Roads and Maritime Services

Princes Highway upgrade, Dignams Creek

Submissions report
November 2013
Final
Executive summary

Roads and Maritime Services propose to realign around 3.7 kilometres of the Princes Highway at Dignams Creek on the South Coast of New South Wales (NSW) (the proposal). The proposal is located between Narooma and Cobargo in the Eurobodalla and Bega Valley Local Government Areas (LGAs). The proposal includes the section of the Princes Highway starting about 1.5 kilometres north of the intersection with Dignams Creek Road and extending around 2.2 kilometres to the south of the intersection.

The proposal has been split into two stages. The first stage would involve addressing the key road safety issues in the northern end of the corridor and the second stage providing a longer term plan for future works at the southern end of the corridor. The investigation of staged options was undertaken to identify potential options that would achieve all proposal objectives and assist in obtaining funding for construction of stage 1.

A Review of Environmental Factors (REF) was prepared for the both stage 1 and 2 of the proposal and was placed on public display from 28 June 2013 until 29 July 2013 at four locations. The REF was also made available to download and advertisements were placed in local papers. Information sessions with the project team were held on 16 and 17 July 2013.

A total of 14 submissions relating to the proposal and the REF were received by Roads and Maritime Services. This submissions report summarises the issues raised and provides responses to each issue, details additional investigations carried out since the REF went on display, describes and assesses the environmental impact of changes to the proposal and identifies new or revised environmental management measures.

Of the 14 submissions received, there were ten community submissions and four government agency/stakeholder submissions. The government agencies included the Office of Environment and Heritage (OEH), Eurobodalla Shire Council, Department of Primary Industries (DPI) (Fisheries NSW), and DPI (Batemans Marine Park). Each submission has been examined individually to understand the issues raised. Issues raised in each submission have been collated and responses to the issues have been provided. Where similar issues have been raised in different submissions, only one response has been provided.

A description of the proposal covered by the REF is provided below.

Key features of Stage 1 include:

- Realigning about two kilometres of single carriageway starting about 1.5 kilometres north of the Dignams Creek Road and Princes Highway intersection and extending to about 600 metres south of the Dignams Creek Road and Princes Highway intersection. This section would be constructed as a single carriageway with 3.5 metre wide lanes and three metre shoulders in each direction.
- Removal of four tight sub-standard curves along the existing Princes Highway.
- Construction of a new single carriageway bridge over Dignams Creek about 91 metres in length.
- Relocating the Princes Highway and Dignams Creek intersection about 100 metres north-west.
• Realigning around 200 metres of the most eastern section of Dignams Creek Road.
• Tie ins to the existing Princes Highway alignment.
• Provision of around 1.4 kilometres of road safety treatments along the existing Princes Highway alignment at the southern end of the proposal.
• Provision of one dedicated fauna underpass and one combined drainage culvert/fauna underpass.
• Relocating two private property access roads and formalising and combining two national park access points into one.
• Part of the existing Princes Highway alignment and Dignams Creek Bridge would be retained for private use.

Key features of Stage 2 include:
• Realigning about 1.5 kilometres of single carriageway commencing about 600 metres south of the Dignams Creek Road and Princes Highway intersection and extending to the southern end of the proposal. The section would be constructed as a single carriageway with 3.5 metre wide lanes and three metre shoulders in each direction.
• Removal of six sub-standard curves along the existing Princes Highway.
• Tie ins to stage 1 and the existing Princes Highway alignment.
• Provision of one dedicated fauna underpass, one combined drainage culvert/fauna underpass and one rope canopy bridge.
• Relocating access roads for Kooraban National Park and Gulaga National Park.
• Removal of the existing Princes Highway between Dignams Creek Road and the access road to Gulaga National Park.

The following general features would be included for both stages of the proposal:
• Installation of operational water quality controls including:
  – Five biofiltration basins.
  – One water quality basin.
  – Two constructed wetlands.
  – Biofiltration/vegetated swales.
• Installation of four retaining walls.
• Provision of ancillary facilities such as temporary sedimentation basins, compound and stockpile sites, and access tracks.
• Removal, rehabilitation and revegetation of 1.6 kilometres of the redundant sections of the Princes Highway, 0.6 kilometres in Stage 1 and one kilometre in Stage 2.
• Relocation of overhead utilities to accommodate the proposal.
# Contents

- Executive summary ........................................................................................................... i
- 1 Introduction ........................................................................................................ 1
  - 1.1 Purpose ..................................................................................................... 1
  - 1.2 The proposal ............................................................................................. 1
  - 1.3 REF display ............................................................................................... 3
- 2 Response to issues ............................................................................................... 6
  - 2.1 Submissions provided ............................................................................... 6
  - 2.2 Overview of issues raised .......................................................................... 7
  - 2.3 Analysis of options, design requirements and project need ....................... 8
  - 2.4 Consultation ............................................................................................ 13
  - 2.5 Environmental impact assessment .......................................................... 16
  - 2.6 Biodiversity .............................................................................................. 17
  - 2.7 Noise and vibration .................................................................................. 38
  - 2.8 Landscape character, urban design and visual impact assessment ........ 39
  - 2.9 Heritage .................................................................................................. 44
  - 2.10 Revocation and offset strategy ................................................................ 48
  - 2.11 Water quality and hydrology ................................................................... 52
  - 2.12 Socio-economic ....................................................................................... 55
  - 2.13 Traffic and access ................................................................................... 58
  - 2.14 Energy ..................................................................................................... 60
- 3 Additional assessment ............................................................................................... 61
  - 3.1 Options analysis ...................................................................................... 61
  - 3.2 Aboriginal Cultural Landscape Assessment ............................................. 69
  - 3.3 Additional Koala survey ........................................................................... 72
- 4 Environmental management ..................................................................................... 75
  - 4.1 Environmental management plans (or system)........................................ 75
  - 4.2 Summary of safeguards and management measures .............................. 75
  - 4.3 Licensing and approvals ........................................................................ 105
- 5 References ............................................................................................................. 106
  - Appendix A: Aboriginal cultural heritage assessment .................................... 109
  - Appendix B: Additional Koala assessment ....................................................... 111
1 Introduction

1.1 Purpose

This submissions report relates to the Review of Environmental Factors (REF) prepared for the upgrade of the Princes Highway, Dignams Creek and should be read in conjunction with that document.

The REF was placed on public display and submissions relating to the proposal and the REF were received by Roads and Maritime Services (Roads and Maritime). This submissions report summarises the issues raised and provides responses to each issue (Chapter 2), details investigations carried out since finalisation of the REF (Chapter 3), and identifies new or revised environmental management measures (Chapter 4).

1.2 The proposal

Roads and Maritime propose to realign around 3.7 kilometres of the Princes Highway at Dignams Creek on the South Coast of New South Wales (NSW) (the proposal). The proposal is located between Narooma and Cobargo in the Eurobodalla and Bega Valley Local Government Areas (LGAs). The Princes Highway is a rural highway on the NSW South Coast that extends from Sydney to the Victorian border.

To the north of the proposal, in the Eurobodalla LGA, the existing Princes Highway passes through forested areas before descending into the Dignams Creek valley. The valley is characterised by cleared pastoral lands and is comprised of a number of private farms and rural residences. The highway crosses Dignams Creek and into Bega Valley LGA over Dignams Creek Bridge which is listed as a local heritage bridge on the Roads and Maritime Section 170 heritage register.

To the south of the Dignams Creek Bridge the existing Princes Highway climbs up a forested ridge to the top of Dignams Hill. The forested areas next to the highway include Koorababan National Park to the north and Gulaga National Park to the south. At the base of Dignams Hill, the surrounding area is characterised again by cleared pastoral and rural properties. An overview of the locality of the proposal is shown in Figure 1-1.

The proposal includes realignment and upgrade of the Princes Highway from about 1.5 kilometres north of the intersection with Dignams Creek Road to around 2.2 kilometres south of the intersection. This section of Princes Highway is a single carriageway with one northbound and one southbound lane. An overtaking lane is present on the southbound lane around 50 metres from the intersection with Dignams Creek Road. The alignment of this section of highway is characterised by steep road inclines and tight curves that follow east-west orientated ridgelines and spurs, which have resulted in a road that is well below modern, safe road design standards.

The proposal has been split into two stages (refer to Figure 1-2). The first stage would involve addressing the key road safety issues associated with the tight curves and narrow bridge in the northern end of the corridor and the second stage would provide a longer term plan for future works at the southern end of the corridor. The investigation of staged options was undertaken to identify potential options that would achieve all proposal objectives and assist in obtaining funding for the construction of stage 1.
A description of the proposal is provided below. Key features of Stage 1 include:

- Realigning about two kilometres of single carriageway starting about 1.5 kilometres north of the Dignams Creek Road and Princes Highway intersection and extending to about 600 metres south of the Dignams Creek Road and Princes Highway intersection. This section would be constructed as a single carriageway with 3.5 metre wide lanes and three metre shoulders in each direction.
- Removal of four tight sub-standard curves along the existing Princes Highway.
- Construction of a new single carriageway bridge over Dignams Creek about 91 metres in length.
- Relocating the Princes Highway and Dignams Creek intersection about 100 metres north-west.
- Realigning around 200 metres of the most eastern section of Dignams Creek Road.
- Tie ins to the existing Princes Highway alignment.
- Provision of around 1.4 kilometres of road safety treatments along the existing Princes Highway alignment at the southern end of the proposal.
- Provision of one dedicated fauna underpass and one combined drainage culvert/fauna underpass.
- Relocating two private property access roads and formalising and combining two national park access points into one.
- Part of the existing Princes Highway alignment and Dignams Creek Bridge would be retained for private use.

Key features of Stage 2 include:

- Realigning about 1.5 kilometres of single carriageway commencing about 600 metres south of the Dignams Creek Road and Princes Highway intersection and extending to the southern end of the proposal. The section would be constructed as a single carriageway with 3.5 metre wide lanes and three metre shoulders in each direction.
- Removal of six sub-standard curves along the existing Princes Highway.
- Tie ins to stage 1 and the existing Princes Highway alignment.
- Provision of one dedicated fauna underpass, one combined drainage culvert/fauna underpass and one rope canopy bridge.
- Relocating access roads for Kooraban National Park and Gulaga National Park.
- Removal of the existing Princes Highway between Dignams Creek Road and the access road to Gulaga National Park.

The following general features would be included for both stages of the proposal:

- Installation of operational water quality controls including:
  - Five biofiltration basins.
  - One water quality basin.
  - Two constructed wetlands.
  - Biofiltration/vegetated swales.
- Installation of four retaining walls.
- Provision of ancillary facilities such as temporary sedimentation basins, compound and stockpile sites, and access tracks.
- Removal, rehabilitation and revegetation of 1.6 kilometres of the redundant sections of the Princes Highway, 0.6 kilometres in Stage 1 and one kilometre in Stage 2.
• Relocation of overhead utilities to accommodate the proposal.

The proposal is located within the south eastern corner bioregion of NSW, which is important for biodiversity as it’s the transitional area from the coast to the hinterland. The proposal would result in the loss of about 20.6 hectares of vegetation which includes 0.2 hectares of the Threatened Ecological Community (TEC) recognised as River-flat Eucalypt Forest on Coastal Floodplains and listed as endangered under the Threatened Species Conservation Act 1995 (TSC Act).

The proposal is located within the Dignams Creek and Narira Creek catchments, which both flow into Wallaga Lake. Dignams Creek is the main catchment impacted by the proposal and is important estuarine tributary of Wallaga Lake as shown in Figure 1-1. Dignams Creek flows downstream through the Dignams Creek Sanctuary Zone (Batemans Marine Park) and through five State Environmental Planning Policy No 14 – Coastal Wetlands (SEPP 14). The sanctuary zone is around three kilometres downstream of where the proposal crosses the creek and the first SEPP 14 wetland is 5.2 kilometres downstream of the proposed bridge location.

1.3 REF display

Roads and Maritime prepared an REF to assess the environmental impacts of Stage 1 and 2 of the proposed works. The REF was on public display between 28 June 2013 and 29 July 2013 at four locations, as detailed in Table 1-1.

Table 1-1 Display locations

<table>
<thead>
<tr>
<th>Location</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Tilba General Store.</td>
<td>Bate Street, Central Tilba.</td>
</tr>
<tr>
<td>Bega Valley Shire Councils.</td>
<td>Zingel Place, Bega, NSW.</td>
</tr>
<tr>
<td>Eurobodalla Shire Councils.</td>
<td>Vulcan Street, Moruya, NSW.</td>
</tr>
<tr>
<td>Bega Roads and Maritime office.</td>
<td>153 Auckland Street, Bega.</td>
</tr>
</tbody>
</table>

The REF was placed on the Roads and Maritime website and made available for download. The exhibition locations and website link were advertised in the Narooma News for three weeks on the 3, 10 and 17 July 2013.

An email was sent to identified stakeholders with a link to the project website on 28 June 2013. Variable message signs were also placed on the Princes Highway south of Dignams Creek during the display period to inform motorists that the REF was on display and directed them to the Roads and Maritime website for further information.

Letters of notification, which included a copy of the REF, were sent to directly impacted residents and the Dignams Creek Community group.

In addition to the above public exhibition, an invitation to comment on the REF was sent directly to the following identified stakeholders:

• Eurobodalla and Bega Valley Shire Councils.
• The Office of Environment and Heritage.
• Department of Primary Industries (Fisheries NSW).
• Department of Primary Industries (Batemans Marine Park).

Information sessions with the project team were held at the Cobargo School of Arts on 16 and 17 July 2013.
Upgrade of the Princes Highway, Dignams Creek

Figure 1-2 | The proposal
## 2 Response to issues

### 2.1 Submissions provided

The REF was placed on public display for comment between 28 June 2013 and 29 July 2013. A total of 14 submissions relating to the proposal and the REF were received by Roads and Maritime, including late submissions. Of the 14 submissions received ten submissions were from the community and four were from government agencies/stakeholders and included the Office of Environment and Heritage (OEH) Eurobodalla Shire Council, Department of Primary Industries (DPI) (Fisheries NSW), and DPI (Batemans Marine Park). **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 this report.

**Table 2-1 List of respondents and where there issues are addressed in the submissions report**

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Submission No.</th>
<th>Section number where issues are addressed</th>
</tr>
</thead>
</table>
| OEH                      | 1              | 2.4 – Consultation  
<pre><code>                      |                              | 2.6 – Biodiversity             |
</code></pre>
<p>|                          |                | 2.8 – Landscape character, urban design and visual impact assessment               |
|                          |                | 2.9 – Heritage                                                                  |
|                          |                | 2.10 – Revocation and offset strategy                                             |
| Individual submission    | 2              | 2.3 – Analysis of options, design requirements and project need                   |
| Fisheries NSW            | 3              | 2.3 – Analysis of options, design requirements and project need                   |
|                          |                | 2.4 – Consultation                                                              |
|                          |                | 2.5 – Environmental impact assessment                                            |
|                          |                | 2.6 – Aquatic biodiversity                                                       |
|                          |                | 2.8 – Landscape character, urban design and visual impact assessment             |
|                          |                | 2.11 Water quality and hydrology                                                |
| Individual submission    | 4              | 2.13 – Traffic and access                                                        |
| Individual submission    | 5              | 2.4 – Consultation                                                              |
|                          |                | 2.8 – Landscape character, urban design and visual impact assessment             |
|                          |                | 2.12 – Socio-economic                                                           |
|                          |                | 2.13 – Traffic and access                                                        |
| Individual submission    | 6              | 2.3 – Analysis of options, design requirements and project need                   |
|                          |                | 2.8 – Landscape character, urban design and visual impact assessment             |
|                          |                | 2.7 – Noise and vibration                                                        |
|                          |                | 2.12 – Socio-economic                                                           |</p>
<table>
<thead>
<tr>
<th>Respondent</th>
<th>Submission No.</th>
<th>Section number where issues are addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual submission</td>
<td>7</td>
<td>2.3 – Analysis of options, design requirements and project need</td>
</tr>
<tr>
<td>Individual submission</td>
<td>8</td>
<td>2.3 – Analysis of options, design requirements and project need</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.4 – Consultation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.6 – Biodiversity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.8 – Landscape character, urban design and visual impact assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.11 – Water quality and hydrology</td>
</tr>
<tr>
<td>Individual submission</td>
<td>9</td>
<td>2.4 – Consultation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.6 – Biodiversity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.11 – Water quality and hydrology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.12 – Socio-economic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.14 – Energy</td>
</tr>
<tr>
<td>Individual submission</td>
<td>10</td>
<td>2.3 – Analysis of options, design requirements and project need</td>
</tr>
<tr>
<td>Individual submission</td>
<td>11</td>
<td>2.3 – Analysis of options, design requirements and project need</td>
</tr>
<tr>
<td>DPI (Batemans Marine Park)</td>
<td>12</td>
<td>2.6 – Biodiversity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.5 – Environmental impact assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.11 Water quality and hydrology</td>
</tr>
<tr>
<td>Gulaga Board of Management</td>
<td>13</td>
<td>2.4 – Consultation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.9 – Heritage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.10 - Revocation and offset strategy</td>
</tr>
<tr>
<td>Eurobodalla Shire Council</td>
<td>14</td>
<td>2.8 – Landscape character, urban design and visual impact assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.13 - Traffic and access</td>
</tr>
</tbody>
</table>

2.2 Overview of issues raised

Each of the 14 submissions received has been examined individually to understand the issues being raised. The separate issues raised in each submission have been extracted and collated and corresponding responses to the issues have been provided. Where similar issues have been raised in different submissions, only one response has been provided. The issues raised and Roads and Maritime response to these issues forms the basis of this chapter.

The OEH submission focussed on biodiversity issues and the revocation and offset strategies. The submission from the Gulaga Board of Management focused on Aboriginal heritage issues, specifically cultural values and the revocation and offset strategy. The Eurobodalla Shire Council submission raised issues regarding design requirements and property impacts.
The Fisheries NSW and DPI (Batemans Marine Park) submissions focused on ongoing consultation, the environmental impact assessment process, aquatic biodiversity and impacts to water quality and sensitive aquatic environments located downstream of the proposal.

The most prominent issues raised in the individual submissions related to:

- Selection of the preferred option.
- Alternatives considered and analysis of options.
- Property.
- Landscape character, urban design and visual impact.
- Biodiversity.
- Consultation.
- Noise and vibration.
- Flooding and water quality.
- Socio-economic impacts.

Other considerations included traffic and access, the strategic need for the proposal, energy, and environmental management.

2.3 Analysis of options, design requirements and project need

2.3.1 Analysis of options

Submission numbers

2, 6, 7, 8, 10 and 11.

Issue description

The following is a summary of the issues raised:

- Concerned that there was not enough consideration of potential routes to the east, which may have reduced environmental impacts.
- Provides a map with an alternate alignment just to the east of the preferred option.
- Concerned that selection of the preferred option prioritised cost over impacts to the environment, agricultural land, and private property. Considered that other options would have less impact on private properties than the preferred option and as such there would be a reduced requirement for compensation.
- Concerned that the decision has already been made and won't change.
- Concerned that the impacts of the proposal to the social environment are less valued than the impacts to threatened flora and fauna species.
- Proposes an alternate alignment for the proposal that is located around 250 metres to the east of the preferred option.
- Concerned that the REF has had to provide a band aid solution to a poor design and poor option selection.
- Suggests that the road should be aligned along dry spurs/ridges and avoid large amounts of fill in the Dignams Creek floodplain.
- Supports community option 15 as a good option and suggests that Roads and Maritime designers could have undertaken further refinement of the option to better fit with the landscape by starting it at the location of the Pretty Vale current driveway and following higher topography to the east.
- Does not support the change of option to the west of Dignams Creek.
Issue response

As part of the development of the concept design 13 options were identified by Roads and Maritime and two by the community, for detailed evaluation. Chapter 2 of the REF discusses these 15 options. An additional two options (called Option 16 and Option 17) suggested during the display of the REF, are evaluated within this report (refer to Section 3.1).

All options have been considered against the project objectives which are as follows:

- To improve road safety.
- To provide a continuous 100 kilometre per hour travel speed environment.
- To improve economic efficiency including freight through improved alignment.
- To provide a well-engineered, safe and environmentally acceptable road transport facility.
- To provide a value for money project.

Comparative analysis of the options has also been undertaken for the following parameters:

**Design characteristics.**
- Length.
- Maximum grade.
- Bridge structure.
- Cut and fill volumes, earthworks balance, and quantities of spoil produced or import of materials required.

**Environmental impacts.**
- Impacts to threatened species.
- Section of the alignment impacting on remnant vegetation, habitat trees and the Threatened Ecological Community (TEC) recognised as River flat Eucalypt Forest on Coastal Floodplains located along Dignams Creek.
- Impact to national parks.
- Social / urban amenity impacts.
- Impacts to residences (noise and visual).
- Landform.

Refer to Table 2.1 of the REF and refer to Section 3.1 of this report for the additional analysis of the options according to the parameters and proposal objectives outlined above.

Providing value for money was a consideration in the options analysis, however, Roads and Maritime undertook a robust and balanced options evaluation process which considered all the project objectives and the additional parameters described above.

While Roads and Maritime has identified a preferred alignment for environmental assessment in the REF, the final decision and determination of that alignment had not been finalised. Roads and Maritime has considered all comments received during the display of the REF including the two new options (option 16 and 17) suggested.
As part of the decision making process Roads and Maritime has also engaged in ongoing consultation with the community. This has included:

- Engaging with the community during the strategic and concept design phase of the proposal.
- Seeking feedback on the proposal from display of the concept design and REF.
- Giving all comments received due consideration.
- Assessing any proposed changes arising from display of the REF against the project objectives to ensure they are consistently addressed.
- Following consideration of all comments raised, a decision is made whether to proceed with the proposal or not.

Determination of the proposal was not completed until this Submissions report was finalised and considered.

Regarding impacts to properties, the option analysis process considered the area and the location of options as well as impacts to individual properties. Roads and Maritime understood that impacts to properties would result from all of the options and that any property impacted that would require acquisition, would be purchased according to the requirements of the Roads and Maritime Land Acquisition Information Guide (2012) and compensation would be based on the requirements of the Land Acquisition (Just Terms) Compensation Act 1991.

Roads and Maritime has considered options to the east and the west of the existing highway alignment. Of the 15 options considered in the REF, eight of the options considered are located to the to the east of the existing highway alignment and existing Dignams Creek Bridge (refer to Figure 2-3 of the REF). Option 7 also starts to the east of the existing highway alignment but ties into the existing Dignams Creek Bridge. While these eastern options would potentially have reduced impacts to private dwellings located closest to the proposal along Dignams Creek Road, each option has other environmental impacts, such as a larger construction footprint, and higher costs. Due to the topography on the eastern side of the existing Princes Highway, much larger scale earthworks and larger bridge structures would be required to ensure conformance with current road design standards and would not provide a value for money solution. When assessed against the proposal objectives these eastern options were not considered for further development. Roads and Maritime therefore considers that adequate assessment of options to the east of the existing highway alignment has been undertaken as part of the option analysis process.

In regards to the suggestion that the road alignment should follow spur lines and ridges, while this method of road design has been used previously and is evident in sections of the existing Princes Highway alignment to the north of Dignams Creek, the resulting road alignment and curves would be substandard. This is one of the reasons the highway has been targeted for upgrade.

Water features and adjoining floodplains regularly bisect the landscape and often require crossing. This requires the construction of bridges and roadside batters to allow bridges to be constructed to a suitable height to avoid becoming submerged during large flood events. Consequently all options considered require the construction of fill batters on the flood plain next to Dignams Creek and the option analysis has considered impacts to landform and existing landform features. While the preferred option would have large fill batters in the floodplain, so would all the other options with the exception of option 7 which would use the existing bridge. However, this option was not considered for further development as it did not meet...
the project objectives. The preferred option minimises the earthworks required while meeting the project objectives.

It is possible to alter the design of the eastern options to start at the location where the current driveway enters the Pretty Vale property, number 9523 Princes Highway, Dignams Creek. However, any alignment that meets current road design standards through this terrain would require much larger scale earthworks and bridge structure than an alignment to the west due to the steep topography. Consequently while any alignment to the east would impact on fewer residents, these options would not provide a value for money solution due to substantial constructability issues associated with the eastern options. As such these options were not considered for further development.

In reference to the comment on Option 15, this option was considered in the option analysis (refer to Section 2.4.3 of the REF). This option would reduce noise and visual impacts for most residents in the Dignams Creek valley as it sits lower in the valley and is between 150 and 500 metres further east than the existing alignment. However, in the northern section of the proposed option 15 alignment there are substantial engineering difficulties associated with the steep terrain that would require construction of a large retaining wall next to Dignams Creek. While this option is shorter it has costs similar to the full length options. Within the context of the low traffic volumes along this section of the Princes Highway this option has a low economic performance. Consequently this option was not pursued for further development.

Roads and Maritime has also undergone additional assessment of two new options (options 16 and 17). Further detail of this assessment is included in Section 3.1 of this report. The results of the additional analysis of these two options against the project objectives is summarised in Table 3.1.

In summary the analysis of options 16 and 17 found the following. Option 16 is very similar to the preferred option however it requires additional earthworks and would be more costly. Additionally there would not be a significant change in the outcome of impacts to residents such as noise, vibration, air quality and visual amenity. Roads and Maritime considers that the minor reductions in socio-economic issues do not outweigh the additional costs and environmental impacts associated with the additional earthworks and transportation and stockpiling of materials. Consequently this option was not pursued for further development. Option 17 would require a long, large bridge structure, crosses the existing Princes Highway three times presenting substantial constructability issues and would also have a large imbalance of earthworks requiring the stockpiling of material. Option 17 would therefore not provide a value for money project and accordingly this option was not considered for further development.

The option analysis process completed to date for the proposal is robust and included consideration of 15 separate options in the REF and two additional options in this report. All options have been compared against the proposal objectives and other parameters identified above. Roads and Maritime acknowledges that not all residents support the change of option to the west of Dignams Creek. However the preferred option was found to be the best performing option when weighed against all assessment criteria and all other options have subsequently not been pursued for further development. The design presented in the REF is a feasible and cost effective solution that meets the project objectives. Further design refinement would occur as part of the detailed design stage.
2.3.2 Project need
Submission numbers
10 and 14.

Issue description
The following is a summary of the issues raised:

- Supports the proposal as the stretch of road has been a long standing safety concern and has been the site of many accidents over the years.
- The proposal appears to be adequate to improve safety at this location and the inclusion of additional overtaking lanes will also help improve traffic flow and reduce travel times.
- Suggests there are other more dangerous sections of the highway that would be better suited for an upgrade such as Couria Creek and Brogo Bridge and questions why this proposal has been prioritised over others.

Issue response
Roads and Maritime acknowledges the comments that support the proposal as the stretch of road has been a long standing safety concern and has been the site of many crashes over the years. The proposal would improve safety at this location by removing a number of sub-standard curves and constructing a new bridge.

In regards to the question of prioritisation for the proposal, in 2008 there was a coronial inquest into fatalities on the Princes Highway and the findings of the report were that Roads and Maritime should seek funding to upgrade the Princes Highway between Victoria Creek and Dignams Creek. Victoria Creek has been upgraded and Dignams Creek is in the planning phase. Following completion of development of Dignams Creek, Roads and Maritime intends to seek funding for planning for an upgrade between Dignams Creek and Victoria Creek. The crash rates between these sections are not as high as at Dignams Creek and so Dignams Creek has been prioritised over the section to the north. Roads and Maritime is aware of the road safety issues near Brogo Bridge however the crash rate at Brogo Bridge is not as high as the crash rate at Dignams Creek and there is no funding currently allocated for development of an upgrade to this bridge and its approaches.

2.3.3 Design requirements
Submission numbers
3 and 8.

Issue description
The following is a summary of the issues raised:

- DPI (Fisheries) requires that all temporary waterway road crossings are designed and constructed in accordance with the Department's Policy and Guidelines for Fish Friendly Waterway Crossings (2004) and Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (2004).
- Suggests that erosion and sediment impacts could be minimised if the road design reduced the quantity of fill in the floodplain.
- Suggests that rock should be provided to the maximum flood level to protect the foot of all soil fill embankments located on the floodplain.
Issue response

The REF includes the following mitigation measure which addresses this issue:

*If a temporary creek crossing is required and impacts to fish passage are unavoidable, a permit would be sought from DPI (Fisheries and aquaculture). In-stream structures would be designed and constructed to minimise potential impacts to fish passage according to Fairfull & Witheridge (2003) Why Do Fish need to Cross the Road: Fish Passage Requirements for Waterway Crossings. NSW DPI (Fisheries).*

This measure will be updated to include the second DPI policy guideline as follows:

*If a temporary creek crossing is required and impacts to fish passage are unavoidable, a permit would be sought from DPI (Fisheries and aquaculture). In-stream structures would be designed and constructed to minimise potential impacts to fish passage according to Fairfull & Witheridge (2003) Why Do Fish need to Cross the Road: Fish Passage Requirements for Waterway Crossings. NSW DPI (Fisheries) (2013) Policy and Guidelines for Fish. Habitat Conservation and Management.*

The quantity of fill on the floodplains is required for the proposal in order to ensure that the height of the bridge above Dignams Creek provides enough clearance to allow for at least a 1 in 100 year flood event, and to allow the vertical geometry of the highway to tie into the existing alignment while maintaining design standards for grades. It is noted that during the option development, all options with the exception of Option 7 which ties in with the existing Dignams Creek bridge would require large fill batters on the Dignams Creek floodplain. It is noted that some options have less fill on the floodplains than others however these options have much longer bridge structures with a higher cost associated with them. Erosion and sediment controls will be implemented to manage potential impacts to the floodplain from construction of the fill batters. These are summarised within Section 6.6 of the REF and are discussed in full in the *Erosion and Sedimentation Management Report* completed by Soil Conservation Service (2013) for the proposal and which is attached as Appendix F of the REF.

Spill through batters at the bridge would be protected with rocks at the base but would not be provided to the height of the maximum flood levels. All other sections of the batters would be revegetated to provide soil and slope stability

2.4 Consultation

2.4.1 Ongoing consultation

Submission numbers

1 3, 5, 8, 10 13 and 13.

Issue description

The following is a summary of the issues raised:

- Requests that community representatives are invited to review the final draft of the REF document. A local native flora expert is nominated for this review.
- Requests that any draft construction contract be made available to stakeholders, including the community for approval before it is placed for tender.
• Questioned Roads and Maritime commitment to record issues raised by the community at public meetings. Considers that local resident’s views have not been taken seriously.

• Noted that it has been difficult to provide an adequate response as the REF is very large, is difficult to download and only a short time was provided for review. Asks that additional time be provided to allow the respondent to become familiar with all aspects of the document and prepare a more detailed response.

• Requests to be consulted and requests that action be undertaken by Roads and Maritime on the intersection of Princes Highway and Wallaga Lake Road south of Tilba.

• Fisheries NSW concurs with the proposed new Dignams Creek bridge design and require the final design be submitted to Fisheries NSW for approval. This includes the design for the temporary bridge crossing.

• The Construction Environmental Management Plan (CEMP) is to be submitted to Fisheries NSW for approval.

• Requires copies of the Soil and Water Management Plan (SWMP) and Landscape Management Plan to be submitted to Fisheries NSW prior to the commencement of road works.

• The Gulaga Board of Management have identified themselves as a key neighbour to the proposal and would like to maintain ongoing consultation with Roads and Maritime regarding issues raised.

• Suggests that Roads and Maritime may also wish to consult with the Biamanga Board of Management as the proposal will be disturbing the cultural landscape connection between Gulaga and Biamanga Mountains.

• It is noted that Roads and Maritime intend to take the Part 5 determining authority role for the REF on OEH managed lands of the former Kooraban National Park. While legally possible, OEH would like to be consulted on any conditions and any mitigation offset measures proposed in the determination process.

**Issue response**

Roads and Maritime has undertaken consultation with the community and key stakeholders during development of the preferred option (refer to Chapter 5 of the REF). Consultation has been undertaken with the community for the preferred road corridor in December 2010, the display of the concept design for the preferred alignment in November/December 2012 and during the display of the REF in June/July 2013.

While Roads and Maritime has held public meetings during the display of the preferred option and the REF, these meetings were intended to provide the community with additional detail and not necessarily to capture comment. Roads and Maritime prefers all submissions to be provided in writing to ensure that comments are captured accurately.

Issues raised by residents during this consultation process have been given due consideration by Roads and Maritime and included the preparation of an issues report capturing issues raised during the display of the concept design. The issues report is available online via the Roads and Maritime Dignams Creek project website: http://www.Roads and Maritime.nsw.gov.au/roadprojects/projects/princes_hway/dignams_creek/public_information.html.
Roads and Maritime have considered four additional route alignments as proposed by the community, refer to Section 2.4.2 of the REF for details on options 14 and 15 and Section 3.1 of this report regarding options 16 and 17.

As a result of community concerns regarding the ecological value of Blind Creek, Roads and Maritime has steepened the batter near Blind Creek to reduce the road footprint, commissioned a third party review of the hydrological assessment and has commissioned an anthropologist to undertake a cultural landscape impact assessment to address concerns raised regarding the assessment of Aboriginal Cultural Heritage in the REF (refer to Section 3.2).

In regards to ongoing consultation with the community about draft construction contracts, this information will only be made available to construction contractors that are eligible to tender. In regard to the community reviewing the final documents associated with the REF and the proposal, this has already occurred as part of the process of placing the REF on public display and inviting the community and interested stakeholders to make comment. However the community can exercise its review on the delivery of the project by continuing to be involved in the community engagement process. Ongoing community consultation would be undertaken regarding various design aspects such as noise mitigation, landscaping strategy and private property impacts. There would also be a complaints handling system in place through which the community would be able to notify Roads and Maritime of any grievances that may arise during the construction phase of the proposal so they can be managed appropriately.

This submissions report is in response to the public display of the REF. Roads and Maritime provided four weeks for the community to review the REF and provide comment. The process and timeframes were in accordance with legislative standards and consistent with the timeframes provided on other Roads and Maritime projects. Submissions received after the closing date are included in this submissions report which will be available to the public on the Roads and Maritime project website. In addition, Roads and Maritime will be sending out an acknowledgement letter to those who made submissions advising them that the submissions report is now available. Roads and Maritime will continue to engage with the community where necessary as the proposal progresses through to detailed design and construction.

With respect to the submission regarding the intersection of Wallaga Lake Road and the Princes Highway, a number of sign and line marking improvements have recently been undertaken at this intersection including the removal of 100 km/h signage and patch on Wallaga Lake Road, installation of a red back T Junction warning sign, and improvements to arrow pavement markings at the junction.

Roads and Maritime will provide the final design of the proposal to Fisheries NSW for consideration. This will include providing the design for the temporary creek crossing to Fisheries NSW for approval, should it be required following detailed design. Roads and Maritime will also provide the CEMP to Fisheries NSW for consideration prior to construction commencing. This will include copies of the SWMP and Landscape Management Plan.
Roads and Maritime acknowledges that the Gulaga Board of Management are a key neighbour of the proposal. Roads and Maritime have engaged with the Gulaga Board of Management through development of the concept design, as part of the REF display and will continue to liaise with the board in regards to the potential transfer of part of the proposed offset package to Gulaga National Park. Roads and Maritime have also consulted with the Biamanga Board of Management.

Roads and Maritime acknowledges that it will be the determining authority for the proposal as the portion of Kooraban National Park on which the southern part of the proposal would be constructed was revoked following the passing of the National Parks and Wildlife Amendment (Adjustment of Areas) Bill 2012 by the NSW Parliament. Roads and Maritime will continue to consult with OEH regarding the proposal including the resolution of an appropriate compensatory lands and offset package for the revocation of Kooraban National Park and other impacts to vegetation. Following finalisation of the compensatory lands and offset package with OEH, the lands will no longer be considered OEH lands as per the requirements of the revocation passed in parliament (refer to Section 3.6 of the REF).

2.4.2 Request for information

Submission numbers

9.

Issue description

The following is a summary of the issues raised:

- Requests Roads and Maritime to provide dates of previous upgrades along the Princes Highway, including the upgrade for the passing lanes on Dignams Hill and the upgrade to the north through Goura Nature Reserve. Asks for information concerning the volume of gravel removed from the bed of Blind Creek for the latter upgrade.

Issue response

No records have been maintained regarding previous upgrades however anecdotal evidence from construction contractors was that the passing lane on Dignams Hill was constructed in the late 1970’s. in the order of 3000-4000 cubic metres of gravel was extracted from Dignams Creek for this work. Around 1972 a few thousand cubic metres of gravel was extracted from Blind Creek to construct the Quaama bypass.

2.5 Environmental impact assessment

Submission numbers

3 and 9.

Issue description

The following is a summary of the issues raised:

- Fisheries NSW has confirmed that the notification letter for the Dignams Creek proposal complies with Section199(1)(a) of the Fisheries Management Act 1994 (FM Act).
- Fisheries has reviewed the REF and confirmed that the proposal complies with the requirements of the FM Act (namely the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A of the Act,
respectively), and the associated Policy and Guidelines for Fish Habitat Conservation and Management (2013).

- Suggests that the REF is not a user friendly document, contains contradictions and in places uses estimates, assumptions and models instead of a realistic assessment of site specific information.

**Issue response**

Roads and Maritime acknowledges that Fisheries has confirmed that the notification letter for the Dignams Creek proposal complies with Section 199(1)(a) of the FM Act.

Roads and Maritime acknowledges that Fisheries has reviewed the REF and confirmed that the proposal complies with the requirements of the FM Act (namely the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A of the Act, respectively), and the associated Policy and Guidelines for Fish Habitat Conservation and Management (2013).

It is acknowledged that the REF is a large and comprehensive document. Roads and Maritime requires REFs to be prepared using plain English and avoid jargon so that it can be more readily understood. All assessment methodologies are best practice and satisfy both legal and government agency requirements. The conclusions reached in the proposal are based on the results of detailed field surveys undertaken for biodiversity (aquatic and terrestrial), noise and vibration, water quality, hydrology, and heritage (Aboriginal and non-Aboriginal). The results of these field surveys were compared against desktop information that was available from a large array of current datasets including hydrological, air quality, property, heritage, vegetation, threatened flora and fauna and spatial datasets. Where necessary, the data obtained in the field was used as inputs into models for predictive purposes and all assessment undertaken was specific to the proposal. The information collected was used to identify potential impacts and develop appropriate safeguards to manage and minimise impacts.

### 2.6 Biodiversity

#### 2.6.1 Biodiversity assessment

**Submission numbers**

1.

**Issue description**

The following is a summary of the issues raised:

- OEH have reviewed the Biodiversity Assessment and found it to be thorough and comprehensive. OEH generally agree with its findings and methodology.

**Issue response**

Roads and Maritime acknowledges that OEH have reviewed the Biodiversity Assessment and found it to be thorough and comprehensive. Roads and Maritime acknowledges that OEH generally agree with the findings and methodology of the Biodiversity Assessment for the proposal.
2.6.2 Aquatic biodiversity

Submission numbers

3 and 12.

Issue description

The following is a summary of the issues raised:

- Identifies DPI: Bateman's Marine Park responsibilities and that the department is concerned with ensuring that any associated environmental effects from the proposal do not adversely impact the marine biodiversity and ecological values of the marine park.

- Confirms the location of the proposal from Dignams Creek Sanctuary as outlined in the REF but notes that the northern end of the highway works are only 80-150 metres upslope of Dignams Creek and within approximately 400-500 metres of the Marine Park Sanctuary Zone. Reiterates the importance of ensuring that stormwater, erosion and sedimentation, and habitat re-establishment, are actively managed within the construction footprint to prevent impacts on downstream water quality that would adversely impact the marine biodiversity and ecological values of the marine park.

- Fisheries has no objectives to the proposal as long as all works conform to and are consistent with the REF and the mitigation measures proposed in the REF and Appendices for the proposal (June 2013) are fully implemented.

- DPI (Fisheries NSW) is to be immediately notified of any fish kills in the vicinity of the works on 1800 043 536. In such cases, all works other than emergency response procedures are to cease until the issue is rectified and written approval to proceed is provided by Fisheries NSW. Recommends that all of the safeguards and mitigation measures detailed in the REF in relation to biodiversity (Table 6-12) and water quality and hydraulic impacts (Table 6-45) and fish and riparian habitat as contained in Table 5-4 of the Biodiversity Assessment be implemented.

- Recommends that all of the safeguards and mitigation measures detailed in the REF in relation to biodiversity (Table 6-12 of the REF), water quality and hydraulic impacts (Table 6-45 of the REF) and fish and riparian habitat as contained in Table 5-4 of the Biodiversity Assessment be implemented.

Issue response

Roads and Maritime acknowledge the importance of ensuring that stormwater, erosion and sedimentation, and habitat re-establishment, are actively managed within the construction footprint to prevent impacts on downstream water quality that would adversely impact the marine biodiversity and ecological values of the marine park.

Roads and Maritime acknowledges Batemans Marine Park’s responsibilities and acknowledges the departments concerns with ensuring that any associated environmental effects from the proposal do not adversely impact the marine biodiversity and ecological values of the marine park. As outlined in Section 2.1 and Chapter 4 of the REF, Roads and Maritime has assessed the proposal according to relevant legislative requirements including the Environmental Planning and Assessment Act 1979 (EP&A Act), the Environmental Planning and Assessment Regulation 2000, the Threatened Species Conservation Act 1995 (TSC Act), the Fisheries Management Act 1994 (FM Act), and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). In doing so, the REF completed for the proposal helps to fulfil the requirements of Section 111 of the EP&A Act, which Roads and Maritime examine and take into account to the fullest
extent possible, all matters affecting or likely to affect the environment by reason of the activity. The REF has found that provided the mitigation measures outlined in Table 7-1 of the REF are implemented, the proposal would not have a significant impact on the environment.

Roads and Maritime acknowledges that DPI has correctly noted that at the northern end of the proposal, works are only 80-150 metres upslope of Dignams Creek and at this location are within approximately 400-500 metres of the Dignams Creek Sanctuary Zone (Batemans Marine Park). At this location no direct impacts are anticipated provided the mitigation measures as proposed in the REF are implemented. These mitigation measures include erosion and sediment controls which would be managed in accordance with Managing Urban Stormwater, Soils and Construction guidelines; 4th Edition Landcom 2004 (The Blue Book) and DECCW’s Managing Urban Stormwater, Soils and Construction Guidelines, Main Road Construction (2009). Roads and Maritime acknowledge that the Dignams Creek Sanctuary Zone (Batemans Marine Park) is a sensitive environment and have construction sediment basins are to be sized at the 85th percentile as per the Blue Book to ameliorate these risks.

Roads and Maritime also have a comprehensive range of water quality treatments proposed to manage water quality impacts during operation of the proposal including:

- Five biofiltration basins.
- A water quality basin.
- Two constructed wetlands.
- Biofiltration/vegetated swales.

Roads and Maritime acknowledge the importance of ensuring that stormwater, erosion and sedimentation, and habitat re-establishment, are actively managed within the construction footprint to prevent impacts on downstream water quality that would adversely impact the marine biodiversity and ecological values of the marine park.

Roads and Maritime acknowledges that Fisheries has no objection to the proposal as long as all works conform to and are consistent with the REF and the mitigation measures proposed in the REF and Appendices for the proposal (June 2013) are fully implemented.

In accordance with DPI (2013) Policy and Guidelines for Habitat Conservation and Management, Roads and Maritime has noted that DPI (Fisheries NSW) is to be immediately notified of any fish kills in the vicinity of the works on 1800 043 536. If it is ascertained by Fisheries NSW that the proposal is responsible for the fish kill, then a stop work permit will be issued. All works within the vicinity of or contributing to the fish kill, other than emergency response procedures, are to cease until the issue is rectified and written approval to proceed is provided by Fisheries NSW. This measure will be updated in the mitigation measures included in Section 4.2.

Roads and Maritime will be implementing all the safeguards and mitigation measures detailed in the REF in relation to biodiversity (Table 6-12 of the REF), water quality and hydraulic impacts (Table 6-45 of the REF) and fish and riparian habitat as contained in Table 5-4 of the Biodiversity Assessment during construction of the proposal.
2.6.3 Bell Miner Associated Dieback

Submission numbers
8 and 9.

Issue description
The following is a summary of the issues raised:

- The REF does not appear to address the potential for advancement of Bell Miner enhanced forest dieback, associated with opening up the gullies.
- Notes that in previous consultation with the community, the potential impacts of the proposal on Bell Miner Associated Dieback and Myrtle Rust was raised. Concerned that the information on these issues as contained within the REF is too brief.
- Suggests that the classification of Bell Miners as a common species in the Biodiversity Assessment infers a broader distribution of this species than along gullies and creek lines.
- Concerned about the presence of Bell Miner Associated Dieback and that the level of assessment undertaken in the Biodiversity Assessment is inadequate as it did not determine the current extent of Bell Miner Associated Dieback, nor does it list Bell Miner Associated Dieback as a key threatening processes relevant to the proposal. Respondent raises doubt over suggestion there is mitigation measures to minimise effects of the proposal on Bell Miner Associated Dieback.
- Notes that although a Bell Miner bird population was recorded in the local area and the proposal is likely to cause an increase in a key threatening process, it was not identified or mapped in the environmental assessment. Disputes the area to be impacted will be 80 ha rather than the 20 ha referenced in the REF.
- Suggests that as the REF has not addressed ways to manage or mitigate this key threatening process (KTP) that a Species Impact Statement is required.
- Suggests that destruction of moist eucalyptus forests in Gulaga National Park and adjacent lands can be attributed to the construction of the passing lane and subsequent disturbance impacts of BMAD.

Issue response
Discussion on Myrtle Rust and Bell Miner Associated Dieback has been included in Chapter 6.1.3 of the REF and Appendix K - Biodiversity Report Additional information and discussion on Bell Miner Associated Dieback has also been included in this report in response to the comments raised during the display of the REF.

According to a literature research completed by the DECC in 2006, Bell Miner Associated Dieback is a form of forest dieback which appears to be related to:

- Bell Miner and psyllid interrelations.
- Proximal and ultimate causal factors associated with insects.
- Proximal and ultimate factors associated with environmental disturbance.

Bell Miner Associated Dieback is considered a significant threat to the sustainability of the moist eucalypt forests of north-eastern NSW and south-eastern Queensland and has been identified as a threatening process under the TSC Act (Wardell-Johnson, Stone et al, 2006).
Habitat where Bell Miner are mainly found include open eucalypt forests and woodlands with a dense shrubby understorey that are typically located in the temperate zone of Eastern Australia in broad gullies of foothills or on coastal plains, often at the edges of rainforest areas. These habitats do exist within some areas of the proposal's construction footprint and the presence of Bell Miners was noted in the fauna surveys in some of the gully environments.

While Bell Miners were recognised during the survey, the presence of Bell Miner Associated Dieback was not identified as a significant feature of the existing environment. Dieback was noted in some areas next to the roadway and in some gullies, however these appeared to be associated with weed invasion which is widespread, particularly in areas adjoining the road. Furthermore the presence of dieback noted was not necessarily associated with the presence of Bell Miners. While Bell Miner Associated Dieback may occur in the locality, this phenomenon is often associated with disturbed landscapes.

The issue of Bell Miners and Bell Miner Associated Dieback does not appear to be a significant issue in the construction footprint of the proposal and while the threat of Bell Miner Associated Dieback may potentially be exacerbated by the proposal these impacts are considered to be low. Additionally while specific measures have not been identified to manage Bell Miner Associated Dieback, measures have been included within the Biodiversity Assessment and the REF which will help ameliorate the potential impacts of Bell Miner Associated Dieback and which are consistent with some of the measures included in the Bell Miner Associated Dieback Strategy prepared by the Bell Miner Associated Dieback Working Group in 2004. This includes the following:

- Managing weed invasion, specifically lantana in edge habitats (refer to mitigation measures in Section 6.1.3 of the REF).
- Maintaining biodiversity integrity and forest structure through revegetation of areas cleared for the proposal (refer to mitigation measures included in Section 6.1 and Section 6.3 of the REF).
- The proposal will also introduce substantial revegetation of cleared areas as part of the Biodiversity Offset which will reduce the area of disturbed habitat in the locality.

In regards to the classification of the Bell Miner as a common species in the Biodiversity Assessment, this definition was used to identify that the species is not listed as a threatened species under the TSC Act or the EPBC Act rather than inferring spatial distribution throughout the proposal footprint. Additionally while individuals of Bell Miner were identified during both the NGH and SKM field surveys and were heard during field surveys in some gully habitats, population estimates or densities were not established.

Discussion on the impact of the species on key threatening processes (KTP) identified under the TSC Act was also included in Section 4.10 of the Biodiversity Assessment. This included discussion of the KTP: "Forest Eucalypt dieback associated with over-abundant psyllids and bell miner". According to DECC 2004 the causal factors associated with key threatening processes (KTP) are not fully known and difficult to quantify. It is recognised that Bell Miner Associated Dieback may be associated with disturbed landscapes and consequently the proposal has some potential to contribute to this KTP on a small and localised scale. This may potentially include impacts in areas along gullies and creek lines as a result of indirect impacts to these areas and increased edge effects. However these impacts are not quantifiable and considering that the proposal will upgrade the Princes
Highway alongside its current location the likelihood that this process would be exacerbated by the proposal is considered to be low.

In regards to mapping the distribution of Bell Miners near to the proposal this was not considered necessary for completion of the assessment of impacts from Bell Miner Associated Dieback and the KTP.

While it is possible that the destruction of moist eucalyptus forests in Gulaga National Park and adjacent lands may be attributed to the construction of the passing lane and subsequent disturbance impacts of Bell Miner Associated Dieback it has not been a requirement of the Biodiversity Assessment to assess the impacts of this forest phenomenon in Gulaga National Park. Rather, the Biodiversity Assessment specifically investigated impacts to biodiversity within the construction footprint of the proposal. While Gulaga National Park is adjacent to the proposal there are no direct or indirect impacts anticipated from the proposal.

### 2.6.4 Fauna connectivity structures

**Submission numbers**
1, 8 and 9.

**Issue description**

The following is a summary of the issues raised:

- Agree that the proposed fauna crossing structures provide an improvement to the existing environment but question whether fauna will be able to access them.
- OEH still considers that an additional fauna underpass in the northern section of the project is warranted.
- Concerned that the impact to wildlife has not been adequately considered, specifically that:
  - The standard re-vegetation treatment of roadside soil disturbance will attract wildlife to the fresh green pick.
  - The plans for funnel fencing for fauna crossings may act as a barrier to animals trying to get back off the road in a hurry and will cause fauna strike to occur.

**Issue response**

OEH has raised the issue of an additional fauna underpass previously in the ISEPP consultation undertaken as part of the REF (refer to Table 5-5 of the REF). As detailed in the response to that submission, the proposal provides for a range of wildlife crossing structures, including two dedicated fauna underpasses with fauna furniture, two combined drainage culvert/fauna underpasses, one canopy rope bridge and a new bridge over Dignams Creek which allows fauna passage on both sides of the creek (refer to Section 3.2.3 of the REF).

One of the combined drainage culvert/fauna underpasses is proposed to be constructed to the north of Dignams Creek. Due to engineering constraints there is no other viable location to construct an additional fauna underpass in the northern section of the proposal and given that the majority of the landscape is cleared paddock it not considered to be necessary. Roads and Maritime is however proposing to revegetate within the vicinity of this fauna underpass to strengthen its
use as a fauna corridor following consultation with OEH and the Aboriginal community.

This issue was discussed with OEH during a meeting on 9 September 2013 and it was agreed that an additional fauna underpass within the vicinity of Blind Creek and the Dignams Creek Road intersection would not be viable. This is due to the road design and topography not allowing sufficient clearance to construct a fauna underpass other than within the vicinity of the bridge which will provide an opportunity for fauna to pass beneath.

As outlined in Table 2-1, the proposed wildlife crossing structures have targeted fauna species such as the Long-nosed Potoroo, Koala, Spotted-tailed Quoll, Yellow-bellied Glider and the Squirrel Glider. The location of the proposed wildlife crossing structures is shown in Figure 1-2. Roads and Maritime has undertaken assessments analysing the success of existing fauna crossing structures for such fauna species, refer to Use of fauna passage structures on RTA roads (RTA 2009). The results of this analysis have found evidence of the targeted species identified above using fauna underpasses of the dimensions proposed for the proposal. This includes evidence of Koalas using box culvert underpasses that are 2.4 x 2.4 metres in size underneath the Pacific Highway. Evidence was also obtained of the Spotted-tailed Quoll using 3 metre x 3 metre box culverts and 10 metre arch tunnels. Roads and Maritime also has evidence of Potoroo species (although not specifically the Long-nosed Potoroo) using 3 metre x 3 metre box culverts and there is tentative evidence of Potoroos using box culverts as small as 2.4 metre x 1.2 metre wide. Recently, Roads and Maritime has obtained photographic evidence of gliders using rope canopy bridges to cross sections of the Pacific Highway in northern NSW. The photographic evidence is taken as black and white images and does not specifically identify if the species is a Yellow-bellied Glider.

In terms of access, the proposed fauna underpasses and rope canopy bridge have been located in areas that are adjacent to habitat for threatened species impacted by the proposal. Areas cleared for construction will be revegetated with flora species from vegetation communities that have been impacted by the proposal. The rope canopy bridge has been placed proximal to an area where there is a Yellow-bellied Glider feed tree and which showed evidence of gliders living in the locality. It is considered that the proposed locations for the fauna wildlife crossing structures will be accessible to fauna species.

Fauna fencing is also proposed in areas of bushland and national park next to fauna crossing structures in the southern part of the proposal along the alignments for stage 1 and stage 2 and is intended to funnel fauna towards wildlife crossing structures and prevent fauna accessing the highway. Fauna fencing is not required at the tops of cut batters. Where dedicated or other fauna underpasses are proposed, habitat surrounding these structures and leading into and out of the structures would be appropriately revegetated to encourage their use. This may include koala feed trees away from the road reserve. This detail will be updated in the mitigation measures table included in Section 4.1.
Table 2-1 Wildlife crossing structures

<table>
<thead>
<tr>
<th>Stage</th>
<th>Reference</th>
<th>Chainage</th>
<th>Type</th>
<th>Target species</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>95585</td>
<td>Drainage culvert/fauna underpass</td>
<td>Koala, Long-nosed Potoroo, Spotted-tail Quoll</td>
<td>Box culvert, (3 metres x 3 metres) used for drainage and fauna crossings.</td>
</tr>
<tr>
<td>1</td>
<td>B</td>
<td>95860 and 95895</td>
<td>Bridge</td>
<td>Koala, Long-nosed Potoroo, Spotted-tail Quoll</td>
<td>The vegetated riparian area on both sides of Dignams Creek under the bridge currently provides fauna passage. A small area of riparian vegetation (around 0.01 hectares of map unit 5) may be impacted during construction of the proposal for the temporary creek crossing. Following construction of the proposal any clearing in this area would be revegetated to ensure fauna passage is maintained. An unsealed property access track would be included on the southern side of the creek although vehicle movements are anticipated to occur infrequently and vehicles would be travelling slowly due to the tight bends and as such there would be low potential for impacts to fauna movements or for vehicle strike.</td>
</tr>
<tr>
<td>1</td>
<td>C</td>
<td>96625</td>
<td>Dedicated fauna underpass</td>
<td>Koala, Long-nosed Potoroo, Spotted-tail Quoll</td>
<td>Dedicated fauna crossing that would be 3 metres by 3 metres and would contain fauna furniture.</td>
</tr>
<tr>
<td>2</td>
<td>D</td>
<td>97075</td>
<td>Dedicated fauna underpass</td>
<td>Koala, Long-nosed Potoroo, Spotted-tail Quoll</td>
<td>Dedicated fauna crossing that would be 2.4 metres by 2.4 metres and would contain fauna furniture. Investigation into 3 metres x 3 metres culvert will be undertaken during detailed design for Stage 2.</td>
</tr>
<tr>
<td>2</td>
<td>E</td>
<td>97700</td>
<td>Canopy rope bridge</td>
<td>Yellow-bellied Glider, Squirrel Glider</td>
<td>A rope canopy bridge that is designed for glider use to be located within the National Parks adjacent to the Yellow bellied Glider habitat.</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>97910 - 97890</td>
<td>Drainage culvert/fauna underpass</td>
<td>Koala, Long-nosed Potoroo, Spotted-tail Quoll</td>
<td>Box culvert (2.4 m x 2.4 m) to be used for drainage and fauna crossings. Investigation into 3 metres x 3 metres culvert will be undertaken during detailed design for Stage 2.</td>
</tr>
</tbody>
</table>
There is a possibility that fauna fencing will potentially act as a barrier to fauna that have entered the roadway however the fauna fencing will be provided closer to the base of fill embankments rather than next to the roadway and therefore would not be a barrier to fauna trying to clear the road. Furthermore there will be opportunities for fauna to escape the roadway in areas next to paddocks and at roadside cuttings where there will be no fauna fencing. Further consideration of the extent of fauna fencing will be undertaken during detailed design in consultation with a Roads and Maritime biodiversity specialist. This detail has been updated in the mitigation measures table included in Section 4.1.

### 2.6.5 Koala

#### Submission numbers

1 and 9.

#### Issue description

The following is a summary of the issues raised:

- In regards to Koalas, OEH would advocate that all the suitable habitat lands in the 500 metre radius should be surveyed.
- OEH request that local OEH representatives familiar with Koala issues in Kooraban and Gulaga National Parks be included in any meeting with the Commonwealth to discuss koala specific mitigation and offset measures that relate to EPBC Act considerations.
- The koala survey assessment undertaken does not appear to have followed the guidelines provided by OEH. The survey should be completed according to this methodology and the results reviewed jointly by Roads and Maritime and OEH prior to any submission to the federal Department of the Environment (DoE) being prepared. It may be best that if the preparation of the submission to DoE is undertaken collaboratively by Roads and Maritime and OEH.
- OEH questions the adequacy of the koala survey and requests that an additional six sites as shown in the figure provided should be assessed for koala evidence to achieve the recommended survey of all 500 metre grid sites where eucalypt vegetation occurs within 500 metres of the proposed area of impact.
- OEH questions the hours taken to complete the Koala survey and requests that Roads and Maritime provide greater detail in regards to the time taken to search the litter of each tree for koala pellets.
- OEH questions the conclusion in Appendix K Part B that koala activity in the study area is considered to be very low and the survey results suggest that the habitats adjoining the proposal corridor may only be used occasionally by dispersing individuals rather than supporting a portion of an important population or the home range of an individual. OEH suggest that until additional survey is undertaken using the RGBSAT survey method at the additional six survey sites that this conclusion cannot confidently be drawn.
- OEH disagrees with the statement in the Biodiversity Assessment that states that no koala activity was reported close to the current study area in Allen (2011). OEH notes that on page 9 of the Allen (2011) report an active site was located approximately 1.5 kilometres from the proposal. Given this is a low density population where koalas have home range areas of 30 to 100 hectares, this location is considered close to the proposal.
- The Biodiversity Assessment refers to Lunney et al (1997) which suggests that several larger Koala populations are also known from the wider Eden region.
based on the results of a community survey undertaken in 1991. OEH notes that despite extensive surveys in other areas by OEH in the past decade no evidence of resident koalas elsewhere has been located. OEH indicates that the koalas persisting in Kooraban National Park are outliers of the only known koala population persisting in the wider Eden region.

- OEH questions whether the definition of habitat critical to the survival of the Koala as provided on page 64 of the Biodiversity Assessment is from the DSEWPaC’s Referral Advice for Proponents (2012) and suggests that instead this definition is from the NSW Recovery Plan.

- OEH does not accept the statement that none of the vegetation types fit the definition for habitat critical to the survival of Koalas, based on current knowledge of the habitat preferences of the only known surviving koala population in the region.

- OEH suggests that the statement above is in contradiction to statements on page 129 of the Biodiversity Assessment and in Table 6-2 Summary of Commonwealth EPBC Act assessments of significance that the proposal would remove 19.9 hectares of habitat that meets the criteria for habitat critical to the survival of Koalas in accordance with DSEWPaC (2012).

- OEH notes that page 129 of the Biodiversity Report considers the loss of 19.9 hectares of vegetation is a relatively small loss of habitat in this locality given the presence of over 6,000 hectares of similar forests across these two reserves. OEH suggest that more caution is warranted for this estimate of the extent of Koala habitat in the reserves because of the extent of degradation (primarily the reduction in browse species diversity) that has occurred with intensive logging in the area before it became a reserve.

- OEH question the conclusion that the proposal is unlikely to lead to a long-term decrease in the size of an important population known from the locality. OEH suggest that given the very small numbers of koalas surviving in this outlier, the loss of one koala may make the difference between the survival and extinction of this group of koalas. OEH could only be confident that the risk of this occurring is acceptably small once the additional six RGBSAT surveys have established that no koala home range area occurs within 250 metres of the proposal.

- OEH agrees that the proposed inclusion of targeted crossing structures for the Koala would improve the existing poor connectivity between the reserves.

- OEH notes that fauna underpasses would be designed to a minimum of 2.4 x 2.4 metres and where fill heights allow would be 3 x 3 metres. OEH considers that the dimensions of 3 X 3 metres to be essential to adequately provide for koala passage.

- Suggests that a copy of the Allen, C. (2011). Koala survey Kooraban and Gulaga National Parks and adjacent lands 2010-2011 be made available to the local volunteers that participated in the survey.

- Reference is made to the Australian Koala Foundation (AKF) (2012) report and additional tree species like Coastal Mahogany (E. botryoides) but notes that there is no data to support this suggestion.

- Queries whether the two koala populations referenced in the REF are in fact one population. The map of catchments from Dignams Creek to Wapengo in Appendix 2 does not include survey details conducted by Allen (2011).

- Concerned about the conclusion that the proposal is unlikely to lead to a significant impact on local Koala populations. All that is needed to reach this conclusion is to determine the action constitutes or is part of a key threatening process.
**Issue response**

As outlined in Section 6.1 of the REF, SKM undertook three separate terrestrial ecology surveys in the study area during the development of the proposal over three seasons and included the following:

- Autumn survey (11-15 April 2011).
- Spring seasons (13-14 September 2011).
- Winter season (4-8 June 2012).

Koala surveys were undertaken during the terrestrial surveys based on a methodology approved by OEH and included systematic Koala surveys on the east and west of the highway to record the distribution of preferred and supplementary habitat up to 300-400 metres from the highway based on dominant Eucalypt species and with reference to secondary and supplementary food tree species identified for the south coast region in the Recovery Plan for the Koala (*Phascolarctos cinereus*) (DECC 2008a). Regularised scat searches were conducted by placing a 350 metre grid over the mapped habitat areas and systematically searching for scats using the spot assessment technique (Phillips and Callaghan 1995, 2011) within an area that extended up to 500 metres from the proposal. The initial search trees were selected based on the presence of a scat or given the predicted low abundance of Koalas in the area was based on tree species that are a known important food species.

SKM visited 20 of the 27 sites originally identified as some of these sites were within private property and no property access was available at the time of the survey. The survey of the 20 sites found no evidence of Koala and no Koala scats were recorded from the survey of 601 trees on both sides of the highway within the length of the study area (refer to Figure 2-2 of Appendix K). Feed trees present are comprised of Monkey Gum (*Eucalyptus cypellocarpa*), Yertchuk (*E. consideniana*), Woollybutt (*E. longifolia*), Coast Grey Box (*E. bosistoana*) and Blue Box (*E. baueriana*). According to DECC (2008a) these trees are considered to be either secondary of supplementary feed trees, further detail of the feed tree type classifications is included within Table 2-2. The feed tree species identified in this biodiversity assessment occur within three vegetation communities identified within the study area (refer to Figure 6-1 of the REF) which are as follows:

- Map unit 1: Silvertop Ash - Stringybark Dry Open Forest.
- Map unit 2: White Stringybark Forest.
- Map unit 3: Bangalay/Blue Gum Sheltered Forest.

As outlined in Table 6-5 of the REF the Bangalay (*Eucalyptus botryoides*) has been considered to be a secondary feed tree according to the Australian Koala Foundation (2012), DECC (2008a) and DECCW (2010a). The *E. botryoides* is a component of the map units 3, 4 and 5. Map unit 3 is considered to be secondary habitat (class C) according to DECC (2008a) and map units 4 and 5 are considered to be tertiary habitat.

It was noted in the REF that the area impacted by the proposal in Kooraban National Park has previously been logged. As identified by OEH, Roads and Maritime acknowledges that this area and the surrounding 6,000 hectares of similar forest have undergone degradation including the reduction of browse species diversity. Despite this the assessment still considers that the area of potential Koala habitat to be reduced is small relative to similar habitat available in the surrounding region.

The SKM fauna ecologists took about 20 hours to complete the survey of the 20 Koala plot sites. Additional time was required to travel between sites by 4WD and on
foot walking to and from access tracks. The hour spent at each site was spent completing the following tasks:

- Identifying and counting feed trees.
- Scanning the tree canopy for Koala.
- Undertaking a systematic search for Koala faecal pellets beneath each of 30 trees at each plot based on a cursory inspection of the undisturbed ground surface within 100 centimetres from the base of each tree, followed (if no faecal pellets were initially detected) by a more thorough inspection involving disturbance of the leaf litter and ground cover within the prescribed search area. A maximum of two person minutes/tree were dedicated to the faecal pellet search.

The survey concluded that any Koala activity in the study area is considered to be very low and the survey results suggest that the habitats adjoining the proposal corridor may only be used occasionally by dispersing individuals rather than supporting a portion of an important population or the home range of an individual.

Following the display of the REF, OEH requested that additional assessment be undertaken at an additional seven Koala plot sites that had not been visited during the field survey due to property access issues. OEH undertook this survey on behalf of Roads and Maritime using the Regularised Grid-Based Spot Assessment Technique (RGBSAT) method and the results are included in Appendix B. The results of this survey found no evidence of Koala activity at the seven additional Koala plot survey sites (refer to Figure 3-2). Five of the seven sites surveyed by OEH had one or more of the following preferred koala feed tree species: *E. longifolia*, *E. cypellocarpa* and *E. globoidea*. The Koala feed trees identified by the OEH survey match those identified within the SKM assessment see below:

- **Woollybutt (Eucalyptus longifolia)** is identified as a secondary tree species within map unit 2.
- **Monkey Gum (Eucalyptus cypellocarpa)** is a secondary feed tree in map units 1 and 2.
- **White Stringybark (Eucalyptus globoidea)** is a supplementary tree in map units 2 and 3.

This additional survey undertaken by OEH has been considered by SKM and does not change the results of the Biodiversity Assessment completed for the proposal. Consequently the statement that “koala activity in the study area is considered to be very low and the survey results suggest that the habitats adjoining the proposal corridor may only be used occasionally by dispersing individuals rather than supporting a portion of an important population or the home range of an individual” is still applicable. As is the conclusion in the Biodiversity Assessment that the “proposal is unlikely to lead to a long-term decrease in the size of an important population known from the locality”.

Roads and Maritime acknowledges OEH’s view that any koalas persisting in Kooraban National Park are outliers of the only known koala population persisting in the wider Eden region, however based on the results of the Koala assessment no evidence of Koala activity has been identified within the 500 metres of the proposal using the Koala survey methodology that was approved by OEH.
Table 2-2  Summary of primary and secondary food tree species in the overstorey and assessment of habitat critical to the survival of Koalas (EPBC Act) and category of Koala habitat (DECC 2008)

<table>
<thead>
<tr>
<th>Map Unit</th>
<th>Vegetation types identified in the study area</th>
<th>Food tree species south coast region (DECC 2008) (% cover)</th>
<th>Important food trees south coast region (DECCW 2010ca) additional to DECC (2008a)</th>
<th>Primary food trees and Eurobodalla LGA (AKF 2012) additional to DECC (2008) and DECCW (2010a)</th>
<th>Habitat critical to Koala survival based on DSEWPaC (2012)</th>
<th>Habitat category, Callaghan unpublished in DECC (2008a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MU 1</td>
<td>Silvertop Ash – Stringybark dry open forest</td>
<td>None</td>
<td>Monkey Gum (E.cypellocarp a) (&lt;5%), Yertchuk (E.considerian a) (&lt;5%), Coast Grey Box (E. bosistoana) (&lt;5%)</td>
<td>Silvertop Ash (E.seiben) (&gt;30%), Red Ironbark (E.tricarpa) (&lt;5%), Rough-barked Apple (Angophora floribunda) (20%), Black She-oak (Allocasuarina littoralis) (mid-storey 5-20%)</td>
<td>Monkey Gum (E.cypellocarpa) (&lt;5%)</td>
<td>Secondary habitat (class B)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blue-leaved Stringybark (E.agglomerata) (&gt;30%), White Stringybark (E.globoidea) (10%), Yellow Stringybark (E.muelleriana) (5%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MU2</td>
<td>White Stringybark dry open forest</td>
<td>None</td>
<td>Monkey Gum (E.cypellocarp a) (10%), Coast Grey Box (E. bosistoana) (&lt;5%), Woollybutt (E.longifolia) (&lt;5%), Blue Box</td>
<td>Silvertop Ash (E.seiben), (5%), Rough-barked Apple (Angophora floribunda) (20%), Black She-oak (Allocasuarina littoralis) (mid-storey 5-20%)</td>
<td>Monkey Gum (E.cypellocarpa) (&lt;5%)</td>
<td>Secondary habitat (class C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yellow Stringybark (E.muelleriana) (&gt;30%), White Stringybark (E.globoidea) (&gt;30%), Blue-leaved Stringybark (E.agglomerata)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Map Unit</td>
<td>Vegetation types identified in the study area</td>
<td>Food tree species south coast region (DECC 2008) (% cover)</td>
<td>Important trees south coast region (DECC 2010) additional to food coast region (DECCW 2012) additional to Primary food trees Bega Valley LGA (AKF DECC 2010) and DECC 2010ca</td>
<td>Habitat critical Koala survival based on Habitat category, Callaghan unpublished in DECC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------------------------------</td>
<td>--------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MU3</td>
<td>Bangalay/Blue Gum sheltered forest</td>
<td>None (E. baueriana) (&lt;5%)</td>
<td>Yellow Stringybark (E. muelleriana) (&gt;30%), White Stringybark (E. globoidea) (10%)</td>
<td>Point 1 – No Point 2 – No Point 3 – No Point 4 – No Point 5 – No Point 6 - Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monkey Gum (E. cypellocarpa) (&lt;5%)</td>
<td>Rough-barked Apple (Angophora floribunda) (20%)</td>
<td>Secondary habitat (class C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MU4</td>
<td>River Peppermint – Rough-barked Apple moist shrubby forest</td>
<td>None None None</td>
<td>Rough-barked Apple (Angophora floribunda) (5%)</td>
<td>Point 1 – No Point 2 – No Point 3 – No Point 4 – No Point 5 – No Point 6 - No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bangalay (E. botryoides) (&gt;30%) occurs as a hybrid with Sydney Blue Gum (Eucalyptus saligna)</td>
<td>Tertiary habitat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MU5</td>
<td>Riparian forest</td>
<td>None None None</td>
<td>Rough-barked Apple (Angophora floribunda) (5%)</td>
<td>Point 1 – No Point 2 – No Point 3 – No Point 4 – No Point 5 – No Point 6 - No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bangalay (E. botryoides) (5%) occurs as a hybrid with Sydney Blue Gum (Eucalyptus saligna)</td>
<td>Tertiary habitat</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In regards to statement that “no koala activity was reported close to the current study area” this statement is referring to the results of the targeted koala survey undertaken by SKM for the proposal not the Allen (2011) study. As outlined above, the SKM survey did not confirm any evidence of koala activity in the study area which for the purposes of the Koala survey is the area contained within the Koala plot sites. The SKM report acknowledges the work done by OEH in the region and the presence of low density koala populations in proximity to the study area, but that no evidence was found of koala activity in a 500 metre wide study area along the project corridor.

Following a review of OEH datasets for the region this is consistent with previous studies. This includes the 2005 dataset which found records of Koala pellets located along Sams Ridge Road between 1.5 and 2.7 kilometres from the proposal and records of Koala pellets located in the Jimmy’s Creek region area between 5.7 and 7.2 kilometres from the proposal (refer to Figure 2-1). Sams Ridge Road and Jimmy’s Creek are both located in Kooraban National Park. Additional surveys were conducted in the region in Kooraban and Gulaga National Parks and produced 16 records of Koala activity. Records in Gulaga National Park were also retrieved from OEH and show evidence of two records of Koala pellets in 1999 and two records of Koala sightings in 2011. These records show evidence of Koala around two kilometres to the southeast of the proposal. It is noted that Koalas have a large home range area and that this may include forest within the construction footprint. It is also noted that there is a possibility that the two koala populations referenced in the REF are in fact one population which has been described in the Biodiversity Assessment as an 'important population'.

The definition of habitat critical to the survival of the koala as defined on page 5 of DSEWPaC’s Interim Koala Referral Advice for Proponents (2012) is as follows:

1. Primary Koala food tree species comprise at least 30 per cent of the overstorey trees.
2. Primary Koala food tree species comprise less than 30 per cent of the overstorey trees, but together with secondary food tree species comprise at least 50 per cent of the overstorey trees.
3. Primary food tree species are absent but secondary food tree species alone comprise at least 50 per cent of the overstorey trees.
4. The above qualities may be absent in a forest or woodland but other essential habitat features are present and adjacent to areas exhibiting the above qualities.
5. A relatively high density of Koalas is supported, regardless of the presence of food tree species. Koala population densities vary across their range and regional data should be used to judge relative density.
6. Habitat critical to the survival of the koala is also considered to be any form of landscape corridor which is essential to the dispersal of koalas between forest or woodland habitats.

It is noted that the first two of these points are cited in DSEWPaC advice as being sourced from the Recovery Plan for the Koala (Phascolarctos cinereus) prepared by DECC in 2008 and is available online at: www.environment.nsw.gov.au/resources/threatened_species/08450krp.pdf.

In regards to the statements that there is contradiction in the Biodiversity Assessment regarding habitat critical to the survival of the species, Table 3-6 of the Biodiversity Assessment has been amended slightly to ensure consistency in the report (refer to Table 2-2 of this report). The points (1-6) identified in Table 2-2 are based on the (DSEWPaC 2012a) definition of habitat critical to the survival of the Koala as
In regards to OEH’s concern regarding the conclusions of the Assessment of Significance for the Koala, it is noted that in reaching this conclusion, the factors considered were:

- The importance of the habitat being impacted for koala populations.
- The surveys and assessment determined that the habitat to be cleared (a recognised key threatening process) does not constitute primary or secondary foraging habitat.
- The value of the habitat for koala populations lies in the potential movement and dispersal opportunities across the landscape and disruption of this opportunity is not a key threatening process.
- The upgrade of the highway in this location would improve the current barrier effect of the highway, and this is expected to have a net benefit that outweighs any relatively small loss of marginal foraging, dispersal and sheltering habitat.

Roads and Maritime acknowledges OEH’s request for all fauna underpasses to be designed as a minimum 3 metre x 3 metre structure. As a minimum design principle, all dedicated underpasses would be designed to a minimum of 2.4 x 2.4 metres where fill heights allow, taking into consideration the presence of sensitive vegetation. If possible, structures would be 3 x 3 metres for Koala passage as documented in AMBS (2011). Roads and Maritime have already altered the design for Stage 1 to accommodate 3 metre x 3 metre culverts and will investigate the design of fauna underpasses for Stage 2 during detailed design for that stage.

Roads and Maritime is considering whether to refer the proposal to the Department of the Environment for potential impacts to EPBC listed species as listed in Table 6-4 and 6-5 of the REF. If a referral is required, approval under the EPBC Act would be sought and any requirements by the Department of the Environment would be incorporated into the relevant flora and fauna management plan. Roads and Maritime has considered advice and submissions made by OEH during the preparation of the REF and will endeavour to include representatives of OEH should there be a meeting with the Commonwealth to discuss koala specific mitigation and offset measures that relate to EPBC Act considerations.

Roads and Maritime will suggest to OEH that a copy of the Allen, C. (2011) Koala survey Kooraban and Gulaga National Parks and adjacent lands 2010-2011 be made available to the local volunteers that participated in the survey.
Upgrade of the Princes Highway, Dignams Creek

Figure 2-1 | OEH Koala survey results 1999, 2001, 2005 and 2011

DATA SOURCES
LPMA 2010
SKM 2011

LEGEND
- OEH 2001 Koala survey
- OEH 1999 Koala survey
- OEH 2005 Koala survey
- OEH 2011 Koala survey

Concept design
Stage 1
Stage 2
Major road
Local road
Watercourse
Lake
National Park

PRINCES HIGHWAY
DIGNAMS CREEK
GULAGA NATIONAL PARK
KOORABAN NATIONAL PARK
WALLAGA LAKE
LITTLE LAKE
PRINCES HIGHWAY
NARIRA CREEK
COBARGO
NAROOMA
BATEMANS BAY
NSW
**2.6.6 Square Raspwort**

**Submission numbers**

1.

**Issue description**

The following is a summary of the issues raised by OEH in regards to Square Raspwort:

- OEH consider that the population of around 50 plants of Square Raspwort impacted by the proposal is an important population in a regional context.
- OEH request that individuals of Square Raspwort impacted by the proposal be translocated into areas of suitable riparian habitat rather than cleared.
- OEH noted that the Square Raspwort is listed under the TSC Act and the EPBC Act and that translocation of individuals impacted by the proposal should help to avoid triggering the EPBC Act.

**Issue response**

The Square Raspwort (*Haloragis exaltata* subsp. *exaltata*) population in the study area is considered to be an important population, due to the large size of the population which extends over a relatively large area of habitat and is therefore important for genetic diversity and recruitment and dispersal of individuals. The 50 plants impacted by the proposal comprise a relatively small proportion of the entire population. The population consists of greater than 900 plant clumps, with the survey limited to a small section of Dignams Creek 150 metres to the north and 250 metres to the south of the Princes Highway and the species has been observed several kilometres downstream of the project, and therefore this proportion would be considerably less when considering the broader population in the local area. The seven-part test of significance completed under the TSC Act and the assessment of significance completed under the EPBC Act for the Square Raspwort found that the proposal would not have a significant impact to this population of Square Raspwort located within the construction footprint of the proposal.

Roads and Maritime met with OEH on 9 September 2013 to discuss how to manage the relocation of individuals of Square Raspwort into areas of suitable riparian habitat rather than cleared areas. It was decided that Roads and Maritime would include a mitigation measure to replant plants where possible. As such the following mitigation measure is proposed:

Individuals of Square Raspwort that are directly impacted would be replanted in a suitable location outside the construction footprint in areas of appropriate habitat along Dignams Creek.

**2.6.7 Vegetation**

**Submission numbers**

8 and 9.

**Issue description**

The following is a summary of the issues raised:
Impacts to vegetation where Allocasuarina littoralis present due to past disturbance from logging is to be avoided. Questions whether the attempts to re-vegetate in areas of Allocasuarina littoralis forests are realistic, given previous logging and burning are also claimed to 'improve the forest'.

Questions the number of plot samples used and states the adequacy of the data is dependent on whether forest health is addressed as was raised in the issues report on the Concept Design.

Concerned about the classification of vegetation types and suggests that the extent of the assessed impact will vary dependent on the classification. Queries the classification of the vegetation unit identified as Silver top Ash - Stringy Bark Forest in the REF according to the modelled floristic assemblages (Tozer et al. 2010) and suggests that this could be classified as either Coastal Foothills Dry Shrub Forest or Deua-Brogo Foothills Dry Shrub Forest.

Disputes the figures provided in the Biodiversity Assessment that there is around 76,767 hectares of vegetation consistent with River-flat Eucalypt Forest on Coastal Floodplains within 10 kilometres of the proposal (Tozer et al. 2010) and the potential impacts for the proposed upgrade represent less than 0.002% of this vegetation type in the region.

Suggests that the figure of 76,767 hectares is not attributed to any floristic assemblage in the revised native vegetation classification. Indicates that the most recent information regarding Riverine forest in the NSW section of the South East Corner Bio-region (SECB) has a remaining extent that is less than 1,500 hectares.

Notes that in the Biodiversity Assessment, the one vegetation plot in Riparian forest (Figure 2-1, Appendix K, and Part A) is not located within the construction footprint of the proposal.

Queries the extent and/or classification of River-flat Eucalyptus Forest (RFEF) on Blind Creek in regards to species River Peppermint (Eucalyptus elata) and River Oak (Casuarina cunninghamia).

Questions the species included in the survey list such as: Red Cedar (Toona ciliate) and various Acacias. Red Cedar is not known to occur in the area and may be confused with Ailanthus altissima. Moreover, Acacia sylvestris is known in the area and was not identified.

**Issue response**

Map Unit 2: White Stringybark Forest is also recognised as Coast Grey Box - Mountain Grey Gum - Stringybark moist shrubby open forest in coastal gullies, southern South East Corner Biometric vegetation type according to Table 3-1 of the Biodiversity Assessment. This community includes the Black She-oak (Allocasuarina littoralis) and would be one of the flora species that may be cleared as part of the proposal. However this species is listed as one of the flora species that would be used for revegetating disturbed areas of vegetation where map unit 2 was located. While the Biodiversity Assessment did not specifically assess how successful and realistic attempts to revegetate in areas of Allocasuarina littoralis forests has been, evidence of regrowth in previously logged areas of Kooraban National park was noted during the survey. The proposal does not include a plan to log and burn any areas within the construction footprint and there are no ecological constraints identified that would prevent this species from revegetating.

The number of plot surveys used was based on the DECC (2008b) Biobanking Assessment Methodology and also on the draft Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities guidelines DEC (2004). The habitat condition assessments were undertaken using (DECC 2008b) to assess...
vegetation condition in relation to recognised benchmarks for the biometric vegetation types. Field data was recorded using the Biobanking methodology plot layout, which consists of a 20 x 20 metre plot (0.04 ha), a 20 x 50 metre plot (0.1 ha) and a 50 metre line transect.

The Biodiversity Assessment has considered the condition of vegetation within the construction footprint of the proposal and this includes consideration of forest health. It is noted that the forest has been degraded from previous logging activities.

Terrestrial flora surveys were completed for the concept design during the autumn (11-15 April 2011) and spring seasons (13-14 September 2011). Additional flora surveys were also included during the winter season (4-8 June 2012), which also included assessments of the property Roads and Maritime has purchased for the offset investigations. According to the information obtained during these flora surveys and descriptions by Tozer et al these areas are more consistent with e32A Deua-Brogo Foothills Dry Shrub Forest being dominated by *Eucalyptus sieberi* and *E.agglomerata* rather than *E.tricarpa* which is more common in e32B: Far South Coastal Foothills Dry Shrub Forest. The dominance of Eucalyptus sieberi in the study area also supports the vegetation classification presented as this species is not identified as a diagnostic species for e32A Deua-Brogo Foothills Dry Shrub Forest. Additionally there were more diagnostic species for 32A Deua-Brogo Foothills Dry Shrub Forest recorded in the study area.

The vegetation plot undertaken in Riparian forest (Figure 2-1, Appendix K, Part A) was completed prior to the preferred alignment being identified in the area of riparian vegetation located between Blind Creek and Dignams Creek as the concept design originally had a larger batter which covered this area. It was recommended that the size of the batter be reduced in this location to minimise impacts to the TEC and sensitive vegetation in this location. Following identification of the preferred alignment additional flora survey was undertaken which included survey of riparian vegetation located within the construction footprint. It was considered that the survey plot taken of riparian vegetation that was outside of the construction footprint was representative of the riparian forest community and was appropriate for the Biodiversity Assessment.

For the purposes of this assessment the area extending along Blind Creek was identified as RFEF due to the low elevation of this area and the permanent nature of the creek. Not all diagnostic canopy species need to be present for the vegetation classification and the identification of the community is based on the composition of all structural layers.

In regards to the submission disputing areas of RFEF in the area, it is noted that there is an error in the calculations for this in the Biodiversity Assessment and the actual area identified by Tozer *et al.* within a 10 kilometre radius is 173 hectares comprising map units p30 and p105. Some of the e19 could also be added as some areas of this community may be included but for the purposes of this assessment have been excluded. So the impact of 0.1 ha actually represents 0.057 per cent of the proportion of the TEC in the locality. This is still a very small proportion and does not change the conclusions of the assessment.

In response to the questions regarding classification of the Red Cedar (*Toona ciliate*) and various Acacias the following is noted:

1. Red Cedar versus Ailanthus - This plant may have been incorrectly identified - it was recorded adjacent to Blind Creek as a smaller tree and with limited
identification material, was suspected to be *Toona ciliata*. This does not change the conclusions of the assessment and if *Ailanthus altissima* is found to be present rather than *Toona ciliata* in the project area weed control measures would be implemented.

2. **Sylvestris** - *Acacia subporosa* and *Eucalyptus maidenii* were recorded by NGH and therefore were included in the species listed for completeness. *Acacia longissima* was recorded in the study area by SKM which may have been a narrow phylloide form of *Acacia floribunda* rather than *A. longissima*, but there are unconfirmed records of this species on the southern tablelands and the broader-leaved form of *Acacia floribunda* was recorded in the study area. *Acacia silvestris* is likely to be in the study area with its northern limit in Bodalla State Forest area just north of the study area. If *Acacia silvestris* is present in the study area it may have been mis-identified or assumed to be the very similar and closely related *Acacia mearnsii* which was identified by NGH in the study area.

### 2.6.8 Yellow-bellied Glider

#### Submission numbers

1.

#### Issue description

The following is a summary of the issues raised by OEH in regards to the Yellow-bellied Glider:

- OEH requested that widening the canopy in the southern area of the project where the Yellow-bellied Glider population is found should be minimised. The mitigation measures of not employing a wide batter but going to more vertical wall construction would be justified.

#### Issue response

During the development of the concept design the size of the batter proposed in the southern section of the proposal adjacent to a Yellow-bellied Glider feed tree was reduced. Additionally the REF currently includes the following mitigation measure:

*Measures involving minimising the construction footprint in areas of important habitat and subsequent removal of vegetation would be considered in the detailed design. Specific measures include:*

- Avoiding habitat currently occupied by the Yellow-Bellied Glider, including a significant sap feeding tree and several hollow–bearing habitat trees located in the southern part of the proposal adjacent to stage 2 works. This may include reducing the size of the proposed batter during detailed design.

While the batter may be locally steepened in this location a vertical wall would not be constructed.
2.7 Noise and vibration

Submission numbers

6.

Issue description

The following is a summary of the issues raised:

- Disputes the results of the Noise and Vibration Assessment, specifically that the impacts of the road moving 300 metres closer to residents in Dignams Creek Road will have no significant impact.

Issue response

As outlined in Section 6.2 of the REF, the Noise and Vibration Assessment has been undertaken in accordance with the requirements of the following guidelines and standards:

- Construction noise is assessed on the requirements of the Interim Construction Noise Guideline (ICNG) (DECCW 2009).
- Operational noise criteria for the assessment of road traffic noise is guided by the OEH New South Wales Road Noise Policy (RNP) (DECCW 2011). The Roads and Maritime provides additional information in the Environmental Noise Management Manual (ENMM) (RTA 2001) to assist in application of the criteria and development of the noise mitigation where required.
- Construction vibration is assessed on the requirements of Assessing Vibration - a technical guideline (DECC 2006) which is based on the British Standard BS 6472-1992: Evaluation of human exposure to vibration in buildings (1-80Hz).
- Vibration assessment (structural damage) is based on the Australian Standard AS2187.2-2006 Explosives – Storage, Transport and Use provides guidance for the assessment of structural damage to buildings caused by vibration. This section of the standard is based on the British Standard 7385: Part 2 Evaluation and measurement of vibration in buildings.

The results of this noise and vibration assessment found that in the northern part of the proposal the realignment of the Princes Highway would move between 100 to 275 metres closer to sensitive receivers located to the west of the existing Princes Highway on Dignams Creek Road. Construction noise levels would be exceeded at 10 noise sensitive receivers located along Dignams Creek Road. One location (receiver 7 at Lot 321 DP873421) may experience noise levels close to the highly affected noise level. A feasible and reasonable approach towards noise management measures would be required to reduce noise levels as much as possible during construction.

While earthworks may produce adverse vibration impacts within 30 metres of construction works, structural damage is considered unlikely as there are no residences within 50 metres of the proposal.

The operational noise assessment was based on two build scenarios assuming 2016 (potential year of opening) and 2026 (ten years after opening). Both of these scenarios indicated that traffic noise levels at all but one receiver (receiver 7 at Lot 321 DP873421) would generally rise by about 2 dB(A) to 5 dB(A), however would not exceed the noise criteria as defined in the OEH New South Wales Road Noise Policy (RNP) (DECCW 2011) of 55 dB(A) day time and 50 dB(A) night time. For the noise...
receiver (7) at Lot 321 DP873421 feasible and reasonable mitigation measures would be considered for this receiver during detailed design, refer to Section 6.2 of the REF.

2.8 Landscape character, urban design and visual impact assessment

2.8.1 Visual impacts

Submission numbers

6

Issue description

The following is a summary of the issues raised:

- Concerned that although comments have been made previously there has been no attempt to reduce the visual impact of the proposal on adjacent residents.
- Concerned about the visual impact of the proposal and change in the landscape character from a country lane.

Issue response

As described in Section 6.3 of the REF an Urban Design, Landscape Character and Visual Impact Assessment was completed for the proposal to identify design principles and objectives to inform the concept design and to assess impacts and proposed mitigation measures (refer to Section 6.3 and Appendix C of the REF). Additionally, the concept has been guided by the urban design principles to minimise potential impacts.

The results of the Urban Design, Landscape Character and Visual Impact Assessment found that the proposal would result in changes to the existing landscape character of the area as a result of the removal of vegetation during construction, the increase in road pavement area from wider road shoulders, and the scale of earthworks. The assessment also found that the impression of landscape character from the road user’s perspective would be altered in that the new alignment would be less responsive to the physical features of the landscape. Increased speed limits would also reduce viewing time of cultural and biophysical features. However the visual impacts during construction and operation of the proposal are not considered to be significant and a range of mitigation measures including the development of an urban design and landscaping strategy plan would be implemented. The assessment was prepared in accordance with the Roads and Maritime (2009) Guidelines for Landscape Character and Visual Impact Assessment and the Roads and Maritime (2009) Beyond the Pavement guidelines.

In terms of the change of landscape character from a country lane, the proposal would retain the same lane configuration as the existing highway however would be upgraded to meet current road design standards to improve road safety. It is acknowledged however that the scale of the road form will be increased as a result of the proposal. The urban design and landscaping strategy plan as described in Appendix C of the REF has been developed in order to minimise the visual impacts of the proposal and retain the character of the area.
Visual impacts have been assessed as part of this assessment and measures have been included to mitigate the impacts of the proposal on nearby residents. This includes:

- Revegetation of the disturbed landscape in accordance with a landscape plan.
- Designing the bridge in accordance with the Roads and Maritime Bridge Aesthetics guidelines and ensuring the bridge structure is integrated into the adjacent landform.
- Steepening retaining walls and batters to grades suitable for the proposed surface treatment in order to minimise the overall footprint of the proposal, while still enabling appropriate landscaping.
- Where possible, retaining walls/batters would be constructed of materials that would visually integrate with the surrounding geology and landscape.
- Providing screen planting below walls and use materials that integrate visually with the surrounding environment.
- Ensuring visible roadside channels and median channels are vegetated or rock lined. Concrete lined channels would be avoided as much as possible. Where they are to be used, the concrete would be coloured and/or heavily roughened.
- Retaining existing cultural/landmark trees in the surrounding paddocks would be retained where feasible. This would be undertaken by identifying ‘no go areas’ to restrict access around trees not affected by the proposal and making minor adjustments to the horizontal and vertical carriageways to move them clear of root zones.
- Maintaining natural rock cutting faces where feasible, to allow the geological character of the landscape to be viewed.

Further mitigation of impacts would continually be investigated during detailed design.

### 2.8.2 Landscaping and Revegetation

**Submission numbers**

1, 3, 5, and 8.

**Issue description**

The following is a summary of the issues raised:

- OEH notes that the landscaping plan would use locally indigenous species and would target key fauna food resources to encourage usage either side of the structure and thus provide the habitat linkage to the structure. OEH suggests that it may be better not to plant koala feed species adjacent to the highway so that koalas are less likely to be attracted. OEH also requests that wherever reasonably possible, appropriate rainforest species (including vines) should be established to provide a vegetation barrier and minimise risk of fire.
- DPI (Fisheries) requires a vegetated riparian buffer to be created underneath the new highway bridge between the new property access track and Dignams Creek.
- Requires riparian areas that are degraded or disturbed by the works to be rehabilitated and replanted with native riparian vegetation at the completion of the road works.
- Questions what the specific planting will be on the embankment to the west of the new highway.
- Requests that revegetation of the Pretty Vale property to the west of the proposal be undertaken prior to construction using native species to minimise
visual impacts to residents on Dignams Creek Road. It is important that such areas are managed in an appropriate manner such as planting native species to prevent them from becoming weed infested.

- Concerned that the REF only discusses noxious weeds and not environmental weeds. Requests that construction of the proposal addresses the risk of spread of environmental weeds particularly in creek areas.
- Requests that appropriate native species are stipulated in the construction contract, including native grasses where spray seeding is to occur near bush areas.
- Requests that the cross section of the batter embankments incorporate a broader step halfway down the slope which allows trees to be planted which would visually screen the highway from nearby residences.
- Requests that the tree planting list include species such as Stringybarks, Silvertop Ash, Bangalay and the Southern Blue Gum or Maidens Gum.
- Suggests that more detail needs to be included regarding the revegetation plans and that the idea of stepping the embankments and providing a level for revegetation that would enable greater noise and visibility reduction and revegetation outside the development footprint should be included.
- Suggests that revegetating the land outside the development footprint where there are natural soil profiles are more likely to support better quality forest and habitat for biodiversity and is likely to be more sustainable than revegetating compacted fill batters.
- Concerned that using the flora survey results as the primary guide to revegetation as outlined in Appendix B of the REF would not include species that belong in the area but are no longer common such as (Maidens Gum) *Eucalyptus maidenii* and Stout Bamboo Grass (*Austrostipa ramocissima*).
- Concerned that the impact to wildlife has not been adequately considered, and the standard re-vegetation treatment of roadside soil disturbance will attract wildlife to the fresh green pick.

**Issue response**

Spackman Mossop and Michaels have prepared an urban design and landscape strategy plan which was included in the Urban Design, Landscape Character and Visual Impact Assessment prepared for the proposal (refer to Figures 4-4 and 4-5 of Appendix C of the REF). The tree planting list for the urban design and landscape strategy plan includes species from the five vegetation map units identified within the proposal footprint (refer to Table 3-1 of the Biodiversity Assessment). This includes species such as Stringybarks, Silvertop Ash, Bangalay and the Southern Blue Gum. Maidens Gum (*Eucalyptus maidenii*) is identified by Tozer (2010) as occurring in some of the map units identified in the study area and could be included in the plantings. Southern Blue Gum (*Eucalyptus bicostata*) hasn't been identified by Tozer (2010) in any of the local vegetation communities and its natural range is likely to be further west of the study area so this species should not be included in plantings.

It is noted that (Maidens Gum) *Eucalyptus maidenii* and Stout Bamboo Grass (*Austrostipa ramocissima*) are species that are included in the flora assemblages associated with vegetation Map Unit 5 – Riparian Forest which is identified within the construction footprint. These two species could therefore be included in the species list for the landscaping plan for replanting in areas cleared within Map Unit 5 (refer to Table 6-2 of the REF). The landscaping planting list will be refined in detailed design.
In reference to rainforest species, the landscape plan already includes the following mitigation measure "Revegetation of cleared areas using species occurring from vegetation map units identified within the proposal footprint (refer to Table 6-2 of the REF)." This includes rainforest species which are found in map units 2 to 4 and includes such species as:

- **Map Unit 2 White Stringybark Forest** - Sweet Pittosporum (*Pittosporum undulatum*) and Wild Yellow Jasmine (*Pittosporum revolutum*).
- **Map Unit 4: River Peppermint - Rough-barked Apple moist shrubby forest** - Sweet Pittosporum (*Pittosporum undulatum*), Mock Olive (*Notelaea venosa*), Brush Muttonwood (*Myrsine howittiana*), Wild Yellow Jasmine (*Pittosporum revolutum*), Orange Thorn (*Pittosporum multiflorum*), Prickly Rasp-fern (*Doodia aspera*) and Gristle Fern (*Blechnum cartilagineum*).
- **Map Unit 5: Riparian Forest** - Kurrajong (*Commersonia fraseri*), Fishbone Water Fern (*Blechnum nudum*) and Maidenhair Fern (*Adiantum aethiopicum*).

Primary and secondary Koala feed trees are contained within map units 1 to 3. In order to discourage Koalas from accessing trees adjacent to the proposal the mitigation measures concerned with the urban design landscape strategy plan included in the REF will be updated to include the following:

"Koala plant feed trees as identified in Table 2-2 of the REF will be planted at least 25 metres from the shoulder of the proposal and five metres from fauna fencing to discourage Koalas from accessing potential habitat adjacent to the highway and to discourage them using the tree to jump over the fauna fence."

In regards to the comment regarding environmental weeds, Roads and Maritime will update the mitigation measures for management of noxious weeds to also include management of environmental weeds. As such the following mitigation measure:

“Controlling the spread of noxious weeds - A weed management plan would be developed as part of the CEMP in accordance with the Biodiversity Guidelines(2011) and Introduction Weed Management Manual (Natural Heritage trust 2004), and would include descriptions and mapping of major weed infestation during the pre-clearing survey and appropriate management actions to be undertaken”

will be changed to:

“Controlling the spread of noxious and environmental weeds - A weed management plan would be developed as part of the CEMP in accordance with the Biodiversity Guidelines(2011) and Introduction Weed Management Manual (Natural Heritage trust 2004), and would include descriptions and mapping of major weed infestation during the pre-clearing survey and appropriate management actions to be undertaken”.

All areas of riparian vegetation that are disturbed by construction of the proposal would be revegetated with flora species from the NSW State-listed Threatened Ecological Community identified as the River-flat Eucalypt Forest on Coastal Floodplains. This includes a vegetation buffer of around 25 metres underneath the new highway bridge between the new property access track and Dignams Creek.
In reference to revegetation plans further work will be undertaken during detailed design once the compensatory lands and offset package has been finalised with OEH for the revocation of former Kooraban National Park lands and other impacts to vegetation. The revegetation plans will include revegetation of areas outside of the construction footprint which are proposed to be handed over to OEH for inclusion within Gulaga National Park estate. This will include areas where there are natural soil profiles which as identified in the submission are potentially more likely to support better quality forest and habitat for biodiversity and as such likely to be more sustainable in the longer term.

The Pretty Vale property located at 9523 Princes Highway, Dignams Creek has been purchased for use in the proposal and as part of the compensatory lands and offset package that is being negotiated with the OEH for the revocation of a portion of Kooraban National Park and impacts to other vegetation. Should OEH agree to the package then revegetation of some areas of the Pretty Vale property would potentially result. The timing of revegetation of this land will be negotiated with OEH and may potentially occur prior to construction. Local native species will be used as part of the landscape and revegetation plan and will incorporate species identified from the five vegetation map units identified within the proposal's construction footprint and as defined in Table 3-1 of the Biodiversity Assessment.

In regards to the steps in road side batters, the step in the batter is for maintenance purposes and would not be vegetated so vehicles can access the batter safely. The batter slopes however would be vegetated in order to provide a visual screen for nearby residences. In this regard, a series of steps within the batter for the purposes of revegetation is not considered necessary. Providing a series of steps within the batter would alter the footprint of the project and would affect the earthworks balance requiring fill material to be imported. 2:1 batter slopes as proposed can be revegetated with trees, shrubs and ground covers and do not need to be level.

While revegetating road side batters would provide a visual buffer it would not provide substantial noise attenuation. Roads and Maritime will however consider strategic revegetation on private property outside of the construction footprint for the purposes of reducing visual impacts and strengthening fauna connectivity. Grass species to be included on the roadside batters will be in accordance with standard Roads and Maritime specifications (*R176 Seed Procurement and R178 Vegetation*). The preparation of species lists will be based on vegetation contained within map units 1 – 5 as identified in Table 3-1 of the Biodiversity Assessment.

There is a possibility that revegetation of areas of roadside soil disturbance will attract wildlife to the fresh green pick. However, there is a strategy to include fauna fencing on fill embankments as part of the proposal that is aimed at preventing fauna residing in habitat located adjacent to the proposal from entering the roadway and funnelling fauna to safe crossing structures (refer further to Table 2-1).
2.8.3 Urban Design, Gateway issue

Submission number
14

Issue description

- The existing “Welcome to Eurobodalla Shire” signage will need to be relocated to a suitable location as part of the proposal. It would be appreciated if Roads and Maritime could advise Council as to the new location where this signage will be positioned.

Issue Response

The location of the “Welcome to Eurobodalla Shire” sign will be finalised in detailed design in consultation with Eurobodalla Shire Council. The relocation of this sign would be undertaken by Roads and Maritime as part of the construction of the proposal.

2.9 Heritage

2.9.1 Aboriginal cultural landscape

Submission numbers
1 and 13.

Issue description

The following is a summary of the issues raised:

- OEH request that the issue of Aboriginal landscape cultural values as outlined in letters to Roads and Maritime dated 15 Feb 2013 and 19 July 2012 be further addressed.
- OEH understand that the issue of Aboriginal cultural heritage values has been raised by the Gulaga Board of Management and support their position on this issue.
- Concerned that the environmental assessment does not acknowledge or consider the existing important and significant landscape values that exist in the proposed corridor.
- Considers that the heritage sites and the broader Aboriginal cultural landscape which exists between Gulaga Mountain and Biamanga Mountain to be a single cultural landscape and of high cultural significance to the Yuin People. The Mountains are spiritually interlinked and hold a great deal of cultural history to the Yuin People which has been well documented.
- The significance and connection to country and the cultural landscape was recognised when both national parks were handed back to the traditional owners in 2006.
- Advocates strongly for the protection of the cultural landscape between Gulaga and Biamanga Mountains and proactively works to prevent activities which compromise the connection between the two mountains. Concerned about the on-going impacts of surrounding land uses on the integrity of natural and cultural heritage values of the Mountains.
• Concerned that the consultation process outlined in the REF does not accurately reflect the outcomes of consultation undertaken to date between the Gulaga Board of Management and Roads and Maritime. Despite presentations on options being made nothing has been resolved by the board.

• Supports the preferred option (the proposal) in principle and is in general agreement that the proposal would improve the safety of the Dignams Creek section of the Princes Highway, but concerned about the proposal having significant impacts on the cultural landscape of Gulaga National Park and its surrounding lands. Additionally consider that there is a need for greater awareness of the cultural sensitivity of the broader area and that these values should be respected.

• A draft Plan of Management (PoM) was prepared by the Boards of Management for Gulaga and Biamanga National Parks in December 2012. A priority of the draft PoM is to manage both the Gulaga and Biamanga Mountains as a single landscape and increase the connectivity and protection of lands between them (draft PoM, 2012:19).

• Acknowledges the REF has considered Aboriginal heritage matters and that a number of Aboriginal Cultural Heritage Assessments (Dibden 2008, 2010 and 2010) have been completed. While these reports fulfil the legislative requirements, only a small part of the cultural values of the area has been addressed.

• The Board does not believe that the aesthetic and visual aspects within the REF properly consider the important, significant and spiritual landscape values that exist within the Kooraban National Park. Requests further evaluation of intangible cultural values including dreaming sites that may exist within the construction footprint and in the surrounding area and as documented in numerous studies.

• Mitigation measures should be included in Section 6.4.5 of the REF which provide recognition of the inherent cultural values of the landscape and for construction personnel to receive training in recognition and respect of the broader cultural values.

• The board disagrees the proposal would retain the existing character of the natural and cultural landscapes through which the highway passes given the impact to the cultural landscape

• Disagree that there would be minor or nil impacts to cultural landscape if mitigation measures are implemented as stated in the REF. Further there are no mitigation measures pertaining to protection of cultural landscape.

Issue response

Following comments received from the Gulaga Board of Management and OEH during the display of the REF, Roads and Maritime engaged the services of an anthropologist to undertake an assessment of potential impacts of the proposal on the Aboriginal cultural landscape to explore and address the concerns raised in the submissions. This includes consideration and evaluation of intangible cultural values including dreaming sites that may exist within the construction footprint and in the surrounding area. A report has been completed by Environmental and Cultural Services (2013) and is entitled Assessment of the potential impacts of the proposed Princes Highway upgrade at Dignams Creek, NSW on the Aboriginal cultural landscape which from here on will be referred to as the Aboriginal Cultural Landscape Assessment. A summary of the report is provided in Section 3.12 and the report is attached as Appendix A.
Roads and Maritime acknowledges OEH’s support of the Gulaga Board of Management position regarding the importance of Aboriginal cultural heritage values in the area.

As identified in the Aboriginal Cultural Landscape Assessment (refer to Section 3.2 and Appendix A) the cornerstone features of the Aboriginal cultural landscape surrounding Dignams Creek include the following topographical features. To the north and south of the proposal the cornerstone features are Gulaga (Mt Dromedary) and Mumbulla Mountain. These two prominent geographical features define the northern and southern extent of the Aboriginal cultural landscape. To the east of the proposal the cornerstone features of the Aboriginal cultural landscape includes Najanuka (Little Dromedary Mountain) and the offshore island Baranguba (Montague Island). These four geographical features are imbued with mythological significance and are culturally interconnected. Mumbulla and Gulaga are linked by ancient pathways which also act to define the western extent of the cultural landscape to include Murrabrine and Wandella Mountains.

The significance of the Dignams Creek cultural landscape primarily relates to themes associated with Aboriginal religion, ritual, mythology and customary practises. According to Aboriginal belief system, the intangible values associated with these themes determine relationships between all living things, shape how people move across the landscape and imbue the features within the landscape, including watercourses, with deep spiritual meaning. Also within this space, the archaeological record connects people to the past; natural resources are collected; and memories are retained in relation to living, working, playing and coming into conflict with colonial obstacles across the area.

Roads and Maritime acknowledge that heritage sites and the broader Aboriginal cultural landscape which exists between Gulaga Mountain and Biamanga Mountain is considered to be a single cultural landscape and is of high cultural significance to the Yuin People. Roads and Maritime notes that this has been well documented and that the relationship and connection of the Aboriginal people to this landscape was identified when both national parks were handed back to the traditional owners in 2006 and in the draft Plan of Management (PoM) prepared by the Boards of Management for Gulaga and Biamanga National Parks in December 2012.

Roads and Maritime acknowledges the position of advocacy the Gulaga Board of Management has regarding Aboriginal cultural landscape values and that the board is actively seeking to prevent activities which compromise the connection between the Gulaga and Biamanga Mountains. The Aboriginal Cultural Landscape Assessment found that aspects of the proposal that are likely to potentially impact on individual components of the cultural landscape as well as the overall broader complexes include:

- The removal of vegetation and deep cutting into ridgelines.
- Relocation and shifting rock and soil out of the local area.
- Disturbance to water flow along Dignams Creek into Wallaga Lake.
- Seeking heritage advice from Aboriginal people who do not identify with the cultural area.
- Removal of forest habitat and culturally relevant flora; and altering landscape close to Dignams Creek.

The Aboriginal Cultural Landscape Assessment has found that it is difficult to define the level which a development might impact on broad, intangible, cultural heritage values, especially given the lack of precedents to rely on. However the Aboriginal
Cultural Landscape Assessment (refer to Section 3-2 and Appendix A) has found that the mitigation measures recommended in the report would satisfactorily mitigate the impacts identified on cultural heritage values, if implemented in consultation with the Aboriginal community, and in particular with Aboriginal owners, as identified by the Gulaga National Park Board of Management. Safeguards and mitigation measures to manage potential impacts to biodiversity have been outlined in Table 3-2.

The Aboriginal Cultural Landscape Assessment has found that if these measures are implemented that the impacts to the Aboriginal cultural landscape would be mitigated and accordingly Roads and Maritime does not consider that offsets for impacts to Aboriginal cultural heritage would be required.

Consultation with the Gulaga Board of Management was undertaken as part of the REF. Consultation was also undertaken more broadly with registered Aboriginal parties in accordance with OEH’s Aboriginal cultural heritage consultation requirements for proponents (2010), and the Roads and Maritime Procedure for Aboriginal cultural heritage consultation and investigation (2011). The results of this consultation are summarised within Chapter 5 of the REF. The Gulaga Board of Management was invited to comment on Option 1 and were invited along with the registered Aboriginal parties to the five Aboriginal Focus Group (AFG) meeting held regarding the proposal. The Gulaga Board of Management did not attend any of the AFG meetings. Consultation was undertaken during the REF display period following the community drop in sessions. Additional consultation with the Gulaga Board of Management has been undertaken as part of the additional assessment of Aboriginal Cultural Heritage Assessment and included contact with nominated knowledge holders, for further detail of the comments obtained refer to Appendix A. Consultation with the Gulaga Board of Management will also continue as part of the finalisation of the Koorabun National Park revocation process.

It is noted that at a meeting where the Gulaga Board of Management was in attendance, the board indicated they were in general agreement that the proposal would improve the safety of the Dignams Creek section of the Princes Highway. However, the Board raised concern regarding potential significant impacts to Aboriginal cultural heritage in Gulaga National Park and its surrounding lands.

In summary, due to issues raised by OEH and the Gulaga Board of Management with respect to the assessment of the proposal’s impacts on the Aboriginal cultural landscape, Roads and Maritime engaged an anthropologist to assess these impacts. The anthropologists report identifies the significance of the cultural landscape surrounding Dignams Creek, the potential impacts that the proposal could have on the cultural landscape, and provides a range of measures to satisfactorily mitigate those impacts. Further details are provided in Appendix A of this report.

2.9.2 Aboriginal Heritage Impact Permit (AHIP)

Submission numbers

1

Issue description

The following is a summary of the issues raised:

- OEH notes that an AHIP #113201 under the National Parks and Wildlife Act 1974 was issued to Roads and Maritime on the 20 January 2012. The AHIP
allows harm to Aboriginal objects located outside of the national park estate for geotechnical testing associated with the proposal. This AHIP is not related to the revocation compensation requirements.

**Issue response**

An AHIP (#1131201) was issued to Roads and Maritime on 20 January 2012 by OEH under the *National Parks and Wildlife Act 1974*. As per the conditions of the AHIP, harm is allowed to the survey units of SU11 and SU16 (refer to Figure 6-11 of the REF). A variation to the AHIP #1131201 was issued to Roads and Maritime on 3 June 2013, which updated the survey sites to be covered to include SU19, SU20, SU23, SU24 and SU25. A final notice of variation to the AHIP #1131201 was issued to Roads and Maritime on 24 May 2013. The variation updated the AHIP to include the following:

- Land to which the AHIP applies is now all of the survey units identified in Figure 6-11 of the REF for the proposal.
- Aboriginal objects that are identified on AHIMS that are not to be harmed are no longer applicable.
- Harm of aboriginal objects identified on AHIMS is updated to include two additional AHIMS sites.
- Areas where harm of Aboriginal objects is authorised has been updated to include all of the survey units identified in Figure 6-11 of the REF for the proposal.

A copy of the notice of variation of AHIP #1131201 (24 May 2013) is available in the OEH’s Public Register in accordance with section 188F of the *National Parks and Wildlife Act 1974* (NPW Act). Roads and Maritime acknowledges that the AHIP is not related to the revocation compensation requirements.

### 2.10 Revocation and offset strategy

**Submission numbers**

1 and 13.

**Issue description**

The following is a summary of the issues raised:

- OEH is concerned that Aboriginal cultural heritage has not been addressed in relation to the Kooraban National Park revocation. This issue was raised previously at meetings held on the 1 February 2011 and 16 September 2011.
- OEH considers that the consultation undertaken with Roads and Maritime and the Gulaga Board of Management only considers options for alignment and design and not offsets associated with the loss of Aboriginal cultural heritage from the area proposed for revocation.
- OEH notes that compensating for loss of Aboriginal cultural heritage in the context of this project is not new or unusual and cites the Western Sydney Orbital (M7) project as a recent Roads and Maritime example.
- OEH indicates that a compensation package based on the forested section of the former Pretty Vale property (9523 Princes Highway, Dignams Creek) does not address the full range of impacts resulting from the proposed revocation. Subject to final Ministerial approval, OEH’s preference remains that all of the Pretty Vale property is transferred to OEH as compensation for the whole project, including stages 1 and 2.
• About 18.28 hectares of land previously recognised as Kooraban National Park underwent revocation for the purposes of use as road reserve for the Dignams Creek proposal. An offset package is currently being developed with OEH to compensate for the revocation, but biodiversity values should not be the only value proposed to be an offset as part of the revocation and cultural heritage impacts should also be considered.

• OEH notes that the revocation of Kooraban National Park land requires an Act of Parliament. The Minister for the Environment must be satisfied that there has been appropriate compensation for the land being revoked before the land can be transferred to Roads and Maritime.

• OEH has a publicly available Revocation of Land Policy which provides guidance for projects where there are multiple attributes (such as biodiversity, landform impacts and loss of the natural, cultural and landscape attributes) that require consideration as part of a compensation offset. OEH preference is for a single compensatory offset.

• OEH position on the project has not changed on the offset as per the letter provided to Roads and Maritime signed on 19 July 2012.

• OEH notes the Department of Minerals is opposed to the offset land around Dignams Creek becoming reserve. In accordance with OEH policy, any offset would have to be able to be capable of being added to the OEH reserve system. If the proposed offset land cannot become reserve, alternate lands will need to be found.

• OEH notes that the area of Kooraban NP to be revoked for the proposal is still vested in the Minister for the Environment as per the Revocation Bill until an offset has the Minister’s agreement.

Issue response

As outlined in the REF, the National Parks and Wildlife Amendment (Adjustment of Areas) Bill 2012 was passed by the NSW Parliament which included the revocation of about 18.28 hectares of Kooraban National Park. The land would be transferred to Roads and Maritime for use as road reserve as part of this proposal following agreement on a compensation package between Roads and Maritime and OEH for the revocation of former national park land. Currently the land is vested with the Minister of the Environment until OEH and the Minister is satisfied with the offset strategy. Roads and Maritime has considered the OEH’s Revocation, Recategorisation and Road Adjustment Policy as part of the development of the compensation package, additionally Roads and Maritime is aiming to provide a single compensatory package.

It is noted that according to OEH’s Revocation, Recategorisation and Road Adjustment Policy:

• Compensatory land should preferably be of greater size than the area of land being revoked, and must at least be of equal size.

• It is desirable to match the area, type and quality of habitat, and cultural heritage values on land being revoked with the area of land proposed as compensation where possible. Exceptions to this may include, for example:
  − Compensation that includes a higher conservation priority habitat type (e.g. that is poorly reserved) where the habitat to be impacted is commonly represented within the relevant park.
  − Or, compensation lands that have unique and particularly significant conservation values.
• It is desirable that land to be transferred as compensation is close to the area being revoked and preferably adjacent to the affected reserve.

Roads and Maritime has purchased a property that is greater in size than the area of land being revoked and which has been assessed to match the area, type and quality of habitat, and cultural heritage values of the land being revoked. This land is also located next to the proposal and both Koorablan and Gulaga National Parks as shown in Figure 2-2. While the area shown in Figure 2-2 would be adequate to cater for the compensation and offset requirements of the proposal, the final package of land to be transferred to National Park and revegetation strategies will be subject to negotiation with OEH and NPWS.

In terms of an offset for impacts to Aboriginal cultural landscape values, Roads and Maritime undertook an investigation of impacts to Aboriginal cultural heritage (both tangible and intangible) as part of the preparation of the REF. A cultural heritage assessment report (CHAR) was prepared by New South Wales Archaeology Pty Ltd entitled Princes Highway Upgrade at Dignams Creek via Cobargo, NSW Aboriginal Cultural Heritage Assessment Report (May 2011). This investigation was undertaken in accordance with OEH’s Aboriginal cultural heritage consultation requirements for proponents (2010), and RMS’ Procedure for Aboriginal cultural heritage consultation and investigation (2011).

As part of the preparation of the CHAR, the consultant prepared an oral history which aimed to identify key cultural values within the landscape, and how these values might be affected by the project. Interviews were undertaken with knowledge holders nominated through OEH’s formal consultation process. A range of values were identified which predominantly focused on a history of working and living in the Dignams Creek area. The CHAR also considered the cultural significance of Gulaga and Mumbulla Mountain.

The CHAR did not identify any significant impacts on Aboriginal cultural values as a result of the project. As a result of this, and in the absence of any formal policy or guidance regarding cultural offsets, Roads and Maritime did not further consider the need for Aboriginal heritage to be addressed as part of a compensatory lands or offset package.

In response to concerns raised by Gulaga Board of Management that Aboriginal cultural values had not been adequately addressed, an Aboriginal Cultural Landscape Assessment has been completed to identify and assess Aboriginal cultural values that may be impacted on by the project, and to recommend appropriate measures to manage those impacts. The report would then form the basis for any future considerations of Aboriginal cultural heritage offsets (refer further to Section 3.2 of this report and Appendix A). The Aboriginal Cultural Landscape Assessment has found the mitigation measures recommended in the report (refer to Table 3.2) would satisfactorily mitigate the impacts on cultural heritage values identified, if implemented in consultation with the Aboriginal community, and in particular with Aboriginal Owners, as identified by the Gulaga National Park Board of Management. Accordingly Roads and Maritime do not consider that additional offsets for impacts to the cultural landscape would be required.

In regards to the issue on the Department of Minerals objective to the transfer of lands to National Parks as part of the revocation, it is noted that the Department of Minerals have removed their objection as advised by email from OEH dated 8 October 2013.
Figure 2-2 Vegetation and management zones, and threatened species sub zones - offset area

DATA SOURCES
Imagery: LPMA 2010
Contextual Data: LPMA 2010
Project Data: SKM 2011
2.11 Water quality and hydrology

2.11.1 Water quality impacts

Submission numbers

3, 8 and 12.

Issue description

The following is a summary of the issues raised:

- Concerned about the placement of large amounts of unconsolidated fill in the floodplain and concerned that issues associated with sediment, erosion and water quality which may occur during flood events have not been adequately addressed in the REF.
- Concerned that the proposed sediment basins won't trap sediment during large flood events and may cause additional flood damage by creating turbulence.
- Concerned that erosion of unconsolidated fill into the creek would increase existing siltation issues occurring in Wallaga Lake in the bays adjacent to the mouth of Dignams Creek.
- Requests that all environmental safeguards to manage water quality are installed in accordance with Managing Urban Stormwater: Soils and Construction (4th Edition Landcom, 2004, also known as the Blue Book).
- DPI (Fisheries) require any material removed from the waterway that is temporarily deposited or stockpiled on land to be located well away from the waterway and contained by appropriate sediment control devices as outlined in the Blue Book.
- DPI (Fisheries) requires any split rock used in reclamation works in or adjacent to the waterway to be clean and free of fines.
- Spill kits suitable for the containment of fuel and oils spills should be kept on site.
- Concerned that the proposal is a high risk site for erosion and sediment control due to the combination of high soil erodability, steep slopes and high probability of a high intensity rainfall event occurring during construction.
- Requests that stormwater management and erosion control should receive particular emphasis during construction and that efforts should be made to schedule major earthworks outside of the high risk February – April period as a first-step preventative measure.
- Requests that a mitigation measure be included in the construction contractors Soil and Water Management Plan, to suspend earthworks that are already underway during rainfall events and to postpone earthworks prior to forecast significant or high intensity rainfall events.
- Concerned that there is not adequate mitigation measures to monitor the potential operational impacts of the proposal on erosion and deposition patterns of adjacent waterways.

Issue response

Roads and Maritime has undertaken a detailed assessment of impacts to water quality of nearby waterways as part of the REF. During the assessment it was noted that the proposal is a high risk site for erosion and sediment control due to the combination of high soil erodability, sensitivity of receiving waters, steep slopes and high probability of a high intensity rainfall event occurring during construction. However, no significant impacts are anticipated from the proposal provided the mitigation measures outlined in Table 4-1 are implemented. This includes mitigation
measures for managing impacts during construction and operation of the proposal. All construction mitigation measures for stormwater, sediment and erosion control are in accordance with ‘Managing Urban Stormwater, Soils and Construction guidelines; 4th Edition Landcom 2004 (The Blue Book) and DECC’s Managing Urban Stormwater, Soils and Construction Guidelines, Main Road Construction ((2009). As the Dignams Creek Sanctuary Zone (Batemans Marine Park) is a sensitive environment construction sediment basins are to be sized at the 85th percentile as per the Blue Book to ameliorate these risks.

Any split rock used in reclamation works in or adjacent to the waterway will be clean and free of fines. This has been stated in the following mitigation measure: All construction materials for the temporary creek crossing (i.e. rocks and gravel) would be washed prior to being used to minimise turbidity.

Spill kits suitable for the containment of fuel and oils spills will be kept on site during construction of the proposal.

Additionally the proposal includes the following operational water quality control measures:

- One water quality pond located within 100 metres of a low flow/ ephemeral tributary of Dignams Creek.
- Five biofiltration basins, including:
  - Four basins located within 100 metres from waterways that drain into Dignams Creek.
  - One basin located within the Kooraban National Park and within 100 metres of the upstream reaches of predominantly ephemeral watercourses that drain to Dignams Creek.
  - Two constructed wetlands, located less than 150 metres via overland flow to Dignams Creek on flat terrain suitable for a wetland.

These water quality controls have been designed using the water quality MUSIC model in order to meet the project quality design criteria. These controls incorporate mechanisms for capturing any accidental spills of hazardous liquids that may occur, such as spills of petroleum hydrocarbons. Further detail about the design of these water quality controls is included in Section 3.2.3 and shown in Figure 3-11 of the REF.

The location of ancillary facilities including stockpiles has been shown in Figure 1-2 and details of stockpile sites are included in Table 3-11 of the REF. Two large sites have been identified in Figure 1-2 and smaller stockpile and storage areas would be required along the length of the proposal. It is envisaged that the smaller stockpile and storage areas would be located within the construction footprint. If these are to be located outside the construction footprint, additional assessment would be required.

No long term stockpile areas have been included as part of the proposal. The location of the temporary stockpile and storage areas within the main construction compound area and construction footprint would be subject to the site location criteria set out in the Stockpile Site Management Procedure (RTA 2011a) and QA specification R44-Earthworks - IC-QA-R44 (Roads and Maritime 2011). In addition, the locations for stockpile and storage areas would be selected using the following guidelines:
• Located in areas not prone to flash flooding (i.e. above the 9 metre contour interval) and more than 40 metres from a watercourse.
• Located in areas more than 50 metres from residential dwellings.
• Located in previously disturbed areas and that do not require the clearing of native vegetation where possible.
• Located in plain view of the public to deter theft and illegal dumping.
• Located outside the drip line of trees and on level ground wherever possible.

As per the Erosion and Sedimentation Assessment (refer to Appendix F of the REF), it is not considered feasible to restrict earthworks during February – April, nonetheless a mitigation measure has been included to ameliorate any potential impacts associated with heavy rainfall which is as follows:

The Soil and Water Management Plan would include a program for inspecting sediment and erosion controls, including:

• Weekly inspection of erosion and sediment control measures and prior to forecast rainfall events to ensure measures are in place, and functioning in the event of a rainfall event.
• Inspection of erosion and sediment control measures during rainfall events that cause runoff, to ensure controls are working effectively.

As outlined in the Hydrological Impact Assessment, refer to Appendix D of the REF, it is considered that the potential operational impacts of the proposal on erosion and deposition patterns of adjacent waterways will be minor and as such no monitoring plan is considered necessary or has been proposed.

2.11.2 Flooding
Submission numbers
8 and 9.

Issue description
The following is a summary of the issues raised:

• Concerned about changes in flood flows creating new flow paths, erosion points in and around Blind Creek and the proposed bridge site. Concerned that the access track underneath the new bridge will be left bare and subject to erosion.
• Concerned that the volume of rock, gravel and sediment in Blind Creek significantly increases the height of flood water and dams water. Suggests that this volume of gravel will increase as part of the proposal and as a result of ongoing erosion will cause larger volumes of sediment to accumulate in Dignams Creek.
• Concerned that the future flood levels will be higher than those calculated in the Hydraulic Impact Assessment.

Issue response
It is not anticipated that the proposal will result in erosion issues that will cause substantially increased volumes of sediment and gravel to accumulate in Dignams Creek. Erosion and sediment controls will be implemented during construction according to the requirements of the Managing Urban Stormwater – Soils and Construction, Volumes 1 and 2D (Landcom, 2004 and DECCW, 2008) and RTA
In reference to the access track located underneath the new bridge, this local property access track would be constructed as a compacted gravel road following completion of the proposal and would not be left as bare earth subject to erosion. Additionally, areas adjacent to the access track would be revegetated; this would include a vegetated buffer zone along the edge of Dignams Creek using riparian vegetation from the TEC River-flat Eucalyptus Forest. This vegetation buffer would separate the access track from Dignams Creek.

Roads and Maritime has undertaken an assessment of the hydrological impacts of the proposal, refer to Section 6.6 of the REF. The assessment found that potential impacts associated with the construction of the proposal are primarily associated with the change in topography and disruption to existing drainage patterns. There is potential for construction activities to have an impact on local hydrological flows, however, these are expected to be temporary and localised in nature.

The proposal includes the construction of a new 91 metre bridge over Dignams Creek. The bridge is designed to provide flood immunity to greater than a 100 year average recurrence interval (ARI) flood level and has also considered the potential impacts of climate change. The bridge piers are located outside of the Dignams Creek low flow level and are designed to minimise potential scouring of the banks of the adjacent waterways. During operation of the proposal there is potential for minor changes in localised flood flows to occur in and around Blind Creek and the proposed bridge site. This may potentially cause new flow paths to be created however, given the transient nature of river systems these are expected to be temporary and localised in nature.

Based on the results of the hydrology assessment, the proposal would cause a minor increase in flood levels by up to 0.10 metres adjacent to the proposed bridge over Dignams Creek for the 100 year ARI level under unblocked conditions. The modelled increase in flood levels gradually reduces to about zero metres around 250 metres upstream of the proposed bridge. The hydrology assessment found that the proposal would not significantly change the patterns of ponding/retention of floodwaters, nor would it change the duration of inundation of the floodplain. No adverse flooding impacts to adjacent properties are anticipated and no mitigation controls would be required. The hydrological assessment includes flows from Blind Creek which intersects Dignams Creek just upstream of the proposed new bridge. The flood assessment has also considered a range of climate change scenarios.

2.12 Socio-economic

2.12.1 Property impacts

Submission numbers

6 and 14.

Issue description

The following is a summary of the issues raised:

• Concerned about the impact of the proposal on property values and the Dignams Creek as a whole.
• Concerned that Roads and Maritime has no intention of addressing the devaluation of surrounding properties from noise and visual impacts of the proposal.
• Concerned that the agricultural land Roads and Maritime will compulsorily acquire as part of the proposal will not be independently or appropriately valued to its true market worth.
• Concerned that the proposal will devalue properties located adjacent to the proposal and that there will be no opportunity to regain the financial loss associated with compulsory acquisition.

Issue response

As outlined in Section 6.9.2 of the REF, property acquisitions would be subject to negotiation between the landholder and Roads and Maritime in accordance with Roads and Maritime Land Acquisition Information Guide (2012) and the requirements of the Land Acquisition (Just Terms Compensation) Act 1991. The Act guarantees that, if and when land is acquired by the Roads and Maritime under the Act, the amount of compensation would not be less than the market value (assessed under the Act), unaffected by the proposal. All acquisitions undertaken by Roads and Maritime would consider existing income generated by the property such as rental income and ongoing business interests that may be impacted by the proposal. Compensation is provided for direct property acquisition. An independent valuer would undertake an assessment of the land that is being acquired to consider the market value of the land being purchased. Roads and Maritime will consult with affected property owners following determination of the REF.

If agreement to purchase the property required for the project cannot be reached, Roads and Maritime may choose to initiate compulsory acquisition. The Land Acquisition Information Guide (2012) provides further information on compulsory acquisition.

2.12.2 Construction impacts to residents from the proposal

Submission numbers

5.

Issue description

The following is a summary of the issues raised:

• Concerned about socio-economic impacts, particularly the negative and disruptive impacts of construction to surrounding residents and businesses.
• Concerned about impacts of construction to surrounding residential and business access, specifically the delivery of goods and materials by truck. Requests assurances that access arrangements/requirements are highlighted in a construction contract.

Issue response

The proposal would potentially impact on residents amenity, travel times (due to reduced speeds and change in access), and access during construction. Surrounding residents and businesses would continue to be consulted with during the construction phase to ensure impacts are minimised and access is maintained. This may include notifying all affected property owners before any proposed access interruptions, and where necessary alternative arrangements would be put in place.
Impacts of construction to surrounding residents and businesses have been identified in the following sections of the REF:

- Noise and vibration (refer to Section 6.2).
- Landscape, visual impact and urban design (refer to Section 6.3).
- Land use and property (refer to Section 6.9).
- Traffic and access (refer to Section 6.10).
- Air quality (refer to Section 6.8).
- Socio-economy (refer to Section 6.11).

The REF has identified that while temporary impacts will occur, no significant impacts are anticipated from construction of the proposal. Mitigation measures have been identified that will ameliorate the temporary impacts associated with construction of the proposal.

Mitigation measures regarding residential and business access have been included in Sections 6.9 and 6.11 of the REF. These measures will be incorporated into the CEMP that will be prepared for the project and which will be implemented by the construction contractor. Roads and Maritime would undertake regular audits of the construction contractor to ensure that the mitigation measures included in the CEMP are implemented during construction of the proposal.

### 2.12.3 Health and property impacts

**Submission numbers**
6 and 9.

**Issue description**

The following is a summary of the issues raised:

- The public exhibition of the REF has better explained the proposal to residents however the resident does not think that the REF has adequately addressed a number of concerns. The impact of the proposal (i.e. compulsory acquisition of land and changes in existing noise and visual conditions) has been stressful and exacerbated personal health conditions of nearby residents. If this option goes ahead the resident will have to move out while construction takes place.
- Concerned about the level of responsibility Roads and Maritime have taken for the way the proposal has impacted people’s lives.
- Concerned about the impacts on people as a consequence of increased tree mortality.

**Issue response**

The Noise and Vibration Assessment (SKM, 2013a) found that northern part of the proposal the realignment of the Princes Highway would move between 100 to 275 metres closer to sensitive receivers located to the west of the existing Princes Highway on Dignams Creek Road. Construction noise levels would be exceeded at 10 noise sensitive receivers located along Dignams Creek Road. One location may experience noise levels close to the highly affected noise level. A feasible and reasonable approach towards noise management measures would be required to reduce noise levels as much as possible during construction.
The Roads and Maritime consultation program undertaken for the proposal has aimed to inform and engage the whole community in a constructive and fair process and has evolved to meet the community’s changing needs over the course of the project. Roads and Maritime acknowledges and understands that the uncertainty and progression of the planning process can cause concern and emotional distress for members of the community. Accordingly, the design and diversity of the consultation activities has aimed to allow community members to express individual concerns and views. For example, community information sessions and personal interviews have provided community members with direct access to Roads and Maritime team members and information. The Roads and Maritime team's availability for one-on-one meetings, responsiveness to community members enquiries, concerns and suggestions and open sharing of information and news of developments has also aimed to support members of the community as the project has evolved.

While there is some research on the impacts of increased tree mortality on people the design of the proposal has sought to minimise vegetation impacts where possible, and will revegetate to minimise the impacts. Additionally the offset strategy will potentially include the transfer of a substantial amount of land into national park estate which will be managed and protected in accordance with the requirements of the NPW Act.

2.13 Traffic and access

2.13.1 Construction impacts

Submission numbers

5.

Issue description

The following is a summary of the issues raised:

- Traffic diversions underneath the new bridge along the proposed construction access road will seriously impact on business. Questions whether there will be suitable clearance for large vehicles such as logging trucks, cattle trucks and earth moving equipment.
- Concerned about access to fire tracks on Dignams Hill and minor tracks in the area such as the Silverdale track which is located on the western side of the Princes Highway, just south of the existing driveway that accesses the Pretty Vale property located at 9523 Princes Highway, Dignams Creek. The Silverdale track serves as an emergency evacuation route for properties on the northern side of Dignams Creek during floods as well as servicing the Silverdale property itself.
- Requests that access should be provided to fire trucks to allow them to fill water tanks from Dignams Creek next to the existing bridge.

Issue response

The design of the bridge caters for a 4.6 metre high clearance for vehicles travelling underneath the bridge and caters for the turning path of a 19 metre semi-trailer. Traffic diversions under the proposed bridge during construction would cater for the movements of the vehicles anticipated to require access.

As detailed in Section 2.6.4 the proposal allows for the construction of a new private property access into number 9526 Princes Highway which is currently located around...
287 metres from the start of the proposal (chainage 95250) on the northbound side of the highway. This access road would be relocated about 413 metres to the south of the original access point and would utilise the old Princes Highway alignment (chainage 95450) for around 250 metres. The access road ties into a new 200 metre section of access road which curves to the north where it would tie back into the existing private property access (refer to Figure 2-12 of the REF). This includes access to the Silverdale property and will also allow emergency evacuation route for properties on the northern side of Dignams Creek during floods as well as servicing the Silverdale property itself. The relocation of the access track to this location is considered an improvement on the existing situation as it provides better sight distance for traffic accessing this private access track from the Princes Highway.

Access to Dignams Creek would be available for fire trucks on the access track into property number 9523 Princes Highway, Dignams Creek next to the proposed new bridge during operation of the proposal. This section of the property would remain as road reserve following construction of the proposal and access to Dignams Creek by fire trucks for the purposes of collecting water during fires will be maintained.

2.13.2 Safety

Submission numbers
4.

Issue description

The following is a summary of the issues raised:

- Suggests that Roads and Maritime could save money by installing black spot signs to inform drivers of the risks along the Princes Highway at Dignams Creek.
- Suggests that Roads and Maritime needs to educate drivers more to be accountable for their driving.

Issue response

The Princes Highway near Dignams Creek has a poor crash history with a casualty crash rate eleven times higher than for similar types of roads in NSW. The majority of these crashes result from vehicles running off the road on curves, with speed being the major contributing factor. This section of the Princes Highway was highlighted in 2008 by the NSW State Coroner’s Report into recent fatal crashes on the Princes Highway. The proposal is therefore required to improve road safety issues associated with the existing road, including geometry, alignment, intersection arrangement and other safety considerations (e.g. site distance). The need for the proposal is further detailed in Chapter 2 of the REF. Roads and Maritime has installed a number of warning signs such as reduce speed warning signage, curve advisory speed signage and narrow bridge signage. Signage alone cannot address the existing safety issues at Dignams Creek.

Roads and Maritime continually endeavours to educate drivers on issues associated with road safety through driver training and licensing as well as road safety campaigns, and driver training. These education strategies are part of a wider strategy to improve road safety including safer vehicles, safer roads and improved enforcement. Road safety needs to be addressed through multiple avenues such as this.
2.13.3 Asset Responsibility

Submission Number

14

Issue Description

- Notes that as per consultation with Roads and Maritime and Council that upon completion of the project Council will not become responsible for:
  - The existing lengths of the Princes Highway that will become redundant.
  - The existing Dignams Creek Bridge.

Issue Response

As detailed in the ISEPP consultation undertaken with the Eurobodalla Shire Council on 28/9/2011 in Table 5-5 of the REF, Roads and Maritime accepts that upon completion of the project Council will not become responsible for:

- The existing lengths of the Princes Highway that will become redundant.
- The existing Dignams Creek Bridge.

2.14 Energy

Submission numbers

9.

Issue description

The following is a summary of the issue raised:

- NSW EPA has proposed allowing the use of native forest biomass for electricity generation given the proposals for re-vegetation has clearly not considered soil limitations. Roads and Maritime could consider the option of investing a proportion of the considerable savings (<20%) in infrastructure that would demonstrate all that could be done has been done to mitigate the impacts of the development at a local and broader scale.

Issue response

Roads and Maritime has considered all the environmental impacts associated with the proposal and has avoided and mitigated impacts where possible. Where impacts can not be avoided or mitigated, Roads and Maritime are proposing an offset package to ameliorate the impacts of the proposal. This satisfies Roads and Maritime requirements under legislation and therefore has done all that is required to mitigate the impacts of the proposal. Therefore Roads and Maritime is not proposing to invest in native forest biomass electricity generation.
3 Additional assessment

Following the display of the REF additional assessments were undertaken for the upgrade of the Princes Highway, Dignams Creek, including:

- Assessment of two additional options (16 and 17) proposed during the submissions process for the display of the REF, refer to Section 2.3 and 3.1.
- An Aboriginal Cultural Landscape Assessment (Environmental and Cultural Services, 2013), refer to Appendix A. This was undertaken to investigate assessment of potential impacts of the proposal on the Aboriginal cultural landscape and to explore and address the concerns raised by OEH and the Gulaga Board of Management during the public display period of the REF. The results of the Aboriginal Cultural Landscape Assessment are summarised in Section 3.2.
- Additional Koala survey completed by OEH (2013) (refer to Appendix B). The results of the additional Koala survey undertaken by OEH is summarised in Section 2.6 and 3.3.

3.1 Options analysis

Background

Roads and Maritime has also undergone additional assessment of two new options (options 16 and 17) that were proposed as part of the submissions received during the display of the REF. Figure 3-1 shows the proposed alignments for Options 16 and 17. Roads and Maritime has undertaken analysis of these two options against the project objectives which are as follows:

- To improve road safety.
- To provide a continuous 100 kilometre per hour travel speed environment.
- To improve economic efficiency including freight through improved alignment.
- To provide a well-engineered, safe and environmentally acceptable road transport facility.
- To provide a value for money project.

Comparative analysis of options 16 and 17 has also been undertaken for the following parameters:

Design characteristics.

- Length.
- Maximum grade.
- Bridge structure.
- Cut and fill volumes and earthworks balance.

Environmental impacts.

- Impacts to threatened species.
- Section of the alignment impacting on remnant vegetation, habitat trees and the Threatened Ecological Community (TEC) recognised as River flat Eucalypt Forest on Coastal Floodplains located along Dignams Creek.
- Impact to national parks.
- Social / urban amenity impacts.
- Impacts to residences (noise and visual).
- Landform.
The results of the additional analysis of these two options against the project objectives is summarised below and in Table 3-1 along with the results of the comparative analysis for design requirements and environmental impacts. Table 3-1 also includes the results of the analysis on the preferred option. For details of the assessment completed on all the other options considered during the development of the proposal refer to Chapter 2 of the REF and the summary of these impacts contained within Table 2-1 of the REF.

**Option 16**

*Performance against proposal objectives:*

When considering option 16 against the proposal objectives, it was found that this option would:

- Improve road safety by realigning the northern section of the study area where the existing alignment is most deficient and crashes are more concentrated and severe. This option does not however address the entire study area achieved by the full length options, but addresses more than shorter options. The curvilinear alignment tying into the existing highway in the south during stage 1 is considered less likely to transfer crashes.
- Provide a continuous 100 kilometres/hour travel speed environment.
- Provide large increases in economic efficiency including improved freight transport as the alignment would be shortened by around 279 metres and there would be an increase in road design speed.
- Provide a well engineered road with moderate to large improvements in road design.
- Entail moderate impacts to the environment (including stage 2), including:
  - Clearance of up to 1.1 kilometres of remnant vegetation in stage 1 and an additional 1.3 kilometres in stage 2 works.
  - Direct impacts to Kooraban National Park, including a 1,530 metre section through the most eastern section of the park.
  - Potential minor impacts to the threatened flora species Square Raspwort (*Haloragis exaltata* subsp. *exaltata*).  
  - Direct impacts to around 1.07 kilometres of potential koala habitat and indirect impacts to the Koala (*Phascolarctos cinereus*) currently listed as vulnerable under both the TSC Act and the EPBC Act.
  - Limited impacts to the River-flat eucalypt forest on coastal floodplains TEC located along Dignams Creek (clearance of up to 40 linear metres).  
  - Impacts to around 17 hollow bearing trees (majority in stage 2) and moderate impacts to areas identified in the preliminary study by NGH Environmental (2010) as potential long-nosed Potoroo habitat.  
  - High noise and visual amenity impacts on one sensitive receiver and moderate impacts to other sensitive receivers located adjacent to the proposal.  
  - Partial acquisition of an additional private property.  
  - High impact to the floodplain landform.
- Would provide a low to moderate cost option (for Stage 1 works) with a strategic estimate of $45 million for stage 1 works and a strategic estimate of $20 million for stage 2 works. Option 16 is considered to be a moderate value for money option.
Upgrade of the Princes Highway, Dignams Creek

Figure 3-1 | Options 16 and 17
Option 16 follows almost the same alignment as the Roads and Maritime preferred option as displayed in the REF however it has shifted up to 20 metres to the east in the vicinity of Dignams Creek. The option was proposed as a method to reduce the noise and visual impacts on residences located in closest proximity. The impacts to amenity however would only be slightly reduced by moving 20 metres to the east and would not significantly alter the findings of the noise and vibration impact assessment and urban design, landscape character and visual amenity assessment.

It was found that the small shift to the east would produce a substantial imbalance in earthworks volumes compared with the Roads and Maritime preferred option due to the change in landform that the option would pass through. In order to reduce the imbalance in earthworks, the option was modified so that it overtopped the existing highway for a distance of 150 metres. While this modification would reduce earthworks volumes and associated costs, overtopping the existing highway would make it more costly and difficult to construct than the preferred option.

It was found that the strategic cost estimate for Stage 1 of Option 16 would be $45 million and Stage 2 would be $20 million which would be $5 million more than the preferred option. Option 16 has additional constructability issues and would require the stockpiling of a substantial amount of material. Further, while Option 16 satisfies all road design criteria, the bridge would be up to 1 metre lower than the bridge in the preferred option which would reduce the cross sectional flow area at the bridge and decrease its flood immunity which has been a concern amongst the community. Following the option analysis, Option 16 has not been pursued for further development.

**Option 17**

*Performance against proposal objectives:*

When considering option 17 against the proposal objectives, it was found that this option would:

- Improve road safety.
- Provide a continuous 100 kilometres/hour travel speed environment.
- Provide moderate to large increases in economic efficiency including improved freight transport as the alignment would be shortened by around 279 metres and there would be an increase in road design speed.
- Provide a well engineered road with moderate to large improvements in road design.
- Entail moderate impacts to the environment (including stage 2), including:
  - Clearance of up to 1.5 kilometres of remnant vegetation in stage 1 and an additional 1.3 kilometres in stage 2 works.
  - Direct impacts to Kooraban National Park, including a 1,660 metre section through the most eastern section of the park.
  - Potential minor impacts to the threatened flora species Square Raspwort (*Haloragis exaltata subsp. exaltata*)
  - Direct impacts to around 1.4 kilometres of potential koala habitat and indirect impacts to the Koala (*Phascolarctos cinereus*) currently listed as vulnerable under both the TSC Act and the EPBC Act.
  - Limited impacts to the River-flat eucalypt forest on coastal floodplains TEC located along Dignams Creek (clearance of up to 45 linear metres).
  - Impacts to around 18 hollow bearing trees (majority in stage 2) and low impacts to areas identified in the preliminary study by NGH
Environmental (2010) as potential long-nosed Potoroo habitat.

- Moderate noise and visual amenity impacts on sensitive receivers located adjacent to the proposal.
- Partial acquisition of an additional private property.
- High impact to the floodplain landform.

- Would provide a high cost option (for Stage 1 works) with a strategic estimate of $60 million for stage 1 works and a strategic estimate of $20 million for stage 2 works. Option 16 is considered to be a low value for money option.

Further analysis by Roads and Maritime found that there would be some reduced impacts from Option 17 on the Dignams Creek community as the alignment of the option would be further away than the preferred option. However it was found that Option 17 would be likely to have a higher visual impact on the Dignams Creek community than the preferred option due to the location of the large northern cutting. There is also a large volume of cut compared to fill and this imbalance of earthworks will require the relocation and stockpiling of large quantities of material.

The horizontal and vertical alignments would not be well co-ordinated and the northern curve would be located beyond the crest. Although the curve would likely be visible, it would not be a desirable outcome from a road design perspective. The bridge would be long and in varying horizontal and vertical geometry which would be costly and difficult to construct. Adding to issues of constructability would be the four times the proposed option would cross the existing highway alignment. The alignment at the south of Option 17 does not incrementally reduce the design speed standard toward the connection to the existing highway meaning there would be a sudden change in design standards which the driver may not be prepared for and is a road safety concern.

Roads and Maritime have however modified the proposed option to better conform to design standards and reduce constructability issues to determine if a modified version of the proposal had merit for pursuing further development. By shifting the alignment marginally to the west and tying into the existing highway one curve south of that originally proposed, overall earthworks volumes were reduced by 80,000 m³ in stage 1 and the number of times the proposed option would cross the existing highway was reduced to three. This reduced the strategic cost estimate for stage 1 by $5 million, however this option would still not provide value for money and still has substantial constructability issues with crossing the existing highway three times. Accordingly, Option 17 has not been pursued for further development.

Conclusion

The analysis of the additional options (16 and 17) undertaken by Roads and Maritime has shown that these options were not the highest preforming options and consequently they have not been pursued for further development. Roads and Maritime acknowledges that not all residents support the change of the option to the west of Dignams Creek. However the preferred option was found to be the best performing option, refer to Section 2.5 of the REF, when weighed against all assessment criteria and all other options have subsequently not been pursued for further development. The design presented in the REF is a feasible and cost effective solution that meets the project objectives. Further design refinement would occur as part of the detailed design stage.
Table 3-1 Summary of additional option analysis undertaken for options 16 and 17

<table>
<thead>
<tr>
<th>Option</th>
<th>Option 16 Alternate community option</th>
<th>Option 17 Alternate community option modified to meet Roads and Maritime requirements</th>
<th>Preferred option</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Design Characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Length (kilometres)</td>
<td>2.51</td>
<td>2.36</td>
</tr>
<tr>
<td></td>
<td>Maximum Grade</td>
<td>7.6 % (with the exception of the tie in to the existing alignment)</td>
<td>8.9%</td>
</tr>
<tr>
<td></td>
<td>Design speed</td>
<td>100 km/hr</td>
<td>100 km/hr</td>
</tr>
<tr>
<td></td>
<td>Bridge structure</td>
<td>94 metres long 11 metres high</td>
<td>250 metres long 17.5 metres high</td>
</tr>
<tr>
<td></td>
<td>Cut volume (cubic metres)</td>
<td>Stage 1 – 230,600 Stage 2 – 245,500 Total – 476,100</td>
<td>Stage 1 – 210,000 Stage 2 – 213,000 Total – 423,000</td>
</tr>
<tr>
<td></td>
<td>Fill volume (cubic metres)</td>
<td>Stage 1 – 177,200 Stage 2 – 235,300 Total – 412,500</td>
<td>Stage 1 - 160,000 Stage 2 – 230,000 Total – 390,000</td>
</tr>
<tr>
<td></td>
<td>Spoil produced (cubic metres)</td>
<td>Stage 1 – 53,400 Stage 2 – 10,200 Total – 63,600</td>
<td>Stage 1 – 50,000 Stage 2 – -17,000 Total – 33,000</td>
</tr>
</tbody>
</table>

Note - If the overtopping was removed Stage 1 volumes would be 260,200 m$^3$ of cut and 169,900 m$^3$ of fill, Stage 2 would be 227,300 m$^3$ cut and 263,700 m$^3$ fill. This would create an excess of spoil of 53,900 m$^3$. 

Upgrade of the Princes Highway, Dignams Creek
Submissions report
<table>
<thead>
<tr>
<th>Option</th>
<th>Option 16 Alternate community option</th>
<th>Option 17 Alternate community option modified to meet Roads and Maritime requirements</th>
<th>Preferred option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project objectives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To improve road safety.</td>
<td>Large improvements</td>
<td>Large improvements</td>
<td>Large improvements</td>
</tr>
<tr>
<td>Continuous 100 km/h speed</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Improved travel time and alignment</td>
<td>Moderate to high improvement – 255 metres shorter, including the stage 2 works, with 100 km/hr design speed</td>
<td>Moderate to high improvement – 269 metres shorter, including the stage 2 works, with 100 km/hr design speed</td>
<td>Moderate to high improvement – 255 metres shorter, including the stage 2 works, with 100 km/hr design speed</td>
</tr>
<tr>
<td>Well engineered, safe and environmentally acceptable road transport facility.</td>
<td>Yes, however issues with tying in to poor alignment in the south potentially transferring crashes. Transferring crashes addressed through proposed road safety treatment in southern section. The imbalance in earthworks presents environmental issues with transporting and stockpiling excess material.</td>
<td>Yes, however issues with tying in to poor alignment in the south potentially transferring crashes. Transferring crashes addressed through proposed road safety treatment in southern section. The imbalance in earthworks presents environmental issues with transporting and stockpiling excess material. Multiple crossings of the existing highway presents constructability issues.</td>
<td>Yes, however issues with tying in to poor alignment in the south potentially transferring crashes. Transferring crashes addressed through proposed road safety treatment in southern section.</td>
</tr>
<tr>
<td>To provide a value for money project</td>
<td>Low to Moderate cost (for stage 1 only) Moderate cost (if option includes stage 2)</td>
<td>High cost option</td>
<td>Low cost (for stage 1 only) Moderate cost (if option includes stage 2)</td>
</tr>
</tbody>
</table>

**Environmental impacts**

<table>
<thead>
<tr>
<th>Impacts to threatened species</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section of the alignment impacting on remnant vegetation, habitat trees and the Threatened Ecological Community (TEC)</td>
<td>Requires removal of: o About 1.1 km of remnant vegetation for stage 1 and 1.3 km of remnant vegetation for stage 2.</td>
<td>Requires removal of: o About 1.5 km of remnant vegetation for stage 1 and 1.3 km of remnant vegetation for stage 2.</td>
<td>Requires removal of: o About 1.1 km of remnant vegetation for stage 1 and 1.3 km of remnant vegetation for stage 2.</td>
</tr>
<tr>
<td>Option</td>
<td>Option 16 Alternate community option</td>
<td>Option 17 Alternate community option modified to meet Roads and Maritime requirements</td>
<td>Preferred option</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>------------------</td>
</tr>
</tbody>
</table>
| recognised as River flat Eucalypt Forest on Coastal Floodplains located along Dignams Creek (only the length of the impact is shown) | o Up to 17 identified habitat trees.  
   o About 40 metres of TEC.  
   o About 1.07 km of Koala habitat. Includes stage 2 impacts. | o Up to 18 identified habitat trees.  
   o About 45 metres of TEC.  
   o About 1.4 km of Koala habitat. Includes stage 2 impacts. | o Up to 17 identified habitat trees.  
   o About 40 metres of TEC.  
   o About 1.07 km of Koala habitat. Includes stage 2 impacts. |
| National Parks (only the length of the impact is shown) | Direct impacts stage 1 - 530 m in Kooraban National Park. Indirect impacts also. A further 1000 metres of impacts for the stage 2 works through Kooraban NP | Direct impacts stage 1 - 660 m in Kooraban National Park. Indirect impacts also. A further 1000 metres of impacts for the stage 2 works through Kooraban NP | Direct impacts stage 1 - 530 m in Kooraban National Park. Indirect impacts also. A further 1000 metres of impacts for the stage 2 works through Kooraban NP |

### Social/urban amenity impacts

<table>
<thead>
<tr>
<th>Residences includes visual amenity and noise impacts</th>
<th>High impact on one local residence (slightly reduced compared to the preferred option but still considered to be high). Moderate impact on other residences</th>
<th>Moderate impacts on surrounding residents</th>
<th>High impact on one local residence. Moderate impact on other residences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landform</td>
<td>High impact to floodplain</td>
<td>High impact to floodplain</td>
<td>High impact to floodplain</td>
</tr>
</tbody>
</table>
3.2 Aboriginal Cultural Landscape Assessment

Following comments received from the Gulaga Board of Management and OEH during the display of the REF, Roads and Maritime have undertaken an assessment of potential impacts of the proposal on the Aboriginal cultural landscape to explore and address the concerns raised by the Gulaga Board of Management. This includes consideration and evaluation of intangible cultural values including dreaming sites that may exist within the construction footprint and in the surrounding area. A report has been completed by Environmental and Cultural Services (2013) and is entitled *Assessment of the potential impacts of the proposed Princes Highway upgrade at Dignams Creek, NSW on the Aboriginal cultural landscape* which from herein will be referred to as the Aboriginal Cultural Landscape Assessment. A summary of the report is provided below and the report is attached as Appendix A.

3.2.1 Results of the Aboriginal Cultural Landscape Assessment

**Existing environment**

The cornerstone features of the Aboriginal cultural landscape surrounding Dignams Creek are Gulaga (Mount Dromedary), Mumbulla Mountain, Najanuka (Little Dromedary Mountain) and Baranguba (Montague Island). These four prominent geographical features are highly significant and define the north, east and south extent of the relevant Aboriginal cultural landscape, while the west is defined by ancient pathways which incorporate Murrabrine and Wandella Mountains. Dignams Creek is located in the central north of this geographical area.

The significance of the Dignams Creek cultural landscape primarily relates to themes associated with Aboriginal religion, ritual, mythology and customary practises. According to Aboriginal belief system, the intangible values associated with these themes determine relationships between all living things shape how people move across the landscape and imbue the features within the landscape, including watercourses, with deep spiritual meaning. Also within this space the archaeological record connects people to the past; natural resources are collected; and memories are retained in relation to living, working, playing and coming into conflict with colonial obstacles across in the area. The associative meaning given to the landscape in the Dignams Creek area by Aboriginal people is complex and gives rise to the inseparability of nature and culture, of people and places, of the past and the present.

**Consultation**

Consultation with the local Aboriginal community was undertaken as part of the Aboriginal Cultural Landscape Assessment. This included consultation with the Gulaga and the Biamanga Board of Managements and Merrimans Local Aboriginal Land Council to identify and nominate local Aboriginal knowledge holders to share their personal knowledge of the regions’ cultural landscape history. Local Aboriginal knowledge holders that were selected for the process included members of the Biamanga National Park Board of Management and local Aboriginal knowledge holders that were nominated by the Gulaga Board of Management and others that held a deep cultural knowledge of the area.

Aboriginal Owners and others participated in small focused group interviews and field surveys to document the associative values across the Aboriginal cultural landscape between the 19th and 30th September 2013. Follow up targeted consultations (phone calls and visitation) with key individuals also took place up until the 25th
3.2.2 Potential impacts

Aspects of the proposed works likely to impact on the significance of individual components of the cultural landscape as well as overall broader complexes include:

- The removal of vegetation and deep cutting into ridgelines.
- The relocation and shifting rock and soil out of the local area.
- Disturbance to water flow along Dignams Creek into Wallaga Lake.
- Seeking heritage advice from Aboriginal people who do not identify with the cultural area.
- Removal of forest habitat and culturally relevant flora; and altering landscape close to Dignams Creek.

As is common amongst any cultural group, opinion varied amongst participants about how the proposed works might impact on the identified cultural values giving consideration to pre-existing disturbances, disturbances to be caused during the construction period, the enduring impact of the development and the difference between the actual construction footprint and the view of it from afar. Of primary concern to all Aboriginal participants was the potential impact on native fauna and culturally defined bush beings, on the water quality of Dignams Creek and Wallaga Lake and the need to ensure intangible cultural values are conveyed to the construction team by knowledgeable custodians. Of concern to some participants was the potential impact of works on cultural activities that take place on the top of Gulaga and Mumbulla Mountains and the spiritual connectivity between Gulaga and Mumbulla Mountains.

3.2.3 Safeguards and management measures

The Aboriginal Cultural Landscape Assessment has found that it is difficult to define the level which a development might impact on broad, intangible, cultural heritage values, especially given the lack of precedents to rely on. However the Aboriginal Cultural Landscape Assessment has found that the mitigation measures recommended in this report would satisfactorily mitigate the impacts identified on cultural heritage values within the construction footprint and across the cultural landscape, if implemented in consultation with the Aboriginal community, and in particular with Aboriginal owners, as identified by the Gulaga National Park Board of Management. Safeguards and mitigation measures to manage potential impacts to biodiversity have been outlined in Table 3.2.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Works may have an adverse impact on the long range views and ritual connection between Gulaga and Mumbulla Mountains</td>
<td>Strategically revegetating to minimise the visual impact of the major cutting into Dignams Hill on long range views in accordance with the urban design and landscaping strategy.</td>
<td>Roads and Maritime project manager and construction contractor</td>
<td>Detailed design and post construction</td>
</tr>
<tr>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
</tbody>
</table>
| Potential for earthworks to disturb unknown burials and other unknown archaeological items | • Adhere to Roads and Maritime’s Standard Management Procedure Unexpected Archaeological Finds procedure (2012).  
• A cultural awareness program shall be delivered prior to construction involving male and female Aboriginal Owners with knowledge of the cultural landscape. | Roads and Maritime project manager and construction contractor | Pre-construction and during construction. |
| The proposed works would adversely impact mythological connections between Gulaga and Mumbulla Mountains | • Excavated material will be reused and retained within the project where possible.  
• Strategically revegetating to minimise the visual impact of the major cutting into Dignams Hill on long range views in accordance with the urban design and landscaping strategy.  
• Rehabilitate the existing Dignams Hill gravel pit.  
• Acknowledge the intangible cultural values across the broad landscape through interpretive signage where reasonable and feasible.  
• A cultural awareness program shall be delivered prior to construction involving male and female Aboriginal Owners with knowledge of the cultural landscape. | Roads and Maritime project manager | Detailed design |
| Proposed works could add further siltation build up to the water system disturbing the mythological significance of Dignams Creek and Wallaga Lake | • Ensuring water quality controls and water flow are maintained during and after construction period.  
• A cultural awareness program shall be delivered prior to construction involving male and female Aboriginal Owners with knowledge of the cultural landscape. | Construction contractor | During construction |
| Potential to disregard Aboriginal ownership protocols which could lead to community conflict | • A cultural awareness program shall be delivered prior to construction involving male and female Aboriginal Owners with knowledge of the cultural landscape. | Roads and Maritime project manager and construction contractor | Pre-construction and during construction |
### Impact

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential loss of culturally valued food and medicine resources</td>
<td>• Revegetation of cleared areas with species including those favoured by culturally significant fauna and those which can also be used as native bush food / medicine plants.</td>
<td>Roads and Maritime project manager</td>
<td>Pre-construction and during construction</td>
</tr>
</tbody>
</table>
| Maintaining wildlife connectivity for culturally significant fauna    | • Where possible ensure a vegetated corridor is maintained during the construction period.  
• Improve corridor across pasture between existing vegetation and new fauna underpass ‘A’.  
• Revegetate with species including those favoured by culturally significant fauna e.g. Koalas. | Roads and Maritime project manager and construction contractor | Pre-construction and during construction |
| Impact on Aboriginal historical attachments to Dignams Creek and the broader landscape | • Acknowledgement of the cultural significance of the landscape to Aboriginal people by providing interpretive signage where reasonable and feasible and giving consideration to naming the bridge with a name relevant to the Aboriginal community in accordance with the Roads and Maritime Bridge Naming Policy (RTA, 2008).  
• Roads and Maritime will attempt to facilitate a one off visit to the Dignams Creek Sawmill for elders with historical associations to the site. Given the site is located on private property, access would be dependent upon permission from the land owner. | Roads and Maritime project manager | Detailed design and post construction |

### 3.3 Additional Koala survey

#### Background

Following the display of the REF, OEH requested that an additional assessment be undertaken at seven Koala plot sites that had not been visited during the field survey due to property access issues. OEH undertook this survey on behalf of Roads and Maritime using the Regularised Grid-Based Spot Assessment Technique (RGBSAT) method and the results are included in Appendix B. The following is a summary of the additional Koala survey completed by OEH.

#### Methodology

Seven additional grid sites were assessed adjacent to the alignment of the proposal on 20 September 2013 using the Regularised Grid-Based Spot Assessment Technique (RGBSAT) method. Table 3-3 shows the locations of the seven additional plot sites where Koala assessments were undertaken.
Table 3-3 Locations of the additional Koala survey plot sites.

<table>
<thead>
<tr>
<th>Grid Site ID</th>
<th>Location</th>
<th>Date</th>
<th>Tenure</th>
<th>Eastings</th>
<th>Northing</th>
</tr>
</thead>
<tbody>
<tr>
<td>66-71</td>
<td>Kooraban</td>
<td>20/09/2013</td>
<td>National Park</td>
<td>766231</td>
<td>5971275</td>
</tr>
<tr>
<td>665-72</td>
<td>Kooraban</td>
<td>20/09/2013</td>
<td>National Park</td>
<td>766502</td>
<td>5971991</td>
</tr>
<tr>
<td>67-725</td>
<td>Kooraban</td>
<td>20/09/2013</td>
<td>National Park</td>
<td>767003</td>
<td>5972489</td>
</tr>
<tr>
<td>675-725</td>
<td>Kooraban</td>
<td>20/09/2013</td>
<td>Private</td>
<td>767516</td>
<td>5972501</td>
</tr>
<tr>
<td>68-735</td>
<td>Kooraban</td>
<td>20/09/2013</td>
<td>National Park</td>
<td>768006</td>
<td>5973503</td>
</tr>
<tr>
<td>685-735</td>
<td>Kooraban</td>
<td>20/09/2013</td>
<td>Private</td>
<td>768474</td>
<td>5973501</td>
</tr>
</tbody>
</table>

Grid-intervals for site locations were the closest 500 metre interval derived from 1:25000 topographical maps. These locations were selected to be consistent with the broader koala survey in the region. In one case, the grid site was moved approximately 200 metres from planned to actual eastings and northings to gain a more representative sample of the vegetation (grid site 66-71), refer to Figure 3-2.

At each of the RGBSAT sites the base of the closest 30 live trees over 150 millimetres diameter at breast height (dbh) were searched for Koala faecal pellets out to a metre from the trunks. The species and dbh of each of the 30 trees was recorded. The radius of the survey site was also recorded; this varied according to the proximity of the trees that were searched.

Results of the additional survey

The results of this survey found no evidence of Koala activity at the seven additional Koala plot survey sites (refer to Figure 3-2). Five of the seven sites surveyed by OEH had one or more of the following preferred Koala feed tree species: E. longifolia, E. cypellocarpa and E. globoidea. The Koala feed trees identified by the OEH survey match those identified within the SKM assessment, refer to Table 2-2. The feed trees identified in the 2013 OEH survey include the following:

- Woollybutt (*Eucalyptus longifolia*) is identified as a secondary tree species within map unit 2.
- Monkey Gum (*Eucalyptus cypellocarpa*) is a secondary feed tree in map units 1 and 2.
- White Stringybark (*Eucalyptus globoidea*) is a supplementary tree in map units 2 and 3.

This additional survey undertaken by OEH has been considered by SKM and does not change the results of the Biodiversity Assessment completed for the proposal. Consequently the statement that “koala activity in the study area is considered to be very low and the survey results suggest that the habitats adjoining the proposal corridor may only be used occasionally by dispersing individuals rather than supporting a portion of an important population or the home range of an individual” is still applicable. As is the conclusion in the Biodiversity Assessment that the “proposal is unlikely to lead to a long-term decrease in the size of an important population known from the locality”. No changes to the safeguards and mitigation measures proposed in Section 6.1 of the REF are required.
Figure 3-2 | Location of fauna sampling methods and additional OEH Koala survey sites
4 Environmental management

The REF for the upgrade of the Princes Highway, Dignams Creek identified the framework for environmental management, including management and mitigation measures that would be adopted to avoid or reduce environmental impacts (Chapter 7 of the REF).

After consideration of the issues raised in submissions and changes to the proposal, the management and mitigation measures have been revised for:

- Biodiversity (Section 2.6).
- Heritage (Section 2.9).
- Water quality and hydrology and hydraulics (Section 2.11).

Mitigation measures that have been updated are highlighted in red text.

Should the proposal proceed, environmental management would 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 Project Environmental Management Plan (PEMP) and a Contractors Environmental Management Plan (CEMP) would be prepared to describe safeguards and management measures identified. The PEMP outlines all REF safeguards, while the CEMP is developed by the Contractor and focuses on those safeguards applicable to the construction. These plans would provide a framework for establishing how the safeguards and management measures would be implemented and who would be responsible for their implementation.

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

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, should it proceed. These safeguards would minimise any potential adverse impacts arising from the proposal on the surrounding environment. The safeguards and management measures are summarised in Table 4-1.
### Table 4-1 Summary of site specific environmental safeguards

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General</td>
<td>All environmental safeguards must be incorporated within the Project Environmental Management Plan (those relevant to the detailed design stage). Relevant mitigation measures for the contractor during construction will be included into the contract specifications, and these safeguards would be addressed by the contractor in the Contractor’s Environmental Management Plan.</td>
<td>Project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>2</td>
<td>General</td>
<td>Any works resulting from the proposal and as covered by this REF may be subject to environmental audits or inspections at any time during their duration.</td>
<td>Project manager and regional environmental staff</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>3</td>
<td>General</td>
<td>Relevant environmental contract specifications must be forwarded to the Roads and Maritime Services Environment Manager 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 Environment Manager.</td>
<td>Project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>4</td>
<td>General</td>
<td>The Roads and Maritime Services Project Manager must notify the Roads and Maritime Services Environmental Officer, South Coast Office, at least 5 days prior to work commencing.</td>
<td>Project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>5</td>
<td>General</td>
<td>All businesses and residences likely to be affected by the proposal must be notified at least five working days prior to the commencement of the proposed activities.</td>
<td>Project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>------------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>6</td>
<td>General</td>
<td>Environmental awareness training must be provided, by the contractor, to all field personnel and subcontractors.</td>
<td>Contractor</td>
<td>Pre-construction and during construction as required.</td>
</tr>
</tbody>
</table>

### Biodiversity

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact updates</th>
<th>Measures involving minimising the construction footprint in areas of important habitat and subsequent removal of vegetation will be considered in the detailed design. Specific measures include:</th>
<th>Roads and Maritime project manager</th>
<th>Detailed design</th>
</tr>
</thead>
</table>
| 7   | Design updates                            | • Four fauna underpasses, with at least two including fauna furniture.  
• A vegetated fauna crossing underneath the new bridge to encourage fauna passage  
• One canopy rope bridge at the southern end of the proposal. | Roads and Maritime project manager | Detailed design |
| 8   | Impact on flora and fauna                 | • Avoiding habitat currently occupied by the Yellow-Bellied Glider, including a significant sap feeding tree and several hollow-bearing habitat trees located in the southern part of the proposal adjacent to stage 2 works. This may include reducing the size of the proposed batter during detailed design.  
• Minimise impacts to areas of high quality habitat for the Koala and other threatened fauna. This includes vegetation associated with vegetation map units 1, 2 and 3 and areas of the TEC recognised as River-flat Eucalypt Forest on Coastal Floodplains (map unit 5). | Roads and Maritime project manager | Detailed design |
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact on flora and fauna -</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| 9   | Impact on flora and fauna - | Minimise the removal of vegetation/ habitat to minimise impacts to threatened fauna species would be considered in the detailed design  
Minimise impacts to the TEC (River-flat Eucalypt Forest on Coastal Floodplains) that is located along the banks of Dignams Creek and Blind Creek during construction of the new bridge and any temporary bridge crossing. | Construction contractor | Pre-construction and during construction |

A flora and fauna management plan will be prepared as part of the construction environmental management plan (CEMP). It would be prepared in accordance with the Roads and Maritime Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011b) (Biodiversity Guidelines). The plan would include a clearing procedure, which in turn would specify the requirements for:

- Undertaking pre-clearing surveys in accordance with Guide 1 of the Biodiversity Guidelines. This includes provision for a suitably qualified and licensed fauna ecologist to confirm the appropriate management.
- Identifying the locations and extent of impacted habitats to be salvaged for reuse/relocation such as bush rock, hollow trees and woody debris.
- Identifying, defining and managing exclusion zones for construction sites, including temporary fencing requirements, to avoid damage to vegetation, fauna habitat (both potential Koala feed trees and Yellow-bellied Glider sap feed trees and hollow-bearing trees). Maps of exclusion zones would be provided and developed in accordance with Guide 2 of the Biodiversity Guidelines.
- Identifying nearby habitats for suitable release of fauna
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Impacts to retained vegetation</td>
<td>Vehicles, equipment and stockpiles will not be located in the drip line of trees.</td>
<td>Construction Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>11</td>
<td>Controlling the spread of noxious and environmental weeds</td>
<td><strong>Controlling the spread of noxious and environmental weeds</strong> - A weed management plan will be developed as part of the CEMP in accordance with the <em>Biodiversity Guidelines (2011)</em> and <em>Introduction Weed Management Manual (Natural Heritage Trust 2004)</em>, and will include descriptions and mapping of major weed infestation during the pre-clearing survey and appropriate management actions to be undertaken.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| 12  | Controlling the spread of pathogens/disease causing agents such as bacteria and fungi | Measures to confirm the presence of pathogens/disease causing agents such as bacteria and fungi will be undertaken prior to construction. This will include the following:  
  • A background search of government-maintained websites for the most up-to-date hygiene protocols for each | Construction contractor | Construction |
If risks are identified in the vicinity of the proposal, testing from a National Association of Testing Authorities (NATA) approved laboratory may be required to confirm the presence of pathogens in the soil and/or water. If pathogens/disease causing agents are found to be present, measures to prevent the introduction and/or spread of these pathogens/disease causing agents will be incorporated into the Pest and Disease Management Plan developed as part of the CEMP for the proposal. The pest and disease management plan will be developed in accordance Guide 7 of the Biodiversity Guidelines (RTA 2011b). If pathogens are identified exclusion zones with fencing and signage to restrict access into contaminated areas will be required.

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Habitat re-establishment</td>
<td>The landscape plan will detail the re-establishment of native vegetation on batters, cut faces, areas surrounding sediment basins and other areas disturbed during construction. Re-establishment of habitat will take into account Guide 3 of the Biodiversity Guidelines (RTA 2011b) and will include local species derived from vegetation communities identified within the proposal, refer to Figure 6-1 and Table 6-2. A nest box management strategy will be developed as part of the CEMP in accordance with Guide 8 of the Roads and Maritime Biodiversity Guidelines (RTA 2011b).</td>
<td>Roads and Maritime project manager</td>
<td>Pre-construction and post-construction</td>
</tr>
<tr>
<td>14</td>
<td>Maintaining wildlife connectivity</td>
<td>Incorporate design principles for the proposed wildlife crossing structures as outlined in the Biodiversity Report</td>
<td>Roads and Maritime project</td>
<td>Pre-construction and during construction</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>--------</td>
<td>--------------------------</td>
<td>---------------</td>
<td>--------</td>
</tr>
<tr>
<td>1</td>
<td>Koala plant feed trees as identified in Table 2-2 of the REF will be planted at least 25 metres from the shoulder of the proposal and five metres from fauna fencing to discourage Koalas from accessing potential habitat adjacent to the highway and to discourage them using the tree to jump over the fauna fence.</td>
<td>(refer to Appendix K)</td>
<td>manager</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Where dedicated or other fauna underpasses are proposed, habitat adjacent to these structures and leading into and out of the structures will be appropriately revegetated to encourage their use. This may include koala feed trees away from the road reserve.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Further consideration of the extent of fauna fencing will be undertaken during detailed design in consultation with a Roads and Maritime biodiversity specialist.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If a temporary creek crossing is required and impacts to fish passage are unavoidable, a permit would be sought from DPI (Fisheries and aquaculture). In-stream structures would be designed and constructed to minimise potential impacts to fish passage according to Fairfull &amp; Witheridge (2003) Why Do Fish need to Cross the Road: Fish Passage Requirements for Waterway Crossings. NSW DPI (Fisheries).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If a temporary creek crossing is required and impacts to fish passage are unavoidable, a permit will be sought from DPI (Fisheries and aquaculture). In-stream structures will be designed and constructed to minimise potential impacts to fish passage according</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>15</td>
<td>Impacts to riparian and aquatic habitat</td>
<td>Prior to any disturbance on the banks a thorough inspection for aquatic fauna will be conducted.</td>
<td>Construction contractor</td>
<td>Pre-construction and during construction</td>
</tr>
</tbody>
</table>

- Instream and riparian disturbance, and the removal of sediment, woody snags or debris from streams or stream channels will be minimised. Trimming or ‘lopping’ of branches and logs will be considered as a first option before moving.
- The risk of instream and riparian weeds will be minimised through the implementation of a vegetation clearing and revegetation management strategy that will form part of the Flora and Fauna Management Plan.
- Working platform sites will avoid direct impacts to Dignams Creek and will avoid clearing of riparian vegetation located adjacent to the creek where possible.
- If a temporary creek crossing over Dignams Creek is required, vegetation clearance of riparian vegetation will be minimised where possible. Exclusion zone fencing will be erected around any surrounding vegetation to avoid indirect impacts.
- In accordance with DPI (1999) Policy and Guidelines for Aquatic Habitat Management and Fish Conservation, Roads and Maritime has noted that DPI (Fisheries NSW) is to be immediately notified of any fish kills in the vicinity of the works on 1800 043 536. If it is ascertained...
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Instream woody debris management</td>
<td>Any large woody debris (i.e. logs and branches) located instream will be retained to the greatest extent possible. If any instream woody debris is removed during construction for the proposal, it will be stockpiled and replaced at the completion of the works within the same waterways from which it was removed.</td>
<td>Construction contractor</td>
<td>Pre-construction and during construction</td>
</tr>
<tr>
<td>17</td>
<td>Biodiversity offset</td>
<td>A compensation package and offset plan will be developed for the loss of native vegetation (20.6 hectares), threatened species and habitat for native flora and fauna. This plan will be developed in consultation with OEH. This strategy will be developed in accordance with the Roads and Maritime Guideline for Biodiversity Offsets, November 2011 and will also identify when offsets will be implemented.</td>
<td>Roads and Maritime project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>18</td>
<td>Impact to Yellow-Bellied Glider sap feeder tree</td>
<td>The design will avoid direct impacts to the identified Yellow-Bellied Glider sap feeder tree located at Easting 766245 Northing 5971353.</td>
<td>Roads and Maritime project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>19</td>
<td>Impacts to Square Raspwort</td>
<td>Prior to clearing, clumps of Square Raspwort within the construction footprint surrounding Dignams Creek will be protected where possible. <strong>Individuals of Square Raspwort that are directly</strong></td>
<td>Construction contractor</td>
<td>Pre-construction and during construction</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>--------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>impacted would be replanted in a suitable location outside the construction footprint in areas of appropriate habitat along Dignams Creek.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Impacts to TECs</td>
<td>The location of TECs will be mapped and identified in the CEMP. Exclusion zones will be erected to identify TECs.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| 21  | Clearance of existing vegetation      | A landscape management plan will be developed as part of the (CEMP) which provides specific details for the re-establishment of native vegetation areas disturbed during construction. This will include revegetation and habitat restoration activities. Landscaping for the proposed action will follow the RMS Biodiversity Guidelines (RTA, 2011b and will include the following:  
  • Landscaping of areas impacted by the proposed action including batter slopes, any ancillary sites, sediment basins and other areas disturbed/cleared during construction.  
  • Removal of existing road followed by revegetation with local flora species and habitat re-establishment.  
  • Habitat re-establishment including provision of bushrock and woody debris (Guide 5 of the Biodiversity Guidelines).  
  • Revegetation activities along Dignams Creek and habitat re-establishment to improve wildlife connectivity and provide safe fauna passage across the proposed action beneath the proposed bridge structure (Guide 3 of the Biodiversity Guidelines). | Construction contractor        | Construction    |

**Noise and vibration**

| 22  | Noise and vibration                  | When developing and implementing management strategies, | Construction                  | Pre-construction |

Upgrade of the Princes Highway, Dignams Creek
Submissions report
84
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| 23  | Impacts to sensitive receivers from construction noise                                                                                | Prepare and implement a Noise Management Plan (NMP) in accordance with Roads and Maritime QA Specification G36 as part of the CEMP to minimise the impact of noise from your operations on adjacent properties. The Noise Management Plan must cover all significant noise generating activities. The NMP will include measures to reduce noise impacts to adjacent sensitive receivers. The plan include but not be limited to the following:  
• Substitution by an alternative low noise process.  
• Restricting times when noisy work is carried out.  
• Placement of work compounds, parking areas, equipment and material stockpile sites away from noise-sensitive locations.  
• Screening or enclosures.  
• Consultation with affected residents.  
All construction plant and equipment used will be, in addition to other requirements:  
• Fitted with properly maintained noise suppression devices in accordance with the manufacturer’s specifications.  
• Maintained in an efficient condition.  
• Operated in a proper and efficient manner.                                                                                             | Construction contractor | Pre-construction |

vibration management plans make all practical efforts to comply with the requirements of the POEO Act and, where applicable; the EPA publications *Interim Construction Noise Guideline, Industrial Noise Policy* and *Environmental Criteria for Road Traffic Noise*; and the Roads and Maritime publication *Environmental Noise Management Manual*. contractor
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>Vibration impacts to sensitive receivers from construction activities</td>
<td>Prepare and implement a Vibration and Airblast Management Plan (VAMP) as part of the CEMP to minimise the impact of noise from your operations on adjacent properties. The Noise Management Plan will be developed in accordance with Roads and Maritime QA Specification G36 and must cover all significant noise generating activities. The NMP will include measures to reduce noise impacts to adjacent sensitive receivers. Feasible and reasonable vibration mitigation measures to be adopted during construction will include: • Substitution by an alternative process. • Restricting times when work is carried out. • Screening or enclosures. • Consultations with affected residents.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>25</td>
<td>Operational noise impacts</td>
<td>During the detailed design stage of the proposal, investigations of all feasible and reasonable mitigation treatments will be considered for the affected receiver (R7). All feasible and reasonable measures will be considered in accordance with the NSW Road Noise Policy (DECCW, March 2011) and Practice Note iv of the Roads and Maritime Environmental Noise Management Manual (ENMM).</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>26</td>
<td>Out of hours noise and vibration impacts</td>
<td>Works will be carried out during standard working hours (that is 7am-6pm Monday to Friday, 8am-1pm Saturdays). Any work that is performed outside normal work hours or on a Sunday or public holiday will need to minimise noise impacts in accordance with the Environmental Noise Management Manual, “Practice Note vii – Roadworks Outside of Normal Working Hours” and the Interim Construction Noise Guidelines (DECCW 2009). This will include notifying the</td>
<td>Communications manager and contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
### Local community of any works planned to be undertaken outside standard construction hours prior to the works occurring using the following methods:

- Contact the local community potentially affected by the proposed works (outside of recommended construction hours) and inform them by letter of the proposed work, location, type of work days and dates of work and hours involved. The contact will be made 5 days prior to commencement of works.
- Place a suitable advertisement in local papers including a reference to night-time noise impacts.
- Provide a community liaison phone number and permanent site contact so that complaints can be received and addressed in a timely manner.

### Landscape character, visual impacts and urban design

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>Change of landscape character and visual impact</td>
<td>Detailed design will be undertaken according to the urban design vision, objectives and principles (refer to Table 6-36) which underpin the concept design.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>28</td>
<td>Views of the new Dignams Creek Bridge</td>
<td>The design will be undertaken to reflect the advice given in the Roads and Maritime Bridge Aesthetics guidelines. The bridge structure is to be integrated into the adjacent landform.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>29</td>
<td>Impact from large earthworks and change in landform</td>
<td>The potential visual impact of earthworks will be minimised by careful design that allows them to integrate with adjoining landforms.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>--------</td>
<td>--------------------------</td>
<td>---------------</td>
<td>--------</td>
</tr>
<tr>
<td>30</td>
<td>Visual amenity impacts from construction of new retaining walls/cut batters</td>
<td>Retaining walls and batters will be steepened to grades suitable for the proposed surface treatment in order to minimise the overall footprint of the proposal, while still enabling appropriate landscaping. Where possible, retaining walls/batters will be constructed of materials that will visually integrate with the surrounding geology and landscape. Screen planting will be provided below walls and use materials that integrate visually with the surrounding environment.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>31</td>
<td>Impact from new drainage features</td>
<td>Visible roadside channels will be vegetated or rock lined. Concrete lined channels will be avoided as much as possible. Where they are to be used, the concrete will be coloured and/or heavily roughened.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>32</td>
<td>Changes to the landscape character and visual amenity of the existing environment</td>
<td>Existing cultural/landmark trees in the surrounding paddocks will be retained where feasible. This will be undertaken by identifying ‘no go areas’ to restrict access around trees not affected by the proposal and making minor adjustments to the horizontal and vertical carriageways to move them clear of root zones. Natural rock cutting faces will be maintained were feasible, to allow the geological character of the landscape to be viewed.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>33</td>
<td>Changes to the landscape character and visual amenity of</td>
<td>Following construction, landscaping of areas impacted by the proposal will be undertaken in accordance with the Landscape Plan and the, and will consider: • Revegetation of cleared areas using species occurring</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>--------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>--------</td>
</tr>
</tbody>
</table>
|     | the existing environment                                                                   | from vegetation map units identified within the proposal footprint (refer to Table 6-2).  
• Including screening trees and shrubs to block views of the proposal and intercept potential headlight glare.  
• Ensuring trees and revegetation areas are in conformance with the landscape drawings.  
• Restoring and enhancing areas impacted along Dignams Creek with endemic, riparian vegetation, from the TEC recognised as River-flat Eucalypt Forest on Coastal Floodplains.  
• Ensuring clear zones are kept to the minimum in order to allow regeneration to occur, particularly in parts of the proposal where regeneration would assist with screening and headlight glare control such as on the west facing fill embankments visible from Dignams Creek Road.  
• Re-using removed vegetation in the form of mulch added to planting and bushland reconstruction areas; and coarse woody debris in fauna crossings and creek lines (downstream of structures). |                |        |
<p>|     | Aboriginal heritage                                                                       |                |        |
| 34  | Indirect impacts to Aboriginal cultural heritage                                           | While a proposal wide AHIP has been approved, Roads and Maritime will avoid indirect impacts to AHIMS site numbers 62-3-0623 (survey unit 9), 62-3-0626 (survey unit 14), 62-3-0624 (survey unit 11) 62-3-0627 (survey unit 16) during construction where possible. | Construction Contractor | Construction |
| 35  | Unexpected Aboriginal heritage                                                              | The following safeguards will be applied to manage unexpected Aboriginal heritage finds: | Construction Contractor | Pre-construction and construction |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>find</td>
<td>The CEMP will adopt the implementation of the Roads and Maritime <em>Unexpected Archaeological Finds Procedure</em> (2011b). Construction personnel will receive toolbox training in the recognition of Aboriginal cultural heritage material and sites and information about existing AHIMS sites. When any soil, vegetation clearing or leaf litter removal activities are conducted, workers will be observant and keep a look out for rock engravings, surface shell, bone, rocks or any other Aboriginal cultural heritage material. Should any Aboriginal objects be uncovered during construction, works will immediately cease in the vicinity of the find. Guidance will be sought from the Roads and Maritime Aboriginal Cultural Heritage Advisor. The Planning and Aboriginal Heritage Section of the OEH will then be notified by the Roads and Maritime.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Works may have an adverse impact on the long range views and ritual connection between Gulaga and Mumbulla Mountains</td>
<td>Strategically revegetating to minimise the visual impact of the major cutting into Dignams Hill on long range views in accordance with the urban design and landscaping strategy.</td>
<td>Roads and Maritime project manager and construction contractor</td>
<td>Detailed design and post construction</td>
</tr>
<tr>
<td>37</td>
<td>The proposed works would adversely impact mythological connections</td>
<td>Excavated material will be re used and retained within the project where possible. Strategically revegetating to minimise the visual impact of the major cutting into Dignams Hill on long range views in accordance with the urban design and landscaping strategy</td>
<td>Roads and Maritime project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td>between Gulaga and Mumbulla Mountains</td>
<td>• Rehabilitate the existing Dignams Hill gravel pit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Acknowledge the intangible cultural values across the broad landscape through interpretive signage where reasonable and feasible</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A cultural awareness program shall be delivered prior to construction involving male and female Aboriginal Owners with knowledge of the cultural landscape.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Proposed works could add further siltation build up to the water system disturbing the mythological significance of Dignams Creek and Wallaga Lake</td>
<td>• Ensuring water quality controls and water flow are maintained during and after construction period.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A cultural awareness program shall be delivered prior to construction involving male and female Aboriginal Owners with knowledge of the cultural landscape.</td>
<td>Construction contractor</td>
<td>During construction</td>
</tr>
<tr>
<td>39</td>
<td>Potential to disregard Aboriginal ownership protocols which could lead to community conflict</td>
<td>• A cultural awareness program shall be delivered prior to construction involving male and female Aboriginal Owners with knowledge of the cultural landscape.</td>
<td>Roads and Maritime project manager and construction contractor</td>
<td>Pre- construction and during construction</td>
</tr>
<tr>
<td>40</td>
<td>Potential loss of culturally valued food and medicine resources</td>
<td>• Revegetation of cleared areas with species including those favoured by culturally significant fauna and those which can also be used as native bush food / medicine plants.</td>
<td>Roads and Maritime project manager</td>
<td>Pre-construction and during construction</td>
</tr>
<tr>
<td>41</td>
<td>Maintaining wildlife</td>
<td>• Where possible ensure a vegetated corridor is maintained during the construction period.</td>
<td>Roads and</td>
<td>Pre-construction and</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>--------</td>
<td>---------------------------</td>
<td>---------------</td>
<td>--------</td>
</tr>
</tbody>
</table>
| connectivity for culturally significant fauna | • Improve corridor across pasture between existing vegetation and new fauna underpass ‘A’.  
• Revegetate with species including those favoured by culturally significant fauna e.g. Koalas. | Maritime project manager and construction contractor | during construction |
| 42 | Impact on Aboriginal historical attachments to Dignams Creek and the broader landscape | • Acknowledgement of the cultural significance of the landscape to Aboriginal people by providing interpretive signage where reasonable and feasible and giving consideration to naming the bridge with a name relevant to the Aboriginal community in accordance with the RTA Bridge Naming Policy (2008).  
• Roads and Maritime will attempt to facilitate a one off visit to the Dignams Creek Sawmill for elders with historical associations to the site. Given the site is located on private property, access would be dependent upon permission from the land owner. | Roads and Maritime project manager | Detailed design and post construction |
| 43 | Potential for earthworks to disturb unknown burials and other unknown archaeological items | • Adhere to Roads and Maritime’s Standard Management Procedure Unexpected Archaeological Finds procedure (2012).  
• A cultural awareness program shall be delivered prior to construction involving male and female Aboriginal Owners with knowledge of the cultural landscape. | Roads and Maritime project manager and construction contractor | Pre-construction and during construction. |
<p>| Non–Aboriginal heritage | | An exclusion zone will be placed around DC5 to avoid indirect impacts. If impacts do occur, a section 140 permit will be required to undertake archival recording and salvage excavation prior to works occurring | Roads and Maritime project manager | Pre-construction |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>Indirect impacts to Non-Aboriginal heritage, specifically item DC2</td>
<td>Where possible impacts to DC2 (sections of the Old Princes Highway) will be minimised.</td>
<td>Roads and Maritime project manager</td>
<td>Pre-construction</td>
</tr>
</tbody>
</table>
| 46  | Unexpected non-Aboriginal heritage find | The following safeguards will be applied to manage unexpected non-Aboriginal heritage finds:  
  - Should any relics (as defined by the Heritage Act 1977) or sites of heritage significance be found, construction will cease immediately in the vicinity of the find and advice sought from the Roads and Maritime Environment Branch. This will allow as necessary an archaeologist to assess the find and notify the Heritage Branch in accordance with the Heritage Act.  
  - Steps in the Roads and Maritime Standard Management Procedure: Unexpected Archaeological Finds will be followed.  
  - The CEMP will adopt the Roads and Maritime Unexpected Archaeological Finds Procedure (2011b). | Construction Contractor | Pre-construction and construction |
| 47  | Delisting of a heritage item | The bridge will be bypassed, and cease to be a Roads and Maritime asset.  
The bridge will need to be delisted from the section 170 register in accordance with the Heritage Act.  
The Dignams Creek Bridge will be managed by the new private property owners of 9523 Princes Highway as this would be part of the properties access road. | Roads and Maritime project manager | Pre-construction and construction |

**Water quality**

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>Pollution as a result of sediment</td>
<td>A soil and water management plan (SWMP) will be developed to include controls that would limit movement of</td>
<td>Construction</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
</tbody>
</table>
|     | entering waterways during construction                                 | sediment (erosion controls) and remove sediment from runoff before discharge to watercourses (sediment controls). It will be prepared in accordance with the Managing Urban Stormwater – Soils and Construction, Volumes 1 and 2D (Landcom, 2004 and DECCW, 2008) and RTA Road Design Guideline: Section 8 Erosion and Sedimentation (RTA 2003) and QA Specification G38 Soil and Water Management (Soil and Water Management Plan) (Roads and Maritime 2011a). The SWMP will include, but not be limited to procedures for controlling the following standard activities:  
• Mud and litter transfer.  
• Maintenance and cleaning of sediment control works.  
• Soil and stockpile management (in accordance with Roads and Maritime Stockpile Site Management Guideline (RTA 2011a).  
• Dewatering of sediment basins and excavations (in accordance with Roads and Maritime Technical guideline – Environmental Management of Construction Site Dewatering). | contractor      | Pre-construction |
| 49  | Pollution as a result of sediment entering waterways during construction | The SWMP will include a preliminary erosion and sediment control plan (ESCP) prepared in accordance with Landcom (2004) and DECCW (2008c), which will identify the erosion and sediment control measures that will be implemented on site for preliminary work.  
Progressive ESCPs will be developed throughout construction to reflect the changes in activities and risk throughout the construction process. The plan will include diagrams of erosion and sediment control techniques and details of when and where these measures will be applied. | Construction contractor | Pre-construction |
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Specific measures will include:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Work scheduling (installation of protective measure before earthworks commence, suspension of works during rain, etc).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use of protective measures (silt curtains, use of bunds, site drainage, separation of ‘clean’ and ‘dirty’ water, sediment traps, etc).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Active management and maintenance of those measures (replacing damaged sediment control measures, modify sediment control and stormwater management systems if they are not working appropriately and removing accumulated sediment, ensuring the water quality of any run-off into the lake adheres to the Blue Book (Landcom, 2004) during construction and Managing Urban Stormwater – Council Handbook (EPA, 1997) during operation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rehabilitation of impacted environments such as riparian vegetation and stabilisation of creek banks upon completion of the works.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Water quality management and prevention / minimisation of in-stream barriers</td>
<td>Construction traffic will be restricted to access tracks, and maintained until construction is complete. Chemicals and fuels will be appropriately stored in a bunded area. If construction works cause the temporary isolation of pools of water from the watercourse for any period of time and they become susceptible to drying or poor water quality, then any resident native fish that are trapped will be relocated to undisturbed areas. Appropriate sediment and erosion control measures will be applied.</td>
<td>Construction contractor</td>
<td>Pre-construction and during construction</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td>put in place during the construction process to control turbidity generated during the construction and restoration process.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If the temporary creek crossing is constructed in Dignams Creek sediment and erosion control curtains will be required in Dignams Creek to control turbidity generated during the construction and restoration process.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No turbid water generated from the construction corridor or construction area will be discharged into any waterway.</td>
<td>A Water Quality Monitoring Plan will be prepared to monitor water quality impacts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All construction materials for the temporary creek crossing (i.e. rocks and gravel) will be washed prior to being used to minimise turbidity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>Pollution as a result of sediment entering waterways during construction</td>
<td>The SWMP will include a program for inspecting sediment and erosion controls, including:</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>• Weekly inspection of erosion and sediment control measures and prior to forecast rainfall events to ensure measures are in place, and functioning in the event of a rainfall event.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Inspection of erosion and sediment control measures during rainfall events that cause runoff, to ensure controls are working effectively.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Pollution from construction disturbance of the ground surface</td>
<td>Chemicals and fuels will be appropriately stored in a bunded area.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>Environmental flow in Dignams Creek will be maintained however if construction works inadvertently cause the</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>--------</td>
<td>---------------------------</td>
<td>----------------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td>temporary isolation of pools for any period of time and they become susceptible to drying or poor water quality then any resident native fish that are trapped will be relocated to areas not being disturbed and away from impacts. No turbid water generated from the construction corridor or construction area will be discharged into any waterway.</td>
<td>In the preparation of the SWMP and associated ESCPs, the recommendations of the <em>Erosion and Sedimentation Management Report</em> prepared by SCS (2012) will be considered.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
</tbody>
</table>
| 53  | Pollution as a result of sediment entering waterways during construction | A water quality monitoring plan will be developed and implemented in accordance with the Roads and Maritime *Guideline for Construction Water Quality Monitoring* (RTA undated). The plan will focus on water quality of Dignams Creek, with flow on benefits to downstream environments. Additional to that outlined in the abovementioned guideline, the plan will include:  
- Monitoring of pH, dissolved oxygen, conductivity, temperature, turbidity, total suspended solids, oils and grease will be undertaken.  
- Measurement of the variables described above will be undertaken during construction at identified water monitoring sites on Dignams Creek during rainfall events that produce runoff (receiving 10 millimetres in one rainfall event).  
- An assessment of the adequacy of all water quality control and erosion and sediment control measures will be undertaken should monitoring show a decline in water quality. | Construction contractor | Pre-construction/Construction |
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>quality. The progressive erosion and sediment control plan(s) will be updated to reflect any revised controls.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>Impacting on the water flow of Dignams Creek from extraction of water for the purposes of road construction.</td>
<td>During the extraction of water from Dignams Creek for the purposes of road construction activities, water flows will be maintained to ensure the continuing supply of water to downstream water bodies.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| 56  | Impact of flooding on the proposal during construction | A flood management plan will be prepared to manage any potential flooding in and around the proposal during construction. This will include:  
- Regular weather monitoring.  
- Procedures to move plant and equipment out of identified flood-prone areas. | Construction contractor | Pre-construction, construction |

**Geology, topography and soils**

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>Discovery of previously unidentified contaminated land</td>
<td>Where evidence of contamination is encountered (such as odorous or visually contaminated materials), work in the area will cease immediately and the Roads and Maritime Environment Manager will be contacted to advise, in consultation with a contaminated land specialist on the appropriate action. Works that may disturb the identified contamination will not re-commence until advised by the Roads and Maritime Environment Manager.</td>
<td>Construction contractor and Roads and Maritime project manager</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| 58  | Contamination of environment from accidental chemical spills, | Fuel will be stored on an impervious surface in an appropriately bunded area and will carry spill kit material. Should fuels, chemicals and liquids be stored they will be:  
- Stored at least 40 metres away from any waterways or | Construction contractor | Construction |
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>machinery fuel and oil leaks</td>
<td>• machinery fuel and oil leaks must be stored in an impervious surface or taken off-site.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Any refuelling of construction vehicles will occur at least 40 metres away from any waterways or drainage lines.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>Contamination of environment from machinery fuel and oil leaks</td>
<td>Machinery will be kept in good working order according to the manufacturer’s specifications and will be checked daily to ensure that no oil, fuel or other liquids are leaking from the machinery.</td>
<td>Construction contractor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Construction</td>
<td></td>
</tr>
</tbody>
</table>

**Air Quality and Climate Change**

<p>| 60  | Dust from construction activities                                     | An air quality management plan will be prepared before any pre-construction or clearing activities, and will provide guidance on the use of appropriate dust suppression methods which will include (but are not limited to): |
|     |                                                                        | • Stabilising of areas with the capacity to cause dust, with water spraying, compaction or progressive revegetation. |
|     |                                                                        | • Covering of stockpile and storage areas.                                                   |
|     |                                                                        | • Covering of all materials transported to and from the construction site.                   |
|     |                                                                        | • Considering speed limits for equipment on unsealed surfaces.                               |
|     |                                                                        | • Locating stockpiles as far away from residences as practically possible.                   |
|     |                                                                        | • Minimising the extent of disturbed areas as far as practicable. This may be achieved by staging the works to minimise the number of disturbed areas at any one time. |
|     |                                                                        | • Rehabilitating disturbed areas as quickly as possible.                                    |
|     |                                                                        | • Suppressing dust on unsealed surfaces, temporary roadways, stockpiles and other exposed areas using | Contractor |        |
|     |                                                                        |                                                                                          | Construction            |        |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>water trucks, hand held hoses, temporary vegetation and other practices.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Modifying or stopping dust generating activities during very windy conditions or when dust can't be controlled.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Operating and maintaining vehicles and equipment in accordance with manufacturer's specifications.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Local residents will be advised of hours of operation and provided with contact details for queries regarding air quality.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>Impacts of flooding on infrastructure</td>
<td>During detailed design, consider:</td>
<td>Design contractor</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sizing drainage system to accommodate the impact of climate change on maximum storm/rainfall level predictions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Whether the increase in frequency or intensity of flood events is likely to require modification to concept design scour protection of bridge piers, piles and other infrastructure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Projected climate change when selecting suitable vegetation for landscaping. Consider vegetation suitable for regular inundation, increased rainfall and evaporation and seasonal droughts where applicable to the area.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>Increased average temperature and heatwave</td>
<td>During detailed design, consider projected temperature extremes when:</td>
<td>Design contractor</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Selecting bridge expansion joints.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Selecting bitumen design.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Selecting suitable vegetation and management plans for the maintenance of landscaped areas.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Developing suitable vegetation and management plans.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>---------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>63</td>
<td>Carbon dioxide concentration in the atmosphere alongside increased temperatures</td>
<td>Review detailed design to take into account potential increase in carbonation levels for the future life of the asset. Ensure that where appropriate, design and construction measures take account of increased carbon dioxide concentrations through enhanced design specification.</td>
<td>Design contractor</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Land use and Property</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>Change in land use</td>
<td>Consultation will be undertaken with property owners impacted by the proposal.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>Property acquisition</td>
<td>Property acquisition will be managed in accordance with the provisions of Road and Maritime's <em>Land Acquisition Information Guide (2013)</em> and the <em>Land Acquisition (Just Terms Compensation) Act 1991</em>.</td>
<td>Roads and Maritime project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>Property access</td>
<td>Property access will be maintained wherever possible. Prior to any unavoidable disruption to access, consultation will be undertaken with the affected property owner.</td>
<td>Contractor</td>
<td>Prior and during construction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Traffic and access</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 67  | Impacts to traffic flow and property access during construction         | A detailed Traffic Management Plan will be prepared in accordance with the Roads and Maritime *Traffic Control at Work Sites Manual (RTA, 2010a)* and *RTA Specification G10 – Control of Traffic*, and will be approved by Roads and Maritime prior to implementation. The Traffic Management Plan will address:  
  • Maintaining access along the Princes Highway during construction.  
  • Maintaining access for local traffic using Dignams Creek.  
  • Maintaining access into the National Parks, other forest | Construction contractor | Pre-construction and construction |
<p>| | | | | |
|     |                                                                        |                                                                                           |                           |                         |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>lands and residential property along the proposal route.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 68  | Impacts to traffic flow and property access during construction         | • Maintaining property access whenever possible. Where changes to access arrangements are necessary, owners and tenants will be advised and consulted with on alternate access arrangements.  
• Providing safe access points to work areas from the adjacent road network, e.g. safety barriers where necessary, temporary speed restrictions etc.  
• Construction traffic will enter/exit the construction zone only in areas designated for this purpose in the Traffic Management Plan.  
• Approval for road occupancy will be obtained for any lane closures or road traffic changes.  
• Procedure for informing the community about upcoming road construction activities. |
|     |                                                                        | Traffic control plans (TCPs) will be prepared for the appropriate stage of works and implemented by suitably qualified personnel. Implementation of TCPs will be inspected as required for the duration of the construction phase in accordance with the Roads and Maritime Traffic Control at Worksites Manual. | Construction contractor                | Pre-construction & construction |

**Socio-economic**

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>69</td>
<td>Commencing construction with adequate notification</td>
<td>Local residents will be notified prior to works commencing and will be kept regularly informed of construction activities during the construction process.</td>
<td>Roads and Maritime</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>70</td>
<td>Complaints</td>
<td>A complaints-handling procedure and register will be included in the CEMP.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>------------</td>
</tr>
<tr>
<td>71</td>
<td>Change of conditions and disruptions</td>
<td>Road users, pedestrians and cyclists will be informed of changed conditions including likely disruptions to access.</td>
<td>Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>72</td>
<td>Changes to property access</td>
<td>Property access will be maintained wherever possible. Prior to any unavoidable disruption to access, consultation will be undertaken with the affected property owner.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>73</td>
<td>Emergency vehicle access</td>
<td>Access will be maintained for emergency vehicles in the vicinity of construction works. Ongoing consultation will be undertaken with emergency services during construction to ensure that potential impacts are identified and appropriately managed.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>74</td>
<td>Interruptions to utility services</td>
<td>Residents will be informed before any interruptions to utility services that may be experienced as a result of utilities relocation.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>75</td>
<td>Commencing construction with adequate notification</td>
<td>Prior to construction starting, Roads and Maritime will notify residents that are located adjacent to the proposal of the forthcoming works.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>76</td>
<td>Property acquisition</td>
<td>Property acquisition will be managed in accordance with the provisions of the Road and Maritime’s <em>Land Acquisition Information Guide (2012)</em> and the <em>Land Acquisition (Just Terms Compensation) Act 1991</em>.</td>
<td>Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>77</td>
<td>Local goods and services</td>
<td>Goods and services will be sourced locally during construction wherever possible.</td>
<td>Contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

**Waste minimisation and management**

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Resource management hierarchy principles are to be followed:</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>78</td>
<td>Generation of</td>
<td></td>
<td>Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td>construction waste</td>
<td>• Avoid unnecessary resource consumption as a priority</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Avoidance is followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery). Disposal is undertaken as a last resort (in accordance with the <em>Waste Avoidance and Resource Recovery Act 2001</em>).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Generation of construction waste</td>
<td>A Waste Management Plan will be completed in accordance with the requirements of the Roads and Maritime's QA Specification G36 – <em>Environmental Protection (Management System)</em>.</td>
<td>Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>80</td>
<td>Generation of construction waste</td>
<td>Housekeeping at the construction site will be addressed regularly. This includes collection and sorting of general waste, recycling and green waste. Waste will be disposed of regularly at a licensed waste facility.</td>
<td>Contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
4.3 Licensing and approvals

The licences and approvals required for the proposal have been listed in Table 7-2.

Table 4-2 Summary of licensing and approval requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>The proposal may temporarily block fish passage during the construction of</td>
<td>Prior to the commencement of works that may block fish passage.</td>
</tr>
<tr>
<td>culverts, temporary creek crossing and the new bridge and accordingly, a</td>
<td></td>
</tr>
<tr>
<td>permit to block fish passage will be required under section 220(1) of the</td>
<td></td>
</tr>
<tr>
<td>FM Act.</td>
<td></td>
</tr>
<tr>
<td>The proposal is defined as both dredging and reclamation works under</td>
<td>Prior to the commencement of works within waterways, this includes</td>
</tr>
<tr>
<td>Section 198A of the FM Act. As such notification and approval is required</td>
<td>construction of the new Dignams Creek Bridge. Notification is required</td>
</tr>
<tr>
<td>by the Minister for NSW Department of Trade and Investment, Regional</td>
<td>28 days prior to works occurring.</td>
</tr>
<tr>
<td>Infrastructure and Service (Department of Primary Industries) under</td>
<td></td>
</tr>
<tr>
<td>section 199 of the FM Act. Consideration must be made of any matters that</td>
<td></td>
</tr>
<tr>
<td>are raised by the Minister within 28 days.</td>
<td></td>
</tr>
<tr>
<td>If excavation is required in areas of archaeological potential for the</td>
<td>Prior to the commencement of construction works.</td>
</tr>
<tr>
<td>site of the second public school, a section 140 application will need to</td>
<td></td>
</tr>
<tr>
<td>be made to the NSW Heritage Council in order to obtain an excavation</td>
<td></td>
</tr>
<tr>
<td>permit (under the Heritage Act).</td>
<td></td>
</tr>
<tr>
<td>The existing Dignams Creek Bridge would be bypassed and would cease to</td>
<td>The bridge would need to be delisted from the s.170 register in</td>
</tr>
<tr>
<td>be a Roads and Maritime asset.</td>
<td>accordance with the Heritage Act 1977. This would include giving the</td>
</tr>
<tr>
<td></td>
<td>Heritage Council not less than 14 days written notice of the delisting.</td>
</tr>
</tbody>
</table>

Upgrade of the Princes Highway, Dignams Creek
Submissions report
5 References


Australian Koala Foundation (AKF) 2012. *Australian Koala Foundation’s National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat*. Prepared by Dave Mitchell 04/09/2012.


Department of Environment, Climate Change and Water (DECCW), 2011, *Road Noise Policy*.

Department of Sustainability, Environment, Population and Communities (DSEWPaC) now the Department of Environment (DoE) 2012. *Interim Koala referral advice for proponents*. June 2012.

Environmental and Cultural Services, 2013. *Assessment of the potential impacts of the proposed Princes Highway upgrade at Dignams Creek, NSW on the Aboriginal cultural landscape*.

Fairfull & Witheridge, 2003. *Why Do Fish need to Cross the Road: Fish Passage Requirements for Waterway Crossings*. NSW DPI (Fisheries).


NSW DPI (Fisheries), 2004. *Policy and Guidelines for Fish Friendly Waterway Crossings*.


NGH Environmental (2010). *Terrestrial and aquatic Ecological habitat Investigation Dignams Creek Upgrade, Princes Highway*. Prepared for the RTA.


Roads and Traffic Authority (RTA), 2009. *Use of fauna passage structures on RTA roads*.


Roads and Traffic Authority (RTA) 2011a, *Stockpile Site Management Guideline*.


*QA Specification G36 – Environmental Protection (Management System).*

*QA Specification G40 – Clearing and Grubbing.*


Appendix A: Aboriginal cultural heritage assessment
Appendix B: Additional Koala assessment