/A	25 m	25 m
Jackhammer	Hand held	1 m (nominal)	Avoid contact with structure	100 m	100 m

The REF determined that the proposal would not result in vibration levels that would cause damage to buildings.

The corrected values in Table 3-1 show that building cosmetic damage is not expected at distances greater than 25 metres from vibrating plant and equipment, while human response to vibration is not usually perceived at distances greater than 100 metres from vibrating plant and equipment.

An impact assessment has been undertaken based on the corrected values. It concludes that as construction would usually be at distances greater than 40 metres from dwellings, vibration levels would also be below the criteria for building damage. Vibration from construction activities would not result in levels that cause damage to buildings. It further found that the assessed human response to vibration would be temporary and intermittent.

3.1.1 **Additional safeguards and management measures**

The corrections to the vibration safe working distances require no changes to the safeguards and management measures adopted for the proposal.

3.2 Vegetation clearing at the Doyalson interchange

To progress the proposal to the detailed design phase, additional information would be required in relation to geotechnical conditions that exist at the site. Additionally, the underground utilities in the proposal area would need to be uncovered and accurately surveyed to confirm their locations and depths.

To obtain this information, plant and equipment such as excavators and drill rigs would need to access the proposal area. A Geotechnical and Utilities Investigation Plan was developed to guide the investigations. To assess the potential impacts of the proposed Geotechnical and Utilities Investigations a specific REF has been developed.

The Investigation of Geological Conditions and Utilities REF determined that to undertake the investigations some vegetation clearing would likely be required. Clearing would likely be required to create access tracks to transport the plant and equipment to the investigation sites and to create cleared work areas where plant and equipment would be established to undertake the investigations.

Clearing of vegetation would generally be limited to groundcover, individual trees and shrubs less than 100 mm in diameter and to some lopping of tree branches. However, at the Doyalson interchange, steep land and dense vegetation create challenges to access and establishment and more substantial clearing would likely be required to access and establish for the proposed investigations in this area.

The Biodiversity Technical Study supporting the REF considered vegetation clearing for the purposes of the project. This study concluded that in total, the proposal is expected to require the clearing of up to 18 hectares of native vegetation, including about 5.5 hectares of endangered ecological community (EEC).

At the Doyalson interchange, the *Threatened Species Conservation Act 1995* listed Narrabeen Dooralong Spotted Gum Ironbark Forest EEC has been identified. The REF considered the clearing of 3.4 hectares of this EEC would be required to undertake the proposal. The REF concluded that the impact of this clearing would not constitute a significant impact provided recommended safeguards and management measures were applied.

To undertake the geotechnical and utilities investigations and ultimately construct the proposal at the Doyalson interchange, an increase to the assessed EEC clearing would be required. This is a result of the constraints presented from the topography and vegetation in the area. To undertake these works a further 1.5 hectares of Narrabeen Dooralong Spotted Gum Ironbark Forest EEC would need to be cleared in addition to the 3.4 hectares of clearing that has already been assessed.

To assess the impacts of the additional clearing, an updated 7-part test was prepared by a qualified ecologist (Appendix G). The updated assessment concluded that a total of 4.9 hectares of Narrabeen Dooralong Spotted Gum Ironbark Forest EEC would be cleared at the Doyalson interchange. Clearing of this EEC was assessed to not be likely to constitute a significant impact provided the recommended safeguards and management measures are applied. The assessment concluded that a Species Impact Statement would not be required.

3.2.1 Additional safeguards and management measures

Changes to the proposal safeguards and management measures are required as a result of the proposed geotechnical and utilities investigations. The change is related to modification of the proposed exclusion zones. The amended safeguards are provided below.

No.	Impact	Environmental safeguards	Responsibility	Timing
46	Minimise impacts of the proposal on EECs and SEPP 14 wetlands	• Offsetting for impacts on EEC vegetation should be investigated in accordance with the Roads and Maritime Guideline for Biodiversity Offsets (2011). • Where reasonably practicable, retain vegetation that contains EECs present in the proposal area and adjacent sites. • ~~Exclusion zones detailed in Figure 6-12 and Figure 6-13 are to be established and maintained throughout construction. Ensure that exclusion zones are fenced off and signage erected in accordance with the Roads and Maritime Biodiversity guidelines: Guide 2 – Exclusion Zones (RTA, 2011).~~ • **Exclusion zones detailed in Figure 1 and Figure 2 of the Submissions Report are to be established and maintained throughout construction. Ensure that exclusion zones are fenced off and signage erected in accordance with the Roads and Maritime Biodiversity guidelines: Guide 2 – Exclusion Zones (RTA, 2011).**	Roads and Maritime Construction contractor	Pre-construction

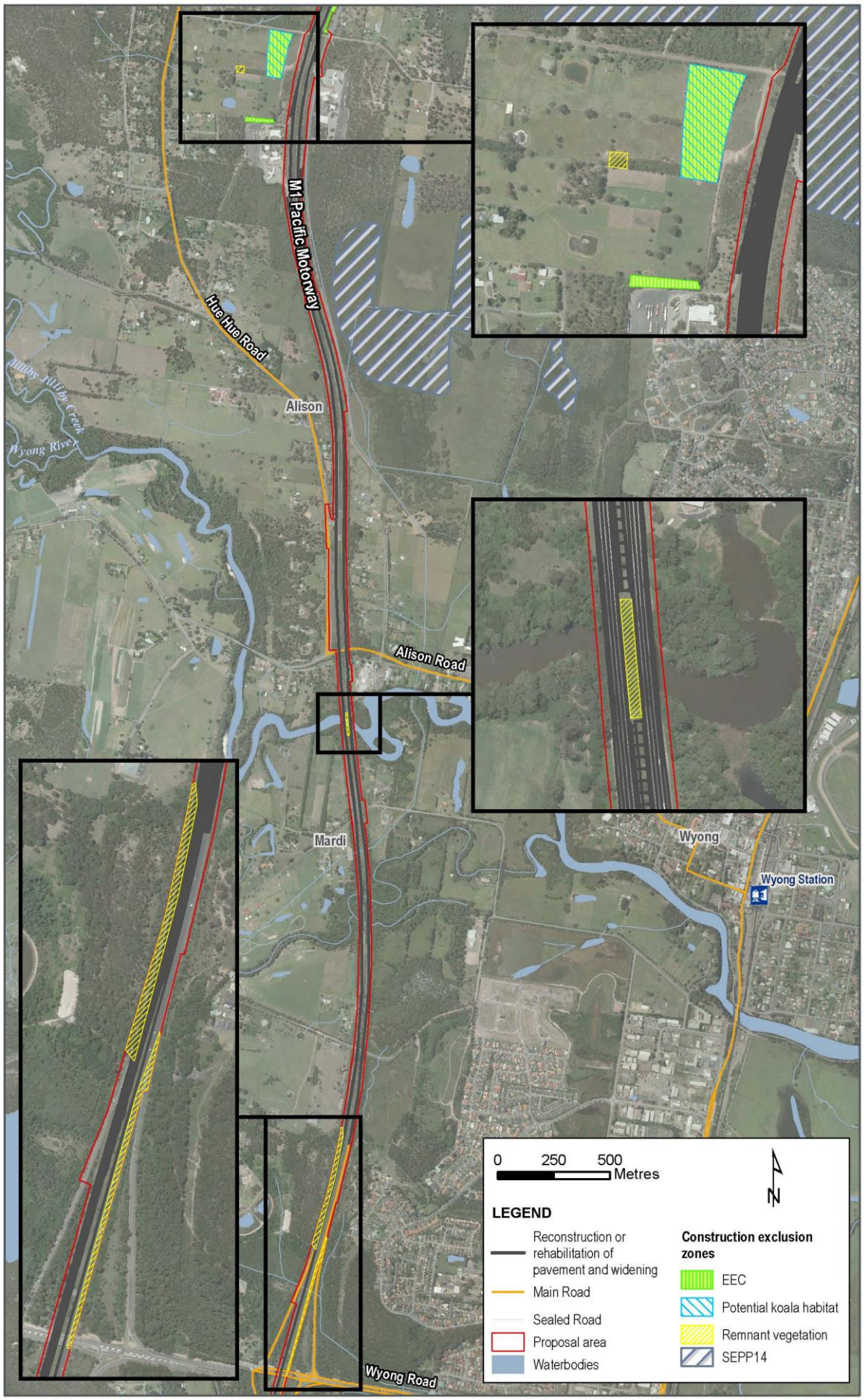

Figure 1 Construction exclusion zones within study area based on flora and fauna habitat surveys - southern section

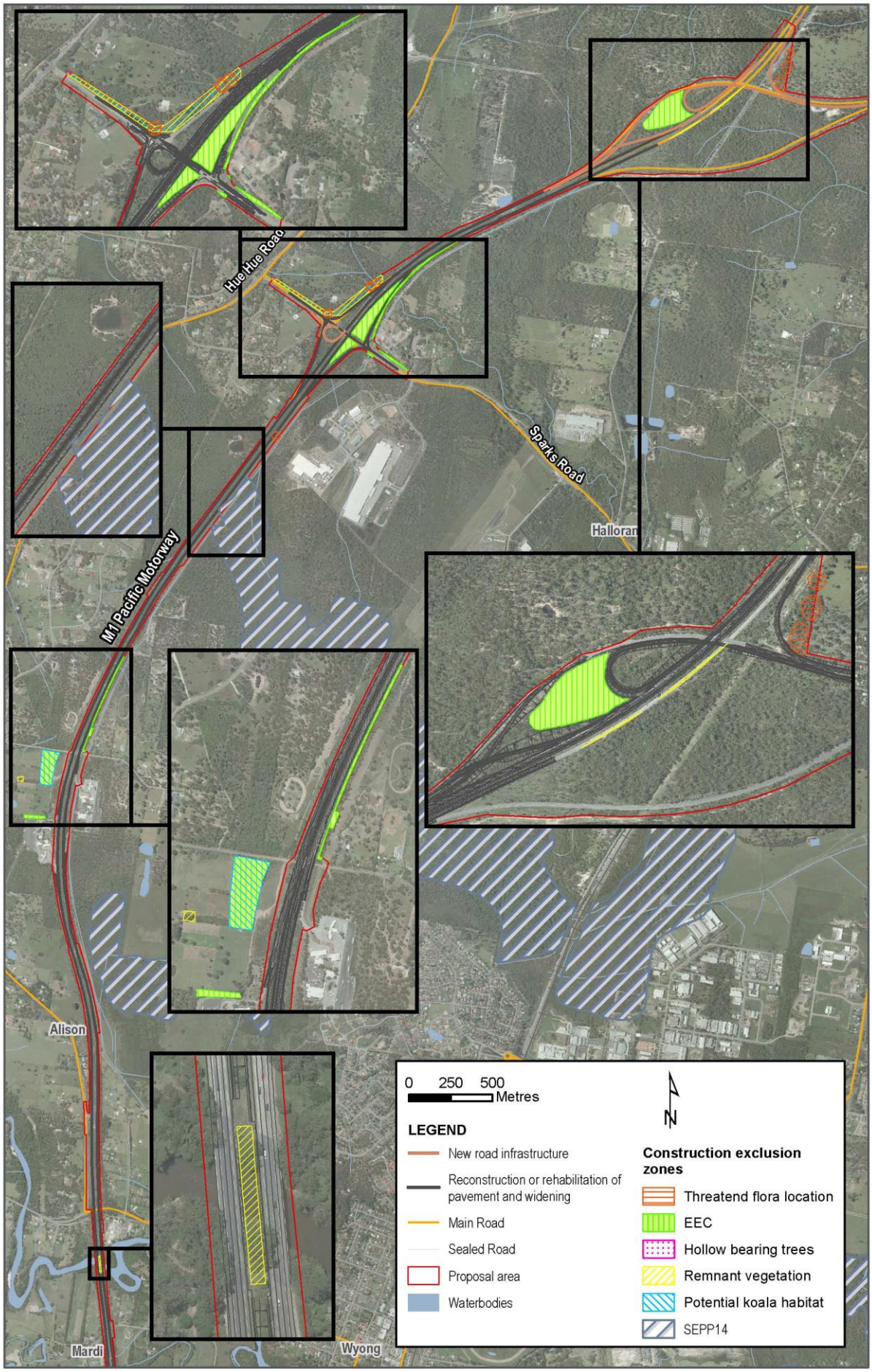

Figure 2 Construction exclusion areas within study area based on flora and fauna habitat surveys - north

3.3 *Tetratheca juncea and Grevillea parviflora subsp. Parviflora* targeted surveys

The Biodiversity Technical Study undertaken to support the REF noted that OEH Wildlife Atlas records for two threatened plant species occurred within the proposal area: *Tetratheca juncea* and *Grevillea parviflora subsp. parviflora*. Neither species was recorded during field surveys undertaken for the Biodiversity Technical Study in April, May and June 2013 or in March 2014.

The REF recommended that additional targeted surveys be undertaken during the peak flowering periods for both species, being between August and October. Since display of the REF, Roads and Maritime has undertaken the recommended targeted searches for *Tetratheca juncea* and *Grevillea parviflora subsp. parviflora*.

The targeted surveys were undertaken on 14 October 2014 by a qualified ecologist. Surveys were undertaken at this time in order to coincide with the peak flowering periods for both target species.

The surveys were undertaken on the northbound and southbound motorway shoulders of the M1 Pacific Motorway between the Warnervale Interchange and the Doyalson Link Road Interchange. Surveys were also undertaken around the Warnervale Interchange and the Doyalson Link Road Interchange. Locations surveyed are indicated in the survey technical note provided in Appendix H.

A nearby known reference populations was also surveyed to establish that the plant was flowering at that time of the survey in the local area. Both *Tetratheca juncea* and *Grevillea parviflora subsp. parviflora* were located and both species were confirmed to be in flower during the survey period.

Targeted surveys confirmed the presence of both *Tetratheca juncea* and *Grevillea parviflora subsp. parviflora* within parts of the proposal area. All individuals within the proposal area were located on or near previous Wildlife Atlas records with the exception of one sub-population near the corner of the existing Sparks Road and the northbound motorway entry ramp.

The locations of all individuals found during the searches were recorded using GPS. Table 3-2 summarises the results of the survey.

Table 3-2: Targeted survey outcomes

ID	Species	Comment
1	*Tetratheca juncea*	Cluster around all sides of the base of a large scribbly gum. Many plant clumps (>100) in area approximately 5 m x 6 m
2	*Tetratheca juncea*	Approximately 7 plant clumps in 2 m x 1 m area
3	*Tetratheca juncea*	Approximately 12 plant clumps in 2 m x 2 m area
4	*Tetratheca juncea*	Approximately 16 plant clumps in 2 m x 2 m area
5	*Tetratheca juncea*	Approximately 8 plant clumps in 1.5 m x 1.5 m area
6	*Tetratheca juncea*	Approximately 12 plant clumps in 3 m x 1 m area
7	*Tetratheca juncea*	Approximately 15 plant clumps in area 3 m x 1 m
8	*Tetratheca juncea*	Approximately 5 plant clumps in 1.5 m x 1 m area

ID	Species	Comment
9	*Tetratheca juncea*	Approximately 10 plant clumps in 2.5 m x 1 m area
10	*Tetratheca juncea*	No individual(s) found at this location. Habitat at this location looks very unlikely to support this species.
11	*Tetratheca juncea*	Unknown number of clumps in area approximately 2 m x 2 m
12	*Tetratheca juncea*	Searched extensively. No individual(s) found at this location
13	*Grevillea parviflora* subsp. *parviflora*	Approximately 8-10 individuals in patch approximately 2 m x 1.5 m. Located partially inside/adjacent to Telstra easement as it crosses waterway.
14	*Grevillea parviflora* subsp. *parviflora*	
15	*Grevillea parviflora* subsp. *parviflora*	
16	*Grevillea parviflora* subsp. *parviflora*	Patch of 50-70 individuals ranging from a few centimetres to 50 cm in height. Not previously recorded in OEH Wildlife Atlas Located in an area approximately 10 m x 5 m with large proportion of juveniles. None noted growing on other (private property) side of fence.

Assessments of Significance for both target species were undertaken in the Biodiversity Technical Study supporting the REF. These assessments were based on the concept design proposal footprint and on the assumption that all Wildlife Atlas records known (at that time) were present. Both assessments resulted in a finding of no significant impact.

Assessments of Significance for both species have been revised based upon the results of the targeted surveys. Despite the new sub-population of *G. parviflora subsp. parviflora* being recorded at the Warnervale interchange, the assessments have concluded that the likely impact of the proposal upon each species would not be significant.

3.3.1 Additional safeguards and management measures

Changes to the proposal safeguards and management measures are required as a result of the outcomes from the targeted threatened species surveys. The amended safeguards are provided below.

No.	Impact	Environmental safeguards	Responsibility	Timing
48	Retention of native vegetation, habitat trees (including hollow bearing trees) and potential	• Threatened flora present in the survey area would be protected and retained where reasonably practicable. • ~~Targeted surveys for Tetratheca juncea and Grevillea parviflora subsp. parviflora are to be undertaken by a qualified ecologist in appropriate flowering season to confirm threatened plant records~~	Detailed design Roads and Maritime Construction contractor	Pre-construction Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
	koala habitat	~~at Doyalson Link Road Interchange, Sparks Road Interchange and within the road corridor between these two interchanges.~~ • ~~Where individuals of Tetratheca juncea or Grevillea parviflora subsp. parviflora are identified that would be unavoidably affected by the proposal, consideration would be given to translocating in consultation with OEH.~~ • Where individuals of *Tetratheca juncea* or *Grevillea parviflora subsp. parviflora* are identified outside of the construction footprint they would be protected and disturbance avoided during construction. • **Locations confirmed to contain individuals, including buffer zones up to 25 m from the individuals of *Tetratheca juncea* or *Grevillea parviflora subsp. parviflora* would be exclusion zones. Exclusion zones are detailed in Figure 1 and Figure 2 of the Submissions Report. Exclusion zones are to be established prior to construction commencing and maintained throughout construction.** • ***Ensure that exclusion zones are fenced off and signage erected in accordance with the Roads and Maritime Biodiversity guidelines: Guide 2 – Exclusion Zones (RTA, 2011).*** • In the event that unexpected threatened species are detected at the site prior to construction the Roads and Maritime Unexpected Threatened Species Finds Procedure should be enacted (RTA, 2011) • During detailed design consideration is to be given to minimising, where reasonably practicable, any vegetation clearance required as a result of the design. In particular, potential koala habitat should be avoided or the construction footprint locally minimised where avoidance cannot be achieved.	Qualified ecologist	

No.	Impact	Environmental safeguards	Responsibility	Timing
		• Retain and protect avoided potential koala habitat from disturbance during construction. • Establish exclusion zones around remnant vegetation, habitat trees, water bodies and EEC to be retained to prevent inadvertent disturbance during construction. • Vegetation that has been protected is not to be removed. • If native vegetation must be removed, wood debris and any bush rock encountered should be stockpiled for later re-use or relocation in appropriate environments following Roads and Maritime Biodiversity Guidelines (2011). • Construction access tracks and construction areas along the motorway verge should be sited to avoid or minimise disturbance of native vegetation. • There should be no clearing of any mature trees on construction ancillary sites.		

3.4 Construction sediment basins

Following the display of the REF, Roads and Maritime investigated the need for sediment basins to be established during the construction phase in order to manage sediment. In accordance with Managing Urban Stormwater: Soils and Construction (Landcom, 2004), construction sediment basins were found to not be required (except at construction ancillary sites) if the contractor was able to appropriately mange the project into sub-catchments. However, it is noted that sediment basins may still be used to reduce the environmental impacts of the proposal during construction.

The area identified in the assessment with the highest potential need for a construction sediment basin was found to be the Doyalson interchange. However, the Doyalson interchange contains sensitive EEC vegetation. Clearing of vegetation for the purposes of temporary works such as construction sediment basins is not recommended.

The contractor will prepare a Soil and Water Management sub plan. In preparing this plan the contractor will consider if sediment basins can be implemented at the Doyalson interchange (and/or elsewhere for the proposal) while maintaining compliance with other project safeguards, such as the exclusion zones detailed in Figure 1 and Figure 2.

3.4.1 **Additional safeguards and management measures**

The additional assessment undertaken for construction phase sediment basins requires no changes to the safeguards and management measures adopted for the proposal.

4 Environmental management

The REF for the M1 Pacific Motorway replacement and widening: Tuggerah to Doyalson identified the framework for environmental management, including management and mitigation measures that would be adopted to avoid or reduce environmental impacts (Section 7 of the REF).

After consideration of the issues raised in the public submissions and changes to the proposal, the management and mitigation measures have been revised. Should the proposal proceed, environmental management will be guided by the framework and measures outlined below.

4.1 Environmental management plans (or system)

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

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

The plans will be prepared prior to construction of the proposal and must be reviewed and certified by environment staff, Hunter Region, prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the specifications set out in the *QA Specification G36 – Environmental Protection (Management System) and QA Specification G38 – Soil and Water Management (Soil and Water Plan)*.

4.2 Summary of safeguards and management measures

Environmental safeguards outlined in this document would be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal. These safeguards would minimise any potential adverse impacts arising from the proposed works on the surrounding environment. All safeguards described in this REF would be incorporated into the CEMP. Measures from the REF (as revised) as well as additional measures are presented in Table 4-1 below.

Table 4-1: Summary of site specific environmental safeguards

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in bold				
1	General	• All environmental safeguards must be incorporated within the following documents: - Project Environmental Management Plan - Detailed design stage - Contract specifications for the proposal - Contractor's Environmental Management Plan	Project manager	Pre-construction
2	General	• A risk assessment must be carried out on the Proposal in accordance with the Roads and Maritime Services Audit Pack and OSD risk assessment procedures to determine an audit and inspection program for the works. The recommendations of the risk assessment are to be implemented. • A review of the risk assessment must be undertaken after the initial audit or inspection to evaluate is the level of risk chosen for the project is appropriate. • Any works resulting from the proposal and as covered by the REF may be subject to environmental audit(s) and/or inspection(s) at any time during their duration.	Project manager and regional environmental staff	Pre-construction After first audit
3	General	• The environmental contract specification G36, G38 and G40 must be forwarded to the Roads and Maritime Services Lead Environmental Officer for review at least 10 working days prior to the tender stage. • A contractual hold point must be maintained until the CEMP is reviewed by the Roads and Maritime Services Senior Environmental Officer.	Project manager	Pre-construction
4	General	• The Roads and Maritime Services Project Manager must notify the Roads and Maritime Services Environmental Officer Hunter Region at least 5 days prior to work commencing.	Project manager	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in bold				
5	General	• All businesses and residences likely to be affected by the proposed works must be notified at least 5 working days prior to the commencement of the proposed activities.	Project manager	Pre-construction
6	General	• Environmental awareness training must be provided, by the contractor, to all field personnel and subcontractors.	Contractor	Pre-construction and during construction as required.
7	Impacts on traffic during construction	• Prepare and implement a detailed traffic management plan (TMP) as part of the Construction Environmental Management Plan (CEMP). The TMP is to include appropriate guidelines and procedures required to ensure the continuous, safe and efficient movement of construction and non-construction traffic in and around the project area. The TMP would be submitted in stages to reflect the progress of the work and would detail: - Signage requirements. - Lane possession and approval process during periods of online construction. - Measures to minimise disruption and inconvenience to road users during the construction period. - Traffic control devices such as temporary signals. - A local and regional communications strategy. - Measures to provide adequate warning, information and guidance for road users during the construction period. - Appropriate construction speed limits to be implemented in consultation with Roads and Maritime to facilitate safety of road users and construction personnel. - Specific traffic management plans to address night works safety for motorists and for construction personnel. - Temporary accesses, ancillary site entrances and exits and other	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		traffic management measures to be designed in accordance with relevant road safety and Roads and Maritime requirements - Temporary accesses, ancillary site entrances and exits and other traffic management measures that do not impact upon the safety of the users of the existing road network. - Safe pedestrian access for the public along Sparks Road during construction. - Temporary parking for use by construction staff at a construction compound. - Access to all properties including the motorway service centres to be maintained throughout the construction. - Make provision for emergency services vehicles to pass through construction zones and update the local emergency services on the staging and progress of works that would affect their movement.		
8	Damage to roads from construction traffic	• Dilapidation surveys of roads around the proposal area should be undertaken prior to their use for construction and after construction is complete. • Any damage to roads as a result of the construction traffic should be repaired.	Construction contractor	Construction
9	Impacts to cyclists during construction	• Cyclist groups would be consulted prior to the commencement of construction and advised to use alternative sections of the M1 Pacific Motorway or alternative routes during the construction period. • Appropriate signage and way finding provisions would be implemented for cyclist detours.	Construction contractor	Construction
10	Provision of incident management	• The contractor would consult with Roads and Maritime Traffic Commanders, Traffic Emergency Patrols (TEP) and the Transport Management Centre (TMC) to plan the construction to allow for	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
	during construction	appropriate incident response plans to be implemented.		
11	Noise impacts resulting from design elements	• An assessment of feasible and reasonable noise mitigation measures for operation of the proposal is to be undertaken during detailed design in accordance with the Roads and Maritime Environmental Noise Management Manual Practice Note 4. • The detailed design should consider pavement treatments such as longitudinal tining or low noise diamond grinding to reduce operational road noise.	Roads and Maritime Detailed design	Pre-construction Pre-construction
12	Noise impacts resulting from construction activities	• Appropriate mitigation and management measures are to be used to minimise construction noise and vibration at noise sensitive receivers as described in the approved construction noise and vibration management plan (CNVMP).	Construction contractor	Construction
13	Noise impacts resulting from construction activities	• Prepare and implement a CNVMP that identifies reasonable and feasible approaches to reduce noise impacts during construction including for ancillary facilities. • Undertake at-receiver noise mitigations that are planned to manage operational noise at the commencement of construction. • Inform the community at least 48 hours before any out of hours work is to be undertaken and provide the following information: - Programmed times and locations of construction work. - Construction noise and vibration impact predictions. - Construction noise and vibration mitigation measures being implemented on site. • Provide specific details of all out of hours work to the EPA. • Implement a notification and consultation procedure to identify when noise impacts during extended hours and out of hours work are above	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		relevant criteria and enable appropriate management measures to be developed. • Implement a phone line and complaints handling procedure for noise and other construction related complaints. • Include specific noise mitigation measures in the CNVMP including: - Noise intensive construction works would be carried out during standard construction hours wherever practicable. - Noisy activities that cannot be undertaken during standard construction hours would be scheduled as early as possible during the evening and/or night-time periods. - Appropriate plant would be selected for each task, to minimise the noise impact. - Deliveries would be carried out during standard construction hours where practical and safe to do so. - Non-tonal reversing alarms would be fitted on all construction equipment where possible. - If it is safe, night-time activities would be planned and conducted in such a manner as to eliminate or minimise the need for audible warning alarms. - The offset distance between noisy plant items and nearby residential receivers would be maximised. - Noisy equipment would be oriented away from residential receivers. - Site access points, ancillary site accesses and ancillary facilities would be positioned as far as practicable away from residential receivers. - Plan the internal layout and operation of construction ancillary facilities to maximise the separation distance between sensitive receivers and noisy on-site activities.		

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		- The use of structures or enclosures will be investigated during detailed design and would be used to shield residential receivers from noise sources where considered practicable and effective. - Trucks would travel via internal haul routes and major roads and routes where practicable and would not be allowed to queue near residential dwellings. - Respite periods would be considered during times of noise intensive works where sensitive receivers would be adversely impacted for extended periods. These could include late start and/or early finishes. - Wherever practicable, noise intensive works would be scheduled/programmed in the following order of priority to minimise the potential impacts on sensitive receivers. 1. Standard working hours. 2. Extended working hours. 3. Night time working hours.		
14	Construction vibration	• Prepare and implement a CNVMP that identifies reasonable and feasible approaches to reduce vibration impacts during construction including for ancillary facilities. • Include specific vibration mitigation measures in the CNVMP including: - Vibration intensive works would not occur outside the safe working distances outlined in Table 6-18 unless necessary. - If vibration intensive works would be required outside the safe working distances outlined in Table 6-18, alternative equipment would be used to ensure these distances are not exceeded.	Construction contractor	Construction
15	Exceedance of RNP where the	• The suitability of architectural treatment of sensitive receivers would	Roads and Maritime	Operation

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
	predicted level is acute or more than two dB(A) higher than under the 'no build' option	be considered on a case by case basis by Roads and Maritime, and negotiated with property owners.		
16	Stockpiling or material storage may reduce flood storage areas	• All stockpile locations and construction ancillary sites should be located above the 100 year ARI flood level.	Construction contractor	Construction
17	Earthworks may affect flow paths	• All piped and channelised water should be directed to existing points of discharge.	Construction contractor	Construction
18	Increased flow rates and velocities of runoff may affect downstream environments	• The design will incorporate measures such as energy dissipation measures, scour protection and other design features to control flow intensity and direction of flow. • Erosion and sediment control measures will be implemented. These will include scour protection and water quality basins.	Design team Construction contractor	Detailed design Construction
19	Groundwater	• Any potential for changes in the groundwater table and any resulting impacts will be reviewed in response to any design refinements. Where necessary, measures to manage the changes will be designed and implemented during construction and operation.	Design team Construction contractor	Detailed design Construction
20	Erosion and sedimentation	• A Construction Environmental Management Plan (CEMP) and associated sub-plans would be prepared for all construction and maintenance activities associated with the proposal. The CEMP should be prepared in accordance with Roads and Maritime guidelines and specification, including, but not limited to G38, G39 and G40. The CEMP would be supported by a Soil and Water	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		Management Plan (SWMP).		
21	Erosion and sedimentation	• A qualified soil conservationist should develop the construction phase soil and water management strategy in accordance with the principles and practises detailed in *Managing Urban Stormwater: Soils and Construction (*Landcom, 2004) and in consultation with relevant government agencies and Council. The soil and water management strategy should be documented within the SWMP.	Construction contractor	Pre-construction
22	Erosion and sedimentation	• The SWMP should contain as a minimum the following elements: • Consideration of appropriate erosion and sediment control during staging of the main widening and replacement construction works. • Consideration of appropriate erosion and sediment controls at ancillary sites with particular consideration of sediment basins at batch plant sites or where significant material processing or stockpiling will occur. • Measures to develop, maintain, monitor and improve progressive, site specific Erosion and Sedimentation Control Plans (ESCPs). • Identification of site conditions or construction activities that could potentially result in erosion and associated sediment runoff. • Methods to minimise potential adverse impacts of construction activities on the water quality within surrounding waterways. • Details of specific measures to protect sensitive areas including SEPP14 wetlands, drinking water catchments and sensitive vegetation (EECs). • Details of measures to minimise any adverse impacts of sedimentation on the surrounding environment. • Details of measures to minimise soil erosion caused by all construction works including clearing, grubbing and earthworks.	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		• Details of measures to make site personnel aware of the requirements of the SWMP by providing information within induction, toolbox and training sessions. • Details of the roles and responsibilities of personnel responsible for implementing the SWMP. • Details of measures for the inspection and maintenance of construction phase water treatment devices and structures.		
23	Erosion and sedimentation	• Soil and water management measures in the ESCP are to be consistent with the principles and practises detailed in Landcom's (2004) Managing Urban Stormwater: Soils and Construction.	Construction contractor	Pre-construction
24	Erosion and sedimentation	• The proposal (including ancillary sites) may require sediment control basins. Temporary basins are to be sized accordingly to the area of land being disturbed and activities being conducted at each site. Sediment basins are to be considered at concrete batch plant sites and or where significant material stockpiling or processing occurs.	Construction contractor	Construction
25	Disturbance to asbestos containing materials	• An Asbestos Management Plan is to be developed in accordance with the Roads and Maritime Services Asbestos Management Plan (2013).	Construction contractor	Construction
26	Disturbance to asbestos containing materials	• If previously unidentified asbestos contamination is discovered during construction, work in the affected area must cease immediately, and an investigation must be undertaken and report prepared to determine the nature, extent and degree of the asbestos contamination. The level of reporting must be appropriate for the identified contamination in accordance with the relevant EPA and WorkCover Guidelines and include the proposed methodology for the remediation of the asbestos contamination. Remediation activities must not take place until receipt of the investigation report by	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		occupational health professional. Works may only recommence upon receipt of a validation report from a suitably qualified contamination specialist that the remediation activities have been undertaken in accordance with the investigation report and remediation methodology.		
27	Disturbance of contaminated material	• A Contaminated Land Management Plan is to be prepared for construction areas identified as contaminated land or any land contamination caused by the proposal.	Construction contractor	Construction
28	Disturbance of contaminated material	• The Contaminated Land Management Plan is to detail procedures to: • Include measures to identify and manage acid sulphate soils. • Protect the environment by implementing control measures to divert surface runoff away from the contaminated land. • Capture and manage any surface runoff contaminated by exposure to the contaminated land. • Investigate the contamination to determine the concentration and type of contaminants and the extent of contamination. • Assess the requirement to notify relevant authorities, including the EPA. • Manage the remediation and subsequent validation of the contaminated land, including any certification required.	Construction contractor	Construction
29	Disturbance of contaminated material	• Each of the ancillary sites proposed, requires a preliminary environmental survey to be undertaken prior to Roads and Maritime occupying the site. The presence of fill (and potential contamination) would be determined by undertaking site inspections.	Construction contractor	Construction
30	Disturbance of contaminated material	• Additional assessment is to be undertaken for soils requiring off-site disposal to ensure the correct waste classification is determined. Excavated material that is not suitable for on-site reuse or recycling,	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		such as contaminated material should be transported to a site that may legally accept that material for reuse or disposal.		
31	Disturbance of contaminated material	• If previously unidentified contamination is discovered or suspected during construction, work in the affected area must cease immediately, and an investigation must be undertaken and report prepared to determine the nature, extent and degree of any contamination. The level of reporting must be appropriate for the identified contamination in accordance with OEH Guidelines for Consultants Reporting on Contaminated Sites (2011).	Construction contractor	Construction
32	Accidental spills during construction	• Vehicles and machinery should be properly maintained to minimise the risk of fuel/oil leaks. Routine inspections of all construction vehicles and equipment should be undertaken for evidence of fuel/oil leaks. • No stockpiles of materials or storage of fuels or chemicals would be located within the 100 year ARI flood zone.	Construction contractor	Construction
33	Accidental spills during construction	• All fuels, chemicals and hazardous liquids should be stored within an impervious bunded area in accordance with Australian standards and EPA guidelines. • Any on-site refueling would occur in a designated area with impervious surfaces.	Construction contractor	Construction
34	Traffic delays during construction	• A Traffic Control Plan (TCP) is to be prepared in accordance with RTA's *Traffic Control at Work Sites Manual* (2010), and approved by Roads and Maritime prior to implementation. The TCP is to include the notification of any traffic alterations or closures. • The TCP is to include procedures for individual notification with directly impacted residences, businesses, emergency services, utility authorities, transport industry groups and government stakeholders. • Timely notification of changes to informal car parking arrangements is	Contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		to be undertaken prior to construction commencing.		
35	Disturbance from activities on ancillary sites	• Consult with sensitive receivers located nearby to construction ancillary sites about likely impacts prior to construction. • Site plant and equipment likely to cause disturbance to sensitive receivers located nearby ancillary sites at a suitable distance to minimise impacts.	Roads and Maritime Contractor	Pre-construction
36	Uncertainty surrounding construction activities	• The TCP is to include a construction communications plan including requirements to provide details and timing of proposed activities to affected residents, 24 hour contact name and number for complaints and details of a notification plan for changed conditions during the construction period. • The communications plan is to be prepared in accordance with Roads and Maritime's *Community Participation and Communications Manual* (2012).	Contractor	Pre-construction
37	Exclusion from the proposal area during construction for informal parking	• The new car park at the Warnervale Interchange should be scheduled for construction as early in the construction program as reasonably practicable.	Contractor	Construction
38	Emergency access	• Relevant emergency services, including fire, ambulance and police, are to be consulted to ensure that safe access is maintained during the construction period in the event of an emergency.	Contractor	Pre-construction
39	Property acquisition	• If property acquisition is required, all acquisition is to be undertaken in accordance with the *Land Acquisition (Just Terms) Compensation) Act 1981*.	Roads and Maritime	Pre-construction
40	Impact on ancillary sites	• All ancillary sites are to be restored to pre-existing conditions or to a condition agreed with the land owner, at the completion of	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		construction.		
41	Potential long term far field effects from mine subsidence	• Roads and Maritime and Wallarah 2 Coal Project are to continue to closely liaise with respect to detailed subsidence planning and monitoring prior to longwall mining activity. • Detailed design, in the vicinity of Sparks Road, west of the M1 Pacific Motorway, is to cater for ground strains of ± 2 mm/m. • Further consultation is to be undertaken with the MSB during detailed design to ensure all potential impacts and risks are identified and mitigated.	Roads and Maritime Detailed design	Pre-construction Construction Operation
42	General reduction of landscape character and visual amenity	• Revegetation by planting or seeding of the median should be undertaken where median width permits. • An effective visual barrier should be created between the two carriageways where this is achievable. • Species used should be endemic and frangible. • Key locations where median screening plays an important role and should be provided include: • On sweeping curves to combat glare from headlights. • Just north of Alison Road where the alignment is over looked by a number of properties. • Between the two motorway service centres. • Revegetation on the verges within the alignment corridor is to be undertaken to provide separation and screening from the motorway. • Protection, retention and enhancement of existing vegetation cover should be considered, in particular, at: - McPherson Road - Collies Lane	Detailed design Roads and Maritime Construction contractor	Pre-construction Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		- Mardi Road - Alison Road - Hue Hue Road - St Johns Road.		
43	Consistency with built form	• Design of the pedestrian bridge at Sparks Road should consider the approaches of the Urban Design Strategy including the following key issues: • Pier form and spacing • Superstructure depth and the relationship to the existing bridge structure • Throw screens and the need for consistency of form with existing throw screens along the corridor.	Detailed design Roads and Maritime	Pre-construction
44	General construction impacts on flora and fauna	• Prepare a Flora and Fauna Management Plan, including weed management, and ensure that it is integrated with the landscape plan for the project. • Prepare a Vegetation Management Plan (VMP) detailing restoration, regeneration and rehabilitation of areas of native vegetation in the vicinity of the project. Preparation of the VMP should involve consultation with local Landcare groups and the CMA.	Construction contractor	Pre-construction
45	Risk to fauna in remnant vegetation to be removed or modified by the proposal	• Limit of work temporary fencing is to be established. • Pre-clearing processes are to be undertaken in accordance *Roads and Maritime Biodiversity Guidelines* (2011) and Roads and Maritime Biodiversity Guidelines: Guide 4 - Clearing of vegetation and removal of bushrock (RTA, 2011). • A fauna relocation site would be identified prior to construction to release any uninjured fauna encountered on site.	Roads and Maritime	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in bold				
46	Minimise impacts of the proposal on EECs and SEPP 14 wetlands	• Offsetting for impacts on EEC vegetation should be investigated in accordance with the Roads and Maritime Guideline for Biodiversity Offsets (2011). • Where possible, retain vegetation that contains EECs present in the proposal area and adjacent sites. • ~~Exclusion zones detailed in Figure 6-12 and Figure 6-13 are to be established and maintained throughout construction. Ensure that exclusion zones are fenced off and signage erected in accordance with the Roads and Maritime Biodiversity guidelines: Guide 2 – Exclusion Zones (RTA, 2011).~~ • **Exclusion zones detailed in Figure 1 and Figure 2 of the Submissions Report are to be established and maintained throughout construction. Ensure that exclusion zones are fenced off and signage erected in accordance with the Roads and Maritime Biodiversity guidelines: Guide 2 – Exclusion Zones (RTA, 2011).**	Roads and Maritime Construction contractor	Pre-construction
47	Maintenance of habitat corridor and wildlife connectivity	• **If any box culverts are to be replaced, t**he design of replacement box culverts would ensure that that they continue to be able to be used by fauna for movement across the motorway. • Culverts would be designed to facilitate opportunistic fauna crossing under the M1 Motorway. • Construction of the proposal should be undertaken in accordance with *Roads and Maritime Wildlife Connectivity Guidelines* (2011).	Detailed design Roads and Maritime Construction contractor	Pre-construction
48	Retention of native vegetation, habitat trees (including hollow	• Threatened flora present in the survey area would be protected and retained where possible. • ~~Targeted surveys for Tetratheca juncea and Grevillea parviflora subsp. parviflora are to be undertaken by a qualified ecologist in appropriate flowering season to confirm threatened plant records at~~	Detailed design Roads and Maritime	Pre-construction Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
	bearing trees) and potential koala habitat	~~Doyalson Link Road Interchange, Sparks Road Interchange and within the road corridor between these two interchanges.~~ • ~~Where individuals of Tetratheca juncea or Grevillea parviflora subsp. parviflora are identified that would be unavoidably affected by the proposal, consideration would be given to translocating in consultation with OEH.~~ • Where individuals of *Tetratheca juncea* or *Grevillea parviflora subsp. parviflora* are identified outside of the construction footprint they would be protected and disturbance avoided during construction. • **Locations confirmed to contain individuals, including buffer zones up to 25 metres from the individuals of *Tetratheca juncea* or *Grevillea parviflora subsp. parviflora* would be exclusion zones. Exclusion zones are detailed in Figure 1 and Figure 2 of the Submissions Report. Exclusion zones are to be established prior to construction commencing and maintained throughout construction.** • ***Ensure that exclusion zones are fenced off and signage erected in accordance with the Roads and Maritime Biodiversity guidelines: Guide 2 – Exclusion Zones (RTA, 2011).*** • In the event that unexpected threatened species are detected at the site prior to construction the Roads and Maritime Unexpected Threatened Species Finds Procedure should be enacted (RTA, 2011) • During detailed design consideration is to be given to minimising, where reasonably practicable, any vegetation clearance required as a result of the design. In particular, potential koala habitat should be avoided or the construction footprint locally minimised where avoidance cannot be achieved. • Retain and protect avoided potential koala habitat from disturbance during construction.	Construction contractor Qualified ecologist	

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		• Establish exclusion zones around remnant vegetation, habitat trees, water bodies and EEC to be retained to prevent inadvertent disturbance during construction. • Vegetation that has been protected is not to be removed. • If native vegetation must be removed, wood debris and any bush rock encountered should be stockpiled for later re-use or relocation in appropriate environments following Roads and Maritime Biodiversity Guidelines (2011). • Construction access tracks and construction areas along the motorway verge should be sited to avoid or minimise disturbance of native vegetation. • There should be no clearing of any mature trees on construction ancillary sites.		
49	Site specific environmental induction	• All staff working on site are to undertake a site-specific environmental induction. The induction is to include items such as: - sensitivity of surrounding vegetation (particularly EECs, remnant and riparian vegetation) - site environmental procedures (vegetation management, sediment and erosion control protective fencing and noxious weeds) - what to do in case of emergency (chemical spills, fire or fauna encountered) - key contact in case of environmental incident - details of threatened flora species and risk of myrtle rust.	Construction contractor Roads and Maritime	Pre-construction
50	Staged habitat removal	• Where **reasonably practicable**, habitat trees and hollow bearing trees are to be retained throughout the proposal area. • If hollow bearing trees are unable to be retained, a qualified ecologist	Construction contractor Qualified ecologist	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in bold				
		is to be present on-site for staged habitat removal and hollow clearing and must follow the Roads and Maritime Staged Habitat Removal Process.		
51	Minimise risk of establishment and spread of invasive species and disease due to the proposed development activities	• The use of pesticides in weed control is to be minimised to reduce threat to fauna species. • Inspection and maintenance procedures are to be implemented to reduce the carriage of weed material on machinery. • All pathogens (eg Chytrid, Myrtle Rust and Phytophthora) are to be managed in accordance with the *Roads and Maritime Biodiversity Guidelines - Guide 7 (Pathogen Management)* and DECC Statement of Intent 1: Infection of native plants by *Phytophthora cinnamomi* (for Phytophthora), DPI Myrtle rust response 2010–11: Preventing spread of Myrtle Rust in bushland and OEH Interim management plan for Myrtle rust in bushland (2011). • Declared noxious weeds are to be managed according to requirements under the *Noxious Weeds Act 1993* and Guide 6 (Weed Management) of the *Roads and Maritime Biodiversity Guidelines* (2011).	Construction contractor	Construction
52	Flora and fauna encountered	• If unexpected threatened fauna or flora species are discovered, stop works immediately and follow the Unexpected Threatened Species Finds Procedure in the *Roads and Maritime Biodiversity Guidelines* – Guide 1 (Pre-clearing process). • WIRES is to be consulted if any injured fauna are encountered as outlined in site specific environmental inductions. • Fauna handling must be carried out in accordance with the requirements the *Roads and Maritime Biodiversity Guidelines* - Guide 9 (Fauna Handling).	Construction contractor	Construction
53	Re-establishment	• Revegetate or replant disturbed areas with native vegetation following	Construction contractor	Post-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
	of any native vegetation disturbed or removed by the proposal	construction. • Revegetation and replanting is to be carried out following *Roads and Maritime Biodiversity Guidelines*.		
54	Unexpected impacts on Aboriginal heritage values	• Should Aboriginal archaeological material be unexpectedly uncovered during construction, all works are to cease within the vicinity of the material/find and the steps in the *RTA Standard Management Procedure: Unexpected Archaeological Finds* must be followed. Roads and Maritime Environmental Manager would be notified immediately.	Construction contractor	Construction
55	Unexpected impacts on human remains	• In the event that construction of the project reveals possible human skeletal material (remains) the Roads and Maritime Standard Management Procedure: Unexpected Archaeological Finds would be implemented and NSW Police would be notified immediately.	Construction contractor	Construction
56	Impact on aesthetic values of heritage listed property	• The screening plantings along the western and southern boundaries of the Alison Homestead should be maintained and, if removed, replaced with appropriate alternative plantings following construction works.	Contractor	Pre-construction Construction
57	Unexpected impacts on non-Aboriginal heritage values	• Should archaeological material be unexpectedly uncovered during construction, all works are to cease within the vicinity of the material/find and the steps in the *RTA Standard Management Procedure: Unexpected Archaeological Finds* must be followed. Roads and Maritime Senior Regional Environmental Officer must be contacted immediately.	Contractor	Construction
58	Impacts on local air quality during construction	• Prepare an Air Quality Management Plan (AQMP) as part of the CEMP. This Plan must show the locations of all potentially affected properties and residences on a map and provide details of air quality	Contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		control measures to be undertaken during construction, including: - air quality and dust management objectives consistent with DECCW guidelines; - potential sources and impacts of dust, identifying all dust sensitive receptors; - an environmental risk assessment to address potential impacts and mitigation measures to minimise dust impacts to sensitive receivers and to the environment; - mitigation measures to be implemented, including measures during weather conditions where high dust episodes are likely (such as strong winds in dry weather); - a monitoring program to assess compliance with the identified objectives; - a progressive stabilisation/ rehabilitation strategy for disturbed surfaces with the aim of minimising exposed surfaces; - contingency plans to be implemented in the event of non-compliances and/or complaints about dust; and - procedures for regularly reviewing the effectiveness of the AQMP.		
59	Impacts on local air quality during construction	• The AQMP is to be followed and updated as required for the duration of construction works. • Construction plant and equipment is to be maintained in order to ensure exhaust emissions comply with applicable regulations (POEO Act). Emissions controls used on vehicles and construction equipment would comply with standards listed in Schedule 4 of the Protection of the Environment Operations (Clean Air) Regulation 2010. In addition, plant would be operated in a proper and efficient manner. • Controlling truck speed and movements onsite and restrict trucks to designated roadways.	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		• Modifying or stopping construction activities during periods of high wind, if necessary. • Vehicle loads involving loose materials are to be covered when travelling off-site. • Implementing control measures, such as compaction or stabilisation, in order to minimise dust from stockpile sites, work areas and exposed soils. • Regularly inspecting and maintaining erosion control structures to ensure silt does not become a source of dust. • Maintaining all equipment for dust control to keep it in good operating condition. The equipment would be operable at all times with the exception of shutdowns required for maintenance.		
60	Construction waste	• A Materials Management Plan is to be prepared by the construction contractor as part of the CEMP prior to the commencement of relevant site works. The Materials Management Plan is to ensure that wastes are properly managed during construction in a way that it is consistent with the principles of avoidance, reduction, reuse and recycling. • The Materials Management Plan would: - Identify the waste streams that would be generated during construction - Detail for each of the identified waste streams: ▪ its waste classification ▪ how and where the waste is to be reused, recycled, stockpiled or disposed ▪ the receptacles that would be used for storing identified waste materials prior to reuse, recycling, stockpiling or disposal	Construction contractor	Pre- construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		▪ how, and by whom, the waste would be transported between generation, storage and point of reuse, recycling, stockpiling or disposal (including maintenance of a waste management register) ▪ specify the methods to be used for monitoring the implementation of the Materials Management Plan ▪ comply with the requirements of the PoEO Act for any non-licensed as well as licensed waste activities that involve the generation, storage and/or disposal of waste ▪ identify the need or otherwise for Section 143 Notices to be obtained from landowners of sites where waste is to be deposited ▪ comply with any relevant NSW Resource Recovery Exemptions when applying waste to land. • The Resource Management Hierarchy principles of the WARR Act are to be adopted in the Materials Management Plan, as follows: - unnecessary resource consumption is to be avoided as a priority - generation of excess materials is to be avoided as a priority - resource recovery including the reuse of materials, reprocessing, recycling, and energy recovery would be implemented throughout construction - disposal is only to be undertaken as a last resort. • Reuse opportunities for the proposal would be considered within the Materials Management Plan and may include: - re-use of recovered aggregates and excavated road materials in road construction in accordance with Roads and Maritime pavement specifications		

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		- weed free topsoil may be stockpiled and reused on batters or in landscaping and revegetation works - ENM may be sent offsite to a place that can legally accept this material for reuse or reprocessing. To facilitate future re-use, excavated natural material should not be mixed with any other types of waste - virgin excavated natural material (VENM) may be sent offsite to a place that can legally accept this material for reuse or reprocessing. To facilitate future re-use, virgin excavated natural material should not be mixed with any other types of waste. • The Materials Management Plan is to include the following as a minimum: - all wastes, including contaminated wastes, would be identified and classified in accordance with OEH's *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes* (DEC, 1997). - excavated material that is not suitable for on-site reuse or recycling would be transported to a site that may legally accept that material for reuse or disposal - green waste that could not be reused during revegetation works would be transported to an appropriate waste depot for recycling - putrescible and other waste, such as chemical waste that cannot be recycled, would be regularly collected and disposed of at an appropriate disposal site - other recyclable wastes would be separated and transported to a suitable recycler - contaminated wastes would be disposed of at an appropriate waste facility - should contaminated land be found during construction activities,		

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in **bold**				
		a contaminated land management plan would be developed and implemented in accordance with G36 - construction waste material would not be left on-site once the works have been completed - loads being transported from the site for disposal would be covered - excavated flexible and concrete pavement would be recycled where possible - working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.		
61	Materials use	• Where feasible and reasonable, procure materials with recycled content or re-use materials for road construction and maintenance such as recycled aggregates in road pavement and surfacing (including crushed concrete, granulated blast furnace slag, glass, slate waste and fly ash). This measure forms part of Roads and Maritime' implementation of the NSW Government's 'Waste Reduction and Purchasing Policy' (WRAPP).	Construction contractor	Construction
62	Construction waste	• The Materials Management Plan would be implemented for all stages of construction. • The Materials Management Plan would be regularly reviewed and revised as necessary. • Wastes would be properly managed during construction in a way that it is consistent with the principles of avoidance, reduction, reuse and recycling.	Construction contractor	Construction
63	GHG emissions	• Specify construction materials with lower emissions intensity in the detailed design (e.g. recycled steel in place of virgin steel) where engineering and other technical specifications can be met and the alternative is feasible and reasonable.	Designer Contractor	Detailed design Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
New or revised measures shown in bold				
64	GHG emissions	• Plant and equipment will be switched off when not in use. • Vehicles, plant and construction equipment will be appropriately sized for the task and properly maintained so as to achieve optimum fuel efficiency. • Materials will be delivered with full loads and will come from local suppliers, where possible.	Contractor	Construction
65	Impact of increased flood events	• Detailed design should take the effect of climate change on the proposal into consideration, including for the drainage design.	Roads and Maritime	Pre-construction
66	GHG emissions	• The energy efficiency and related carbon emissions will be considered in the selection of vehicle and plant equipment.	Contractor	Pre-construction

4.3 Licensing and approvals

The following licenses, permits, notifications and/or approvals are needed to construct/operate the proposal.

Table 4-2: Summary of licensing and approval required

Requirement	Timing
An applicable road occupancy licence would be required. A road occupancy licence allows the proponent to use a specified road space at approved times, provided certain conditions are met. The licence applies to the occupation of the "road space" only and does not imply permission or approval for the actual (physical) works being undertaken.	An applicable road occupancy licence would need to be in place prior to the commencement of construction.
Elements of the proposal would meet the requirements for needing 'controlled activity' approval given that there would be works within 40 metres of waterfront land. However, under section 38 of the Water Management (General) Regulation 2004, Roads and Maritime is exempt from the requirement to obtain a 'controlled activity' approval. Notification of the activity to the NSW Office of Water would be required.	A notification of the activity would need to be provided to the NSW Office of Water at least 30 days before the activity commences.
If groundwater extraction is required, an aquifer interference approval would be required for the work under Section 91F of the *Water Management Act 2000.*	Prior to construction commencement or during construction as required.
The proposal would be a scheduled activity under the *Protection of the Environment Operations Act 1997*. An environment protection licence (EPL) would be required under Section 48 of this act to authorise the carrying out of scheduled development	An EPL would be required prior to undertaking the scheduled work. Each period of 12 months (commencing from the issue of a licence) is a licence fee period for a licence. The administrative fee for any licence fee period of a licence must be paid not later than 60 days after the beginning of that licence fee period.

5 References

DSEWPaC (2011) *EPBC Referral Guidelines for the vulnerable black-eyed susan, Tetratheca juncea*, Commonwealth of Australia, Canberra.

Landcom (2004) *Managing Urban Stormwater: Soils and Construction*, Volume 2D: Main Road Construction.

Roads and Traffic Authority (2001) *Environmental Noise Management Manual*.

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